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BROWN UNIVERSITY

2013

ANNUAL REPORT

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and mainstream political activities? Voting and **protest**? **Pacifism** *and violence? How can we build* **global understanding** *and infor*

BUILDING ON DISTINCTION

INTEGRATIVE SCHOLARSHIP AT BROWN

A LETTER FROM THE PRESIDENT

True distinction is achieved not by having all the answers, but by having the vision and courage to ask bold questions.

I am fortunate to serve as the nineteenth president of the seventh-oldest university in the United States on the occasion of its 250th anniversary. This is a moment for celebrating both Brown's heritage and its culture of continuous renewal and reinvention.

Our historic Van Wickle Gates open just three times each year. Our first-year students walk through them in September, at Convocation – beginning the transformative adventure that is Brown. Our transfer students enter at mid-year. And our graduates walk in the opposite direction at Commencement – carrying the best of Brown out into the world.

Today's Brown is a very different place than it was 250 years ago, when our first President, James Manning, welcomed one fourteen-year-old student. It is very different than it was 150 years ago, when a more robust student body – still of one gender and one race – convened here in Providence. We are different, even, than we were 50 years ago – larger, more international, and engaged in the dynamic process of building continuously on layers of distinguished scholarship and aspiration.

Our community of scholars speaks in many voices and many languages and represents many points of view. We ask ourselves the critical questions of our time – daring to work toward new therapies for devastating diseases, to drive toward candid dialogue that will advance informed discourse and global understanding, and to explore the human experience and the natural world,

How does a **dynamic research** *enterprise enrich* **undergraduate education***? How does a creative, rigorous undergraduate experience inform* **great research***? What skills are necessary for* **full engagement** *in the* **21st century** *world? Shall we* **celebrate** *life's great* **opportunities** *together? Where are the new*

from the cellular level to the far reaches of the universe. Most importantly, we ask and answer those thrilling, daunting, essential questions *together*.

Brown's greatest distinguishing feature is the integrative quality of our scholarship and our community. Born of a Baptist rejection of hierarchy, in a state forged by people who struck out from the Massachusetts Bay Colony with a commitment to ideals of religious freedom, we benefit from an ethos of inclusiveness and collaboration. We offer a community where people of diverse skills, interests, and perspectives are encouraged to come together and create something extraordinary.

In 2013, our community engaged in a year-long, meaningful dialogue about the future of Brown. Together, we developed *Building on Distinction* – a plan that will capitalize on the intense capacity-building of the past decade to create an even better Brown – a university that continues to invest in intellectual growth, with particular focus on seven areas of integrative scholarship in which we have particular strength.

Brown University is a place of creative scholarship, intellectual curiosity, and profound engagement with and concern for the world. I am proud to present a glimpse of our greatness – and a promise of greater things to come.

Christina H. Paxson

How can we address **global issues** *of economic uncertainty, security,* **environmental degradation**, *and poverty? How shall we advance a calm, robust, and* **truthful dialogue** *about issues of* **domination and justice**? *What lessons does the* **19th century sugar trade** *carry to us in the 21st century? How can we develop* **intellectual understanding** *and visceral experience of the horror and economic* **injustice of slavery**

INTRODUCTION

In 2014, we celebrate Brown University's 250th anniversary.

As we mark this milestone, we contemplate our heritage and envision a future that will unfold in a world of rapid technological growth, globalization, explosive expansion of knowledge, and stark paradox: instant communication amid deep cultural and sociopolitical division; increasing wealth amid polarizing disparity; economic growth amid urgent need for active environmental stewardship.

Brown joins universities worldwide in considering seminal questions:

What is the role of the 21st century university? Where is our place in tomorrow's world? How can our unique strengths be channeled to address local, national, and global opportunities and challenges?

Brown University was founded by free thinkers – people who challenged the social norms of colonial America by establishing a great university that would welcome people of all beliefs. More than two centuries later, we continue to be a center of diversity, imagination, and innovation.

Brown's open curriculum and our "university-college" model – that is, a research university that is deeply committed to excellence in undergraduate education – attract entrepreneurial students who have the vision and courage to carve their own paths in the world, as well as top faculty and graduate students who draw inspiration from the rewards of teaching talented young people and from the energy of our dynamic academic community.

We are continuously enriched by values and practices of interdisciplinary teaching and learning across disciplines, among faculty and students, and among campus- and community-based colleagues.

We build our future on integrative scholarship in a broad array of fields, including the arts, engineering, computer science, humanities, medicine, the life sciences, and the social sciences.

Fueled by aspiration, achievement, and transformative philanthropic investment, Brown's physical and intellectual infrastructure has grown dramatically in recent years. Our universe of possibility has expanded with the advent of new facilities, growth in strategic academic areas (including 100 new faculty positions), need-blind admissions, and more. We now ask ourselves: *What's next?*

In 2013, our University community engaged in a process of intensive introspection and dialogue about *what Brown is* and *what it should become*. Those conversations culminated in *Building on Distinction* – a new strategic plan to capitalize on our greatest strengths and on significant growth in capacity developed over the past decade.

Building on Distinction carries us forward.

Our 2013 Annual Report offers insight into the seven themes of integrative scholarship that inform *Building on Distinction*, while introducing some of the members of our community who will shape our future.

Brown University's Department of Theatre Arts and Performance Studies and Sock and Buskin - the nation's oldest student-run university theater company - presented Tennessee Williams' A Streetcar Named Desire in Fall 2013.

How shall we examine and express and share the poignant, paradoxical, whimsical, tragic, bewildering, surprising, transcendent, common and unique experience of being human?

CULTIVATING CREATIVE EXPRESSION

Creativity is integral to life at Brown.

It's in the way our students craft unique, individualized learning experiences of rigor and passion. It's in the web of interdisciplinary partnerships that enrich our community and form the foundation of our scholarship, and in the active ferment of new ideas that happens when people of vision have the freedom to think together. It's in the way artists and scientists and engineers communicate and collaborate in our labs and studios and classrooms and common spaces. It's in the way undergraduates and graduate students and faculty members hypothesize, experiment, and publish together.

Our Creative Mind Initiative brings together faculty, students, and other members of the University community in courses, programs, and conversations designed to explore the roots of creative thinking and dissolve disciplinary boundaries in search of new modes of teaching and learning. Artists, writers, scientists, MBA students, and people from an array of other fields convene to explore approaches to communicating science through social media, develop studio projects, foster cross-disciplinary work in the arts and STEM fields, and more. The initiative sponsors A Better World by Design, an annual three-day conference at Brown and the nearby Rhode Island School of Design (RISD) that actively cultivates a global community of socially-conscious and passionate innovators.

Our Creative Arts Council – a student-faculty collaboration – facilitates a common vision for the arts through cross-disciplinary communication and public activities, largely at the Granoff Center for the Creative Arts.

Creative expression enriches individual lives and sustains civil societies.

The creative arts at Brown are given voice by the extraordinary writers in our Literary Arts MFA program, one of the most competitive in the United States, and by the playwrights, actors, and directors of our Brown/Trinity MFA Program, which weds our theater program to the experience offered by the conservatory of Providence's nationally respected Trinity Repertory Company. The University also offers a rich undergraduate artistic experience in a wide range of genres and disciplines, and students who are drawn to sample the best of both Brown and RISD are invited to complete an innovative five-year, dual-degree program.

Our journey as humans is defined by how we think, how we speak, how we act, and how we experience the world and the people who inhabit it with us. The ability to generate original ideas, express new insights, and share experiences, in an environment that encourages free thinking and requires intellectual integrity, is critical to Brown's future and the future of the broader society to which the University contributes.

Across the curriculum, Brown tightly integrates the creative arts into the liberal arts. We aspire to foster an environment in which artists working at the peak of their powers learn from and inform scholars in other disciplines – contributing to our shared mission of exploring human values, communicating new ideas, challenging societies, and convening people of diverse beliefs, cultures, and interests.

Where does the **writing** *take you? How does the* **written and spoken word** *become a record and reflection of our* **human experience**? *What is the* **power of art**? *How does theater identify, diagnose, and* **explore social issues** *and sustain communities? What is the* **common language** *of scientists and poets? How do we* **capture and express** *the essence of human experience through* **art**? *How do our* **shared rituals** *sustain us, link us, and enric*

THEATER OF LIFE

For Professor of Theatre Arts and Performance Studies Erik Ehn, theater is immersion, not observation.

"Everything that happens is theater," says Ehn, who also serves as head of playwriting at Brown. "Tahrir Square is theater. The Occupy Movement is theater. Every social occasion – where we sit, how we build a space for human interaction, rituals like Thanksgiving, which are parades of customs and symbols – is theater. It spans the human experience, and it speaks across the humanities."

Ehn takes his own practice to downtown Providence, where his Tenderloin Opera Company brings opportunity for creative expression to homeless people, and to Brown's Hillel Center, where he will participate in a project exploring themes around genocide. He is collaborating with colleagues at the Watson Institute for International Studies on a program to mark the twentieth anniversary of the Rwandan genocide.

The intrinsic properties of theater – described by Ehn as "the discipline of ambient imminence, organized in time and space" – are powerfully exploited in a liberal arts environment like Brown, he says. Easy access to a broad, interdisciplinary array of academic and social influences enriches the work of playwrights and actors, and theater – viewed not as performance, but as an intellectual and emotional vehicle for organizing and exploring thought and experience – is a visceral tool for analysis.

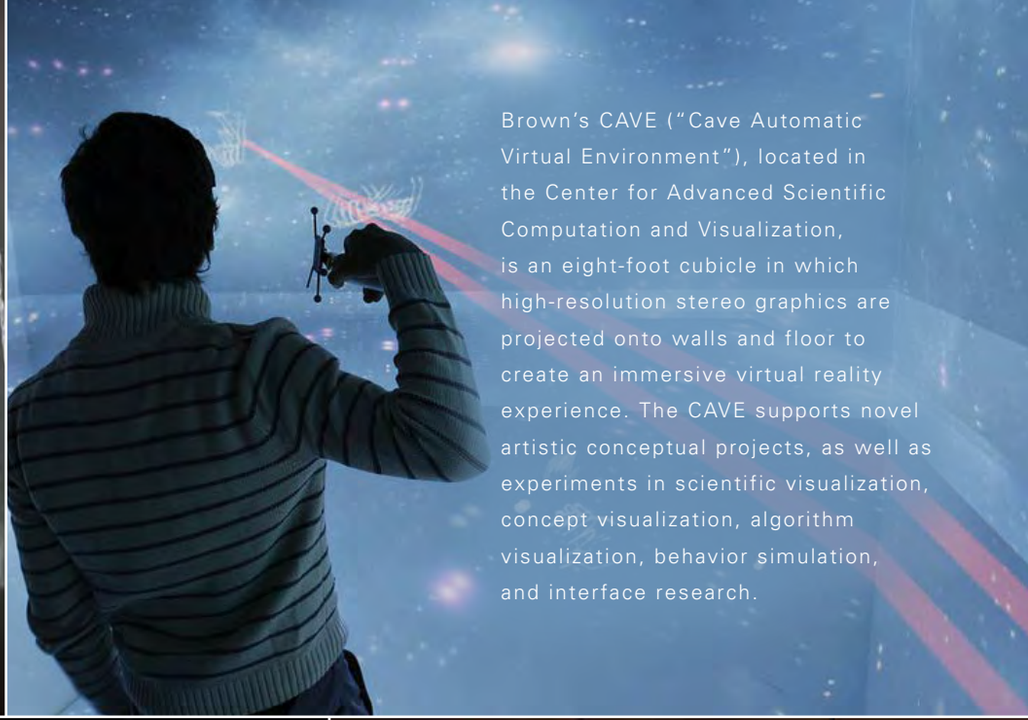
Theater at Brown, on both the undergraduate and graduate levels, offers students hands-on experience in writing, acting, directing, set design, and all of the other elements of production. Under the auspices of the Brown/Trinity MFA Program, they work in close collaboration with the resident artists of Trinity Repertory Company – learning technical skills and exploring content and ideas through several lenses.

"Theater is rich in data and builds knowledge," says Ehn. "It's a way of identifying conflicts, initiating dialogue, and sustaining communities. To survive and thrive, it needs to be about the world, and for that reason it's best taught in a liberal arts context. At Brown, theater shuttles restlessly throughout the campus and throughout the membranes around campus. Our students are part of an active gathering of images and ideas that occurs across disciplines."

"The creative impulse is part of everyone's makeup, and Brown offers a welcoming place for exercising it. Everything from the flexibility of the curriculum to the sculpture and public art on campus says *this is a place that is open to the arts.* It's symbolic that the Granoff Center for the Creative Arts is in the center of campus, with artists working next door to the scientists at Sidney Frank Hall."

– CD Wright, *Israel J. Kapstein Professor of English, Professor of Literary Arts, Poet*

ON THE CATWALK AT BROWN'S LEEDS THEATRE (left to right): Professor Erik Ehn with Brown/Trinity MFA Program students Casey Llewellyn MFA '14, and Laura Colella MFA '14



Brown's CAVE ("Cave Automatic Virtual Environment"), located in the Center for Advanced Scientific Computation and Visualization, is an eight-foot cubicle in which high-resolution stereo graphics are projected onto walls and floor to create an immersive virtual reality experience. The CAVE supports novel artistic conceptual projects, as well as experiments in scientific visualization, concept visualization, algorithm visualization, behavior simulation, and interface research.

Brown hosts many artists working in an eclectic mix of genres, media, and disciplines, from dance to theater to music to the richness of the written and spoken word. Dance at Brown ranges from formal courses in technique, composition, and history to the student-run Fusion Dance Company, Brown Lion Dance, and much more.

BREAKFAST WITH LAURA

"It's a smile from beginning to end." That's how writer/director/producer Paul Thomas Anderson (*Magnolia, There Will Be Blood, The Master*) describes the independent film *Breakfast with Curtis,* written and directed by Laura Colella MFA '14.

An Independent Spirit award winner and official selection of the Los Angeles and Vancouver International film festivals, *Breakfast With Curtis* is an insouciant glimpse of the summer adventures of a boy (Curtis) and his neighbors, a multigenerational group of artists.

"Some common themes in my work deal with the strength of community, and also a feeling of *carpe diem*," Colella says. "Aesthetically, I'm interested in more complex and fresh alternatives to purely plot-driven and conflict-based structures."

Shot in Providence, and featuring Colella and her neighbors, *Breakfast with Curtis* has traveled substantially (often with Colella) over the past couple of years – first through the international festival circuit, with subsequent theatrical runs in New York, Los Angeles, Chicago, and other cities. (Anderson, whom Colella first met when she was a Sundance Institute Fellow more than a decade ago, hosted a screening and Q & A for the film in Los Angeles.) In January 2014, she returned to Brown to mount *Magic Hour*, her final play as a candidate for the Writing for Performance MFA program, for the University's WRITING IS LIVE festival.

Colella, who was a child actor at Trinity Repertory Company in Providence, has been making films for more than two decades, since her undergraduate days at Harvard. She has been teaching in the Film/Animation/Video program at the Rhode Island School of Design (RISD) since 1996. A few years ago, she felt the need to focus on her writing.

"I'd been driving my own practice for a long time, and I was feeling like I wanted to have new influences, new approaches," she remembers. "I knew Erik was experimental and that interested me."

"There's an immediacy in theater, and also a luxuriousness to the rehearsal process, that's completely unlike film work," she says. "I hadn't been writing plays, and the program re-opened that world to me."

the **play** *really the thing? How do* **words and movement** *come together to* **create meaning***? What does it mean to be a* **writer** *in practice? What are the* **lessons of genre***? How can art create* **shared moments** *of heightened experience that* **bring people together***? Are we* **audience***? Are we* **performer***? Are we* **both***? How can creative expression help us* **heal our pain***, honor our heritage,* **imagine our future**

What is the value of **making art** *in a liberal arts environment? How does* **creativity infuse the arts**, *sciences, and humanities? How does art create* **space to ponder**, *celebrate, and parse the depth and breadth of* **human experience**? *From what do we fashion* **community**? *How shall we seize the* **unique opportunity** *of this day? What is the* **power of people** *gathered together, wrapped in the* **common experience** *of sharing stories*

POETRY OF THE BODY

Casey Llewellyn MFA '14 discovered dance in high school. She followed her muse to Marlboro College, then on to study with choreographer David Neumann at Columbia University.

"I found a new way into theater, a movement-based way of thinking, a series of actions that create a character," she remembers. "I discovered theater in which the poetry is in the body and in the interaction with the audience."

"There is something magical and powerful about the gathering of people together, surrounded by each other and the story and the ideas. My work is about trying to make experiences that are liberating, that help people go to a different place with each other," Llewellyn says. "I believe in theater that's spiritual and political, theater in which text is not the most important thing. I resist the idea that a play is complete on the page."

It's an unusual point of view for a playwright. But Theatre Arts at Brown is about creativity in the context of communal experiences.

It was at a week-long retreat, led by Erik Ehn, that Llewellyn set her sights on Brown. "Erik was so inspiring to me, and being here has also inspired me," she says. "At Brown, I've learned what it really is to be a writer in a practice."

After receiving her MFA in writing and performance arts, Llewellyn is headed for New York, where she has been commissioned to write a modern adaptation of *Our Town* – continuing to explore the meaning of community on the stage and beyond.

RITES AND REASON

Established in 1970, Brown's Rites and Reason Theatre – one of the oldest continuously producing Black theaters in the United States – is committed to giving voice to diverse cultural expression and serving as an open forum for undergraduate, graduate, and professional playwrights. From the beginning, the theater's founder, the late playwright and Professor of English George Houston Bass, nurtured Rites and Reason's growth as a Research-to-Performance Method (RPM) theater in which scholars, writers, and people from the community collaborate to develop new works. Some of those works are presented in Rites and Reason's annual season of new plays, which includes the biannual week-long Black Lavender Experience and other initiatives. Rites and Reason Theatre is part of Brown's Department of Africana Studies.

COUNTER-CLOCKWISE, from top left: Janett (Becky) Bass '13; Sylvia Ann Soares, Randy Biagas-Hill '17, Pamela Lambert, Malana Krongelb '17, Sienna Vann '17, Ronnie Young, Lon E. Plynton '79, Rhea Harrington, Nako Adodoadji, Jason Quinn, Janett (Becky) Bass, '13; and Pamela Lambert

Professor Michael Littman and Associate Professor Chad Jenkins at home with a robotic collaborator in Brown's Humanity-Centered Robotics Initiative at the University's Thomas J. Watson Center for Information Technology.

How are engineers, scientists, physicians, and others collaborating to imagine and discover new ways of channeling the potential of science and technology to influence how—and how well—we live?

USING SCIENCE AND TECHNOLOGY TO IMPROVE LIVES

Scientific and technological boundaries are dissolving, as new applications and common tools are used to solve diverse problems. Brown's scientists, engineers, and computer scientists feel right at home.

The role of technology in our lives is at once ordinary and extraordinary. From smartphones to robotics to continuous advances in medical technology, it is ubiquitous. Yet, there is always an elegant, astounding new breakthrough that has the power to change the way we think, communicate, interact with the world, and survive illness or injury. The potential is limitless.

Our great opportunity is to continue to mine the possibilities of science and technology in the context of the full richness of the human experience – with an integrative ethos that delivers breadth of perspective and acuity of vision. The question, increasingly, is not *can we do it?* but *what shall we do with it?* The full value of new technology ultimately hinges on alignment with societal need.

At Brown, scientists and engineers have been working together, across disciplinary lines and with a shared expansiveness of perspective and approach, for years.

Engineers and biologists study the flight patterns of bats. Bioengineers are creating new cell models that can be used to study everything from disease to organ function. Neuroscientists, psychiatrists, and engineers collaborate on creating new knowledge and new therapies in brain science. Our computer scientists are working on cracking open the genome, on understanding cancer, on probing the potential and role of robotics in society, and more. We work small – at the forefront of discovery in nanoscience, for instance – and we work large, creating solar-powered dwelling places and investigating the geological composition of the universe.

Over the past decade, Brown has made significant strategic investments in science and technology. Our laboratories extend across Providence's College Hill and beyond. Plans are now underway to expand the facilities for our School of Engineering.

This work is critical to human progress, and we continue to build on Brown's place at the vanguard of innovation in science and technology to address the needs and concerns of humanity on the local, national, and global levels.

How can we channel the **power of the sun** *to create* **living environments** *in harmony with the* **natural world***? What happens when* **students** *from many disparate disciplines* **come together** *to do something completely* **new***? Will* **robots** *help us* **recover** *from addiction? Take care of our families? Build new* **economic capacity***? How will robots shape the* **future of human life***? How can we drive the* **democratization of technology** *in th*

I, ROBOT

On a late afternoon in the waning days of the fall semester, the lobby of Brown's Thomas J. Watson, Sr. Center for Information Technology (CIT) pulses with energy. Students collaborate on final projects, engage in animated discussion, and huddle over laptops.

Two students are hanging out with Chad Jenkins, Associate Professor of Computer Science. Well, kind of. Three-dimensional Jenkins is down the hall in the robotics lab. His robot, *Suitable Beam* – featuring Jenkins' real-time digital self on a flat-screen monitor – is in the lobby.

Jenkins predicts that, within a decade and a half, robots will not be rarities in American homes, but rather common and even essential elements of daily life. In collaboration with Professor of Computer Science Michael Littman and Professor of Cognitive Linguistic and Psychological Sciences Bertram Malle, and supported by a small army of faculty collaborators, undergraduates, and graduate students who are part of Brown's Humanity-Centered Robotics Initiative (HCRI), he is preparing for that day.

"We're building advanced technology to meet human needs," says Jenkins. "Brown has world-class expertise in computer science, as well as many other assets – including some of the world's best vision researchers. We want to leverage all that to build robots that interact with people, for the benefit of people."

Suitable Beam travels back to the lab, gliding through doors held open – the old-fashioned, human way – by Littman. Jenkins, seated with his laptop at a conference table, pilots *Suitable Beam* across the room and parks it next to *Rethink Robotics Baxter*, a burly, red, human-sized canister-like robot with arms that hug. Across the room, *Willow Garage PR2* – a white robot, straight out of central casting, standing about five-and-a-half-feet tall – faces a bookcase laden with non-perishable food items. *PR2* is learning how to raid the refrigerator.

Sleek, plastic-and-aluminum-framed *Suitable Beam* joined Jenkins on-stage at a TEDx talk last year – demonstrating the ways in which robotics allows a colleague in Palo Alto, California to partner with collaborators 3,000 miles away, despite a stroke that has left him without speech or movement. Silicon Valley entrepreneur Henry Evans controls *Suitable Beam* with his eyes, using it to generate digital speech and travel across a room. He also remotely pilots drones that are operated with open-source software in Jenkins' lab.

The HCRI team is passionate about the potential of robotics and other technology to enrich human life. They've enlisted geriatric medicine experts to help them conceptualize robotic eldercare enhancements. They're thinking about developing a new, interactive addiction recovery tool featuring a tiny, tabletop robot that evokes the benign whimsy of a marshmallow Peep. They envision robots that take medical histories, care for and educate children, bolster the global workforce, and assume a wide range of other roles.

For Littman, the vision extends to the advent of a "smart home for independent living" – in which lights, alarm clocks, appliances, and other computerized household technologies can be custom-programmed by users, in a democratization of technology that he views as the next literacy revolution.

"Look what happened when everyone got access to writing," he says. "We got the novel, among other things. When technology is truly an extension of the human will, who knows what we'll come up with?"

CLOCKWISE (from bottom left): John Raiti, robotics software and web developer, makes an appearance with the help of *Suitable Beam*; Chad Jenkins and Michael Littman, left to right, spend some quality time with PR2; and Baxter says hello.

HERE COMES THE SUN

If all goes according to plan, there will one day be a small village of igloo-like solar houses glowing white on a 15th century French estate – modeling a new way of living in stewardship of the earth.

The structures at Domaine de Boisbuchet, an international center for experimental design, will replicate *Techstyle Haus* – a prototype designed and built by the Brown/RISD/Erfurt Solar Decathlon Team, an interdisciplinary group of students who will compete in the Solar Decathlon Europe 2014 competition at Versailles in July.

"We're not trying to mass-produce, but we also didn't want it to be a 'one and done' project, so we've agreed to build eight more houses, each of which will house about four students at Domaine de Boisbuchet," explains decathlon team member Matthew Breuer '14.

The University of Applied Sciences of Erfurt, Germany joins Brown and the Rhode Island School of Design on the team, which is one of 20 from 16 countries chosen to compete. The Providence element of the enterprise is led by RISD architecture professor Jonathan Knowles, with Brown Assistant Professor of Physics Derek Stein serving as faculty liaison from Brown.

Designed and built by RISD architecture students, Brown engineering students, and an integrated team of students from other disciplines, *Techstyle Haus* is a blend of style and substance. Unlike most solar structures, it will have large windows. It will have an interior designed by RISD textile students. Its custom exterior will be made of sheerfill, the material used to weatherproof stadium domes, over layers of waterproof and fireproof insulation, including aerogel – a kind of insulation used in spaceships. Because the whole confection is light enough to be carried away by a robust gust of wind, and the competition precludes drilling holes for tent lines, all mechanical systems are stored under the house for ballast.

"It has been amazing to work on something so big, with so many moving parts," says Breuer, noting that one of the most daunting tasks was raising the $750,000 in corporate support needed to support the project. "We've learned how to raise capital, in addition to organizational theory and technical content knowledge."

"I'm of the opinion that sustainability will be the biggest challenge of the 21st century, and I think the diversity of the team – students from urban studies, economics, environmental studies, engineering, arts, film, animation, industrial design, all kinds of fields – speaks to the wide acceptance of sustainability as a core value, " says Breuer. "The fact that this project was open to everyone, and that we built it from the ground up, with students of all concentrations and from freshmen to seniors, hopefully sends a clear message that everyone can make a contribution."

BUILDING THE FUTURE OF ENGINEERING AT BROWN

Founded in 1847, Brown's engineering program is the oldest in the Ivy League. Establishment of the School of Engineering in 2010, combined with a major philanthropic initiative launched in 2013, will ensure that engineering at Brown will build on that heritage by continuously renewing itself as a dynamic community of creative, integrative scholars.

With $44 million in lead gifts, the University last year announced a new campaign to support the future growth of the School of Engineering – including improvement and expansion of its facilities. Theresia Gouw '90, Charles H. Giancarlo '79, and Dianne G. Giancarlo contributed gifts totaling $35 million. Anonymous donors contributed an additional $9 million.

Gouw made her gift in honor of Barrett Hazeltine, renowned professor of engineering emeritus, who continues to teach popular classes on engineering and entrepreneurship that have inspired a generation of Brunonians. "Brown is such a special place that has created wonderful opportunities for so many, including for me," she said. "I am delighted to join with others to support the school's growth and continued commitment to cultivating creative thinkers and leaders. I am particularly pleased to honor Barrett Hazeltine, who has made an enduring difference in the lives of so many students he has taught, mentored, and inspired."

"Brown's approach to engineering prepares innovative, broadly-educated leaders who are equipped to address global challenges in areas ranging from energy and the environment to economic development and health care," said Charles Giancarlo. "Dianne and I are so pleased to be able to support the continued development of Brown's School of Engineering and the education of future inspired engineers and entrepreneurs."

The campaign will fund the following facilities and programs:

- **construction of new teaching and research facilities adjacent to existing buildings**
- **creation of a Center for Entrepreneurial Innovation**
- **addition of 15 new faculty (bringing total number of faculty to 60)**
- **development of innovative undergraduate and graduate educational programs**
- **renovation of current classroom and laboratory space**

The planned growth will enable the School of Engineering to capitalize on its prominence in biomedical engineering, nanotechnology, environmental engineering, computer vision, and other emerging fields and allow its faculty and students to continue to build on synergies with colleagues in biology, chemistry, physics, geological sciences, computer science, mathematics, and other departments. In recognition and support of the integrative quality of engineering at Brown, all new facilities will continue to be located in the heart of the University's historic East Side campus – ensuring that vital cross-disciplinary collaborations will continue to thrive.

technology an extension of the **human will**? How can robotics help people **communicate** after stroke? What does a stylish, efficient, portable **solar hous**
ok like? How can technology **change the lives** of people with depression and other **conditions of the mind**? What role d**oes inflammation play i**
eveloping risk factors for mental illness? How can we help veterans with post-traumatic stress disorder and other challenges

"Brown is positioned to offer the best liberal arts education in engineering in the world. We educate engineers who are poised to be 21st century leaders in their field, bringing a broad understanding of human society, as well as excellent technical skills, to their work and to the profession."

– Lawrence Larson, *Dean, School of Engineering*

WIRED

The brain is a dynamic landscape, shaped by the firing of neurons, hormonal activity, aging, psychological and physical trauma, and the cumulative influence of cognitive and emotional life experience. While psychotherapy and pharmaceutical advances have transformed the lives of many people who suffer from affective disorders and other conditions, there are many patients whose symptoms are not relieved by drugs or talk therapy.

Brown research teams are working to help those patients through transcranial magnetic and transcranial direct current stimulation – noninvasive technologies that use mild electrical current to stimulate neurons in specific parts of the brain.

At the Center for Excellence for Neurorestoration and Neurotechnology (CfNN) at the Providence VA Medical Center, Chair of the Department of Psychiatry and Human Behavior and Mary E. Zucker Professor of Psychiatry and Human Behavior Steven Rasmussen leads a team evaluating the potential of neuromodulation – that is, promising new electrical and magnetic brain stimulation technologies – to treat military veterans coping with an array of conditions, including chronic pain, depression, and post-traumatic stress disorder. Rasmussen is one of more than 30 researchers – based at Brown-affiliated Butler Hospital and Rhode Island Hospital, as well as Massachusetts General Hospital – who are working at the CfNN, which is funded by a $4.5 million, five-year grant from the VA.

"We have a NARSAD (National Alliance for Research on Schizophrenia and Depression) grant to study the use of new direct current stimulation to affect extinction of fear in patients with post-traumatic stress disorder (PTSD), and we're also looking at how we can influence the sensory valance of pain," says Rasmussen, explaining that some of the same brain circuitry that transmits pain signals is involved in PTSD. "We're exploring ways in

With the help of a volunteer, Dr. Linda Carpenter demonstrates the technology used for Transcranial Magnetic Stimulation (TMS) at the Warren Alpert Medical School-affiliated Butler Hospital.

which shared elements of that circuitry can affect both fear and pain responses."

At Butler Hospital, Professor of Psychiatry and Human Behavior Linda Carpenter is working to understand the scientific underpinnings of depression while offering similar technology-based treatments.

As a researcher and patient advocate, Carpenter has played a role in shaping insurance coverage policies for treatment of depression with transcranial magnetic stimulation. Since 2009, Butler Hospital's outpatient clinic has helped hundreds of patients who did not get relief from standard therapies. "Through the use of electromagnetic fields, we are able to precisely stimulate the prefrontal cortex with a series of rapid pulses," she says. "We've seen some really amazing outcomes in patients who were not previously getting better."

The newest device introduced in Carpenter's research clinic is the *Starstim* by NE Neuroelectrics – a cap, worn by patients, that facilitates simultaneous transcranial direct stimulation and electroencephalogram (EEG), which she hopes may someday make it possible to choose the ideal brain stimulation treatment for each individual patient, and to project the expected outcomes for a series of treatments in real-time. Future advances, Carpenter says, may include techniques to combine brain stimulation from devices like these with other types of inputs to the brain at the same time. Emerging evidence shows that neuromodulation can improve learning and enhance other cognitive function.

Carpenter is also excited about recent trends in the development of safe and portable "take-home" devices using technology that will eventually allow patients to self-administer treatments outside of the hospital. "It seems that each new class of promising new neuromodulation technology we learn about is less invasive and more portable than the last," she explains.

Brown's historic College Green is a crossroads of the University and a historic and contemporary setting for performance, protest, and other dynamic forms of political and social discourse.

How shall we harness the power of the Humanities to parse the political, social, and philosophical constructs that influence our lives, inform our discourse, bind us together, and drive us apart?

EXPLORING HUMAN EXPERIENCE

We envision Brown as a place of innovation, service, and thoughtful consideration of the lessons of the past and the possibilities of the future – a place informed and enriched by the Humanities.

Every academic endeavor at Brown – from our work in brain science to environmental change to social justice to healing disease and improving health – is rooted in a University-wide imperative to serve humanity through knowledge. Our work in the Humanities – supporting consideration and analysis of the meaning and texture of the human experience through literature, history, the social sciences, and other fields – is a core element of our mission. We intend to continue to support and advance the Humanities in our quest to promote creative critical thinking and informed public dialogue about the most challenging questions facing the world today.

Our Cogut Center for the Humanities, which celebrated its tenth anniversary in 2013, was founded to support collaborative research among scholars working in the Humanities. Crossing boundaries of discipline, culture, nationality, and even time – embracing colleagues working in the ancient, medieval, early modern, and contemporary worlds – the Center seeks to pursue the seminal question of *what it means to be human*. Major initiatives underway at the Cogut Center focus on a range of topics, including religion and internationalism; humanities and science; humanities in diverse global populations, especially among marginalized people; and humanities and medicine. International Cogut projects are underway in Berlin, Nanjing, Havana, and Milan.

In 2010, Brown launched its Humanities Initiative – a major, long-term investment in the Humanities – under the auspices of the Cogut Center. The Initiative defines six faculty positions at the distinguished chair level and disburses programming funds for collaborative research throughout the University. Projects funded in 2013 included: *Medicine and Social Movements*, convening scholars in medicine, anthropology, Africana studies, Middle East studies, political philosophy, and history; *Design and the Civic Space*, linking collaborators from theater arts and performance studies, visual arts, history of art and architecture, and our Swearer Center for Public Service; and the *JCB/Brown British Atlantic Seminar*, which embraced scholars in history, English, history of art and architecture, Renaissance and early modern studies, and curators of the John Carter Brown Library.

The expanded scope of scholarship at Brown over the last decade – encompassing the arrival of 100 new faculty members – has included a robust investment in the Humanities. Among the newest members of our faculty are Amanda Anderson, Bonnie Honig, and David Wills – all of whom are engaged in consideration of core questions about civic discourse and the human experience.

How do race, gender, and other **identity markers** *position us in relation to* **common notions** *of the* **common good**? *What are the connection* *etween* **dissident** *and* **mainstream** *political activities?* **Voting** *and protest?* **Pacifism** *and violence? What are the future possibilities for democrat* **rms of life** *through and alongside* **state-centered institutions**? *What can literature tell us about* **ethical and political life** *in the modern era*

ow does **literature** *allow us access to* **philosophical** *and* **existential questions** *which more straightforward philosophical or academic writin*
ften fails to **capture**? *How can the humanities help us to* **reflect** *upon the* **larger mission** *of the university as well as the vital questions*
alue *and* **method** *that arise in all academic endeavors? How are we* **defining humanity** *in an age in which* **technology** *is changing the*

CONTEXT AND CONVERSATION

Amanda Anderson, the Andrew W. Mellon Professor of Humanities and English, feels the sway of the zeitgeist, and is determined to ensure that it continues to be informed by the Humanities.

"There's a crescendo of discussion right now about the role of the Humanities in higher education, and those of us who are strongly committed to this essential area of scholarship need to protect and enhance it," says Anderson, who joined the faculty in 2012. "That's happening at Brown. There's a distinctive culture here, in the independence and quality of the undergraduate experience and in the work underway at the Cogut Center, as well as across many departments and other centers."

The Humanities, Anderson believes, play a vital role in our ability to translate, understand, and influence all facets of human experience, also enhancing our understanding of other academic disciplines, including scientific practice. "We must acknowledge work in the Humanities as a hugely important force for providing context for our thinking and for enabling us to ask critical questions and listen and talk through our differences. The Humanities foster practices that promote a vibrant, democratic, pluralistic society."

A scholar of 19th and 20th century literature and culture, Anderson has long been interested in the relationship between literature and character – specifically, the way Victorian character, as reflected in the literature of the period, became a repository of value in the context of changing constructs, such as the decline of religion as a force in nineteenth century culture. The theme has informed her two most recent books, *The Powers of Distance* and *The Way We Argue Now*.

Anderson has found the Humanities teaching environment at Brown inspiring. "Engaged dialogue with students is one of the most important elements of pedagogy, and teaching here is very stimulating," Anderson says. "There is a notable energy of preparation at Brown, a degree of engagement and commitment."

THINKERS NEEDED

"Students are more and more challenged by the combination of massive amounts of information and generally less training in what to do with it," says Professor of French Studies David Wills. "The broad questions are *what is information?* and *what is knowledge?"*

Enter the Humanities, says Wills.

An expert in 20th century French literature, Wills developed a particular interest in the work of the French philosopher Jacques Derrida in the 1990s. He is working with colleagues to translate Derrida's forty-year canon of seminars into English.

"The simple strength of Derrida's intellectual approach, and the extent to which his ideas shake things up, combine to make one think differently," says Wills. "Certain aspects of his work – his writings on political questions and architecture, for instance – lead one into other fields."

Wills' research centers in part on ideas advanced in Derrida's seminar on the death penalty. "Derrida was surprised to see that, throughout history, you can count the number of philosophers who were opposed to the death penalty on one hand, and that most of the people who did pick up the topic, such as Kant, were proponents."

The work has led Wills to explore the concept of drone strikes as a form of death penalty. "I'm interested in many aspects of drone policy, from the reduction of time and space at the moment that a drone is released, to broader consideration of it in the context of the judicial death penalty," he says. "Since 1976, the United States has executed some 1,300 people, while drone attacks are reported to have killed 4,000 to 5,000 people."

Philosophical questions surrounding war have long been of interest to Wills. In his latest book, *Inanimation* – the final volume in a three-part series – he writes about a soldier in combat: "I look at how that experience creates a technologization of his body and an opening of spaces where life is extended or spent."

Wills is concerned about preserving the associative and critical thinking skills needed for future generations to carry on this kind of work in a world of increasingly "technocratic education", as he describes it.

"My sense is that the best response is to bind work in the Humanities to other areas of knowledge, such as the social sciences," he says. "Brown is doing that, in that the Humanities do not occupy a silo here. There are cadres of people who are interested in each other's work and in the contributions we can make together, across disciplines."

David Wills in Rochambeau House, the home of Brown's Department of French Studies and Department of Hispanic Studies

PUBLIC THINGS

Bonnie Honig, Professor of Modern Culture and Media, Professor of Political Science, has been considering what she calls "public things" – assets and spaces that are open to all, such as museums, parks, and schools – and the ways in which they
sustain democracy.

While others focus on the *demos* in democracy – the relative sense of inclusion and identity among citizens or residents – Honig looks at objects and places that encourage democratic behaviors, writ large and small.

As municipalities strain to support public assets, and incentives to privatize them intensify, Honig believes that this is a critical time for her inquiry. There are implications for civic discourse as well as "civic resilience", she says, citing the work of British pediatrician and psychoanalyst D.W. Winnicott, who validated the importance of teddy bears, blankets, and other transitional objects as tools for recovery in the aftermath of World War II among London children evacuated during the Blitz.

"One of the qualities a democratic citizen needs is the ability to pick oneself up after loss. We lose elections, policy debates, court decisions, and ballot initiatives but need to go on together. Winnicott wrote about loss and resilience in plainspoken language, even producing radio addresses to the public," says Honig. "I'm very interested in the role that objects and places might play in societal resilience – kind of a political theory analogy to his psychoanalytic argument."

The inquiry goes to the heart of American democratic ethos, she says, noting Alexis de Tocqueville's wonder at observing a gentleman who tipped his hat to a laborer in the street.

"It was a shocking sign of social equality in de Tocqueville's day, a moment that impressed him as being singularly American," says Honig. "We are more divided today than we were then. We have such big economic and social distinctions in this country, with dramatic income inequality and much less casual social intercourse. This is a growing problem. What are the materials and symbolic conditions of healthy democratic life? How do we maintain our democratic threads and egalitarian institutions in the context of divisions, distinctions, and rampant inequality? In the end, ethos becomes a victim of daily practice."

Honig, who joined the faculty in 2013, has discovered like-minded colleagues from diverse disciplines at Brown. "I've come to realize that I've always been trying to build the kind of interdisciplinary program a lot of our students take for granted."

She recalls her first day in a Brown classroom with a laugh, remembering her rising misgivings as her students, representing disparate concentrations, introduced themselves. "I shouldn't have worried," she says. "Brown students are completely habituated to talking across disciplinary lines. They know how to talk to each other."

"We don't want a nation of technical experts in one subject. We want a scintillating civil society in which everyone can talk to everyone. That was a quality that Alexis de Tocqueville wrote of when he visited the United States at the beginning of the 1830s. Even in that era before mass communication, before the telegraph, before the Internet, we were engaged in an American conversation that stretched from one end of the country to another. In a similar manner, Martin Luther King Jr. sketched a "web of mutuality" in his "Letter from Birmingham Jail," fifty years ago this year. We want politicians who have read Shakespeare—as Lincoln did. We want bankers and lawyers who have read Homer and Dante. We want factory owners who have read Dickens."

– Christina Paxson, President, Brown University

Keynote Address, National Humanities Alliance, March 2013

BALANCING ACT

Parkinson's disease was eroding her connections with the world. Her speech was no longer easily understood. She had become homeless. But she exuded great warmth. *And she could dance.*

The woman was in a dance class at the English National Ballet – part of a research study on the impact of dance on motor control and the experience of illness in patients with neurodegenerative diseases, led by Dr. Sarah Houston, principal lecturer at the University of Roehampton and a leading scholar on movement-based art and health and well-being.

Funded by Brown's Royce Fellowship, Cameron Donald '14 spent summer 2013 working on the study.

"We hadn't been able to reach her for weeks. When she returned, she off-handedly shared that she had become homeless," Donald remembers. "Her participation showed profound commitment, and suggested that the class really helped her. I learned from her that every person has a lot to offer, and that every patient knows more about herself than a healthcare professional could ever infer."

In high school, Donald had played soccer, run track and field, and performed with the jazz band. At Brown, he discovered dance – which blended his athletic and musical interests and informed his concentration in human biology – with encouragement from his first-year advisor, Senior Lecturer in Theatre Arts and Performance Studies Julie Strandberg.

At Strandberg's suggestion, Donald applied for a summer Undergraduate Training and Research Award (UTRA) to explore the interplay between dance and health. The work led to the founding of Artists and Scientists as Partners (ASaP), an initiative that has designed undergraduate curricula as well as teaching modules at Warren Alpert Medical School of Brown University, hosted two conferences, and offered arts and movement workshops for children with autism at Bradley Hospital, an Alpert Medical School-affiliated teaching hospital. It also introduced him to Houston's work.

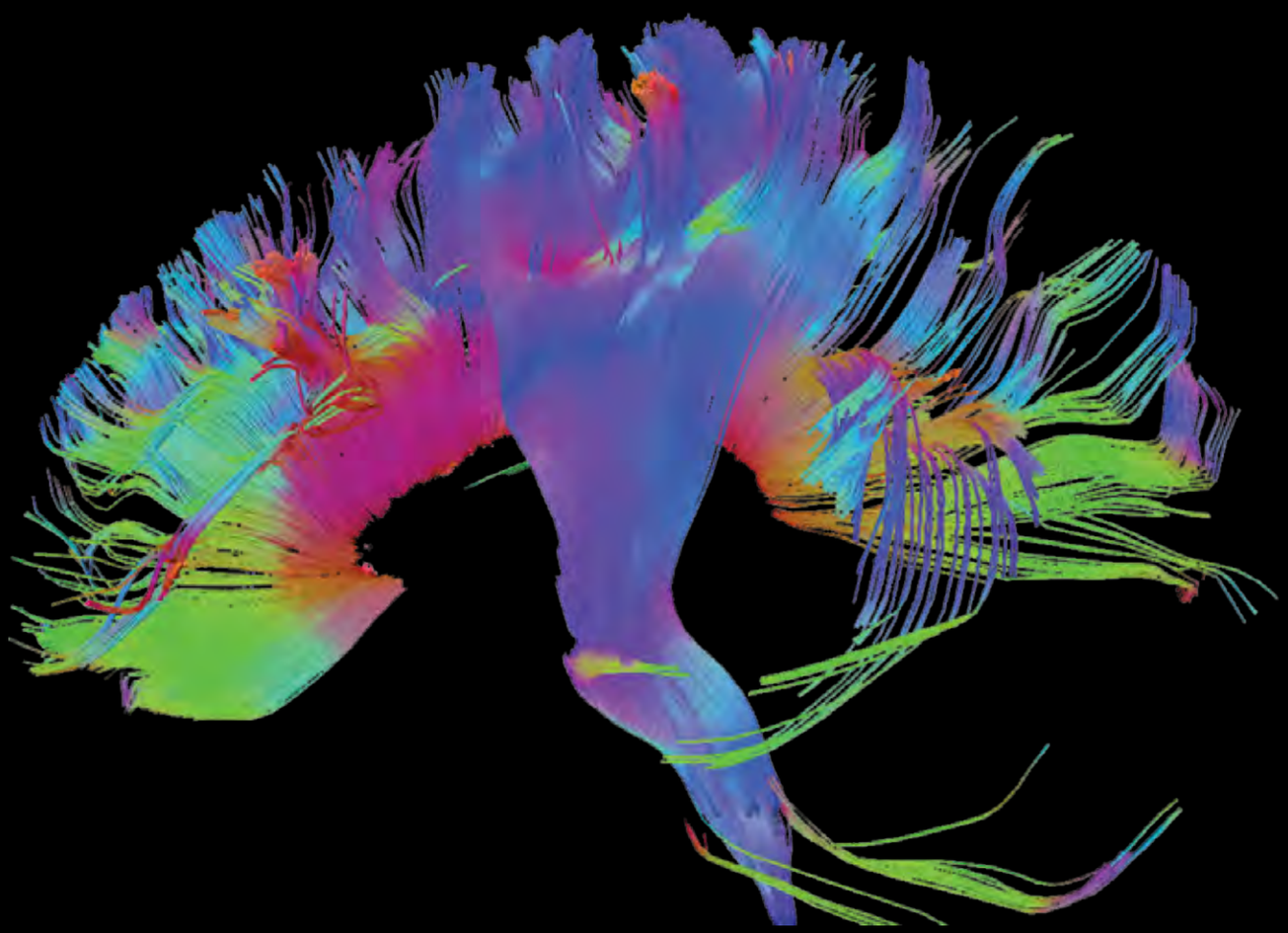
"The class had more than forty participants, many of whom traveled for hours to get there, and was inclusive of people from across a broad spectrum of Parkinson's diagnosis," he remembers. "Some were largely asymptomatic. Others were dependent on walkers or wheelchairs. Some had dementia. But it was amazing what people could do. One man came in with his walker, forgot he needed it, and left without it. The class had given him confidence in his ability to move."

The class went to the ballet together. They performed at the Tate Modern. They convened for tea and biscuits and conversation. They also contributed important qualitative and quantitative data about movement and degenerative disease and the progressive changes that come with aging.

"People have shared with us the human experience of what it means to have Parkinson's," says Donald. "The arts are an important unifier and a means to analyze discourse. In the future, as a physician, I hope to celebrate the unique knowledge that each patient brings to my practice."

how does **literature** *allow us access to* **philosophical** *and* **existential questions** *which more straightforward philosophical or academic writing often fails to* **capture**? *How can the humanities help us to* **reflect** *upon the* **larger mission** *of the university as well as the vital questions of* **value** *and* **method** *that arise in all academic endeavors? How are we* **defining humanity** *in an age in which* **technology** *is changing the*

MRI image produced at Brown University by David Badre, assistant professor of Cognitive, Linguistic, and Psychological Sciences, and Jennifer Barredo, postdoctoral research associate in Neuroscience, both affiliated with the Brown Institute for Brain Science.



How can we explore the mysterious, uncharted territory of the brain to discover new therapies, new insights, and new understanding of the intrinsic properties of the human mind?

UNDERSTANDING THE HUMAN BRAIN

The most mysterious part of the body is the very thing that makes us human. A vast, passionate team of scientists, engineers, and others is working at Brown to probe the secrets of the brain.

Two years ago, a 58-year-old paralyzed woman made history by lifting a bottle of coffee to her lips – using a robotic arm controlled by her thoughts.

Fifteen years earlier, a stroke had "locked her in" – stealing her ability to speak or move. Now – in partnership with Brown researchers who had implanted an electrode array the size of a baby aspirin in her brain and connected it to a robotic arm – she was demonstrating the extraordinary potential of BrainGate, an investigational technology developed at Brown University.

The BrainGate team is currently building on that work – testing a novel, broadband wireless, rechargeable, fully implantable version of the brain sensor, designed to liberate users from the cables now needed to connect them to the system's computers.

BrainGate – built by an interdisciplinary team of neurologists, neuroscientists, engineers, computer scientists, neurosurgeons, mathematicians, and other researchers – is one of several therapeutic interventions developed, or under development, under the auspices of the Brown Institute for Brain Science (BIBS).

In October 2013, the BrainGate team was awarded the $1-million Moshe Mirilashvili Memorial Fund B.R.A.I.N. Prize, which honors a recent breakthrough in the field of brain technology for the betterment of humanity. President Shimon Peres, representing the Israeli Brain Technologies, presented the prize to two of BrainGate's co-leaders, Henry Merritt Wriston Professor of Neuroscience John Donoghue and L. Herbert Ballou University Professor of Engineering Arto Nurmikko, at a brain science technology conference in Israel. BrainGate co-leader Dr. Leigh Hochberg, associate professor of engineering and a neurologist at Massachusetts General Hospital, was unable to attend, as he was delivering a Presidential Symposium Lecture at the American Neurological Association.

More than 100 Brown researchers are immersed in a University-wide, interdisciplinary initiative to unlock the mysteries of the brain.

Clinicians, scientists and engineers are working collaboratively, in campus laboratories and at the affiliated hospitals of Brown's Warren Alpert Medical School, to explore the function and circuitry of the brain. Their work is yielding new insights into both the healthy brain and the mechanisms of brain disease and dysfunction. Donoghue, who serves as director of BIBS, also serves on the National Institutes of Health advisory committee that guides the federal BRAIN Initiative announced by President Obama last spring.

We are committed to continuing to contribute to a growing body of knowledge about the brain and its relationship to cognition, behavior, and disease – expanding and applying that knowledge to enhance understanding of the functions of the brain that distinguish us as humans, discover treatments for disorders that diminish our capacities, and create technologies to improve lives.

BROWN LAUNCHES NEW COBRE CENTER FOR CENTRAL NERVOUS SYSTEM FUNCTION

In 2013, the University received a five-year, $11 million COBRE (Centers of Biomedical Research Excellence) grant to create a Center for Central Nervous System Function designed to launch the research careers of junior faculty, pairing each researcher with a senior faculty mentor. The new Center is directed by Professor of Neuroscience Jerome Sanes, a neuroimaging expert, with support from deputy director Sheila Blumstein, the Albert D. Mead professor of cognitive, linguistic, and psychological sciences, and John Davenport, associate director of the Brown Institute for Brain Science (BIBS).

Five new research projects on the neuroscience of attention and related disorders are underway:

- Dima Amso, assistant professor of cognitive, linguistic, and psychological sciences, will study the development of visual selective attention, the process by which the brain focuses on what's relevant instead of on distractions. She will look at healthy development and how it is disrupted in autism spectrum disorders. *Mentor: Sheila Blumstein, the Albert D. Mead Professor of Cognitive, Linguistic, and Psychological Sciences*

- Dr. Wael Asaad, assistant professor of neurosurgery, will focus on how the basal ganglia integrates sensory information from the cortex and motivational information from subcortical structures to generate learning. *Mentor: John Donoghue, neuroscientist, engineer, and the Henry Merritt Wriston Professor*

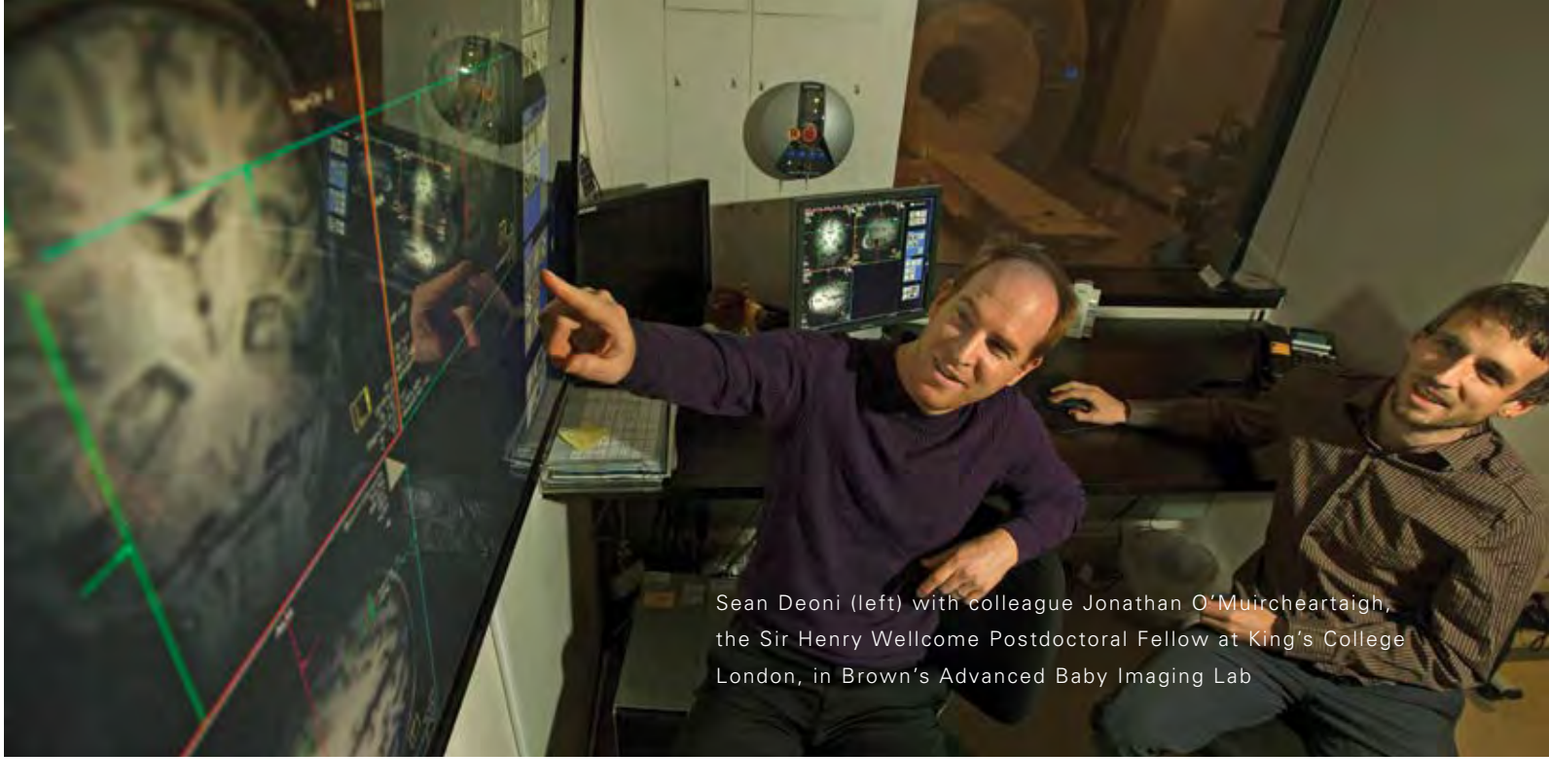
- Dr. Eric Morrow, assistant professor of molecular biology, cell biology, and biochemistry, will use a combination of genetics, neuroimaging, and psychiatric diagnosis techniques to determine whether autism patients with significant levels of obsessive-compulsive behaviors have a unique subtype of autism. *Mentors: Sorin Istrail, professor of computer science, and Dr. Steven Rasmussen, professor of psychiatry and human behavior*

- Joo-Hyun Song, assistant professor of cognitive, linguistic, and psychological sciences, will study how multiple neural systems in the brain work together when someone selects one target over distractors such as deciding to pick up one object vs. another that differs in color. *Mentor: Jerome Sanes, professor of neuroscience*

- Michael Worden, research assistant professor of neuroscience, will examine cases in which the brain must adapt to visual stimuli that conflict because they seem to call for incompatible behavioral responses (such as arrows pointing in opposite directions). He will look at the effect of such adaptation on visual processing. *Mentor: David Sheinberg, professor of neuroscience*

In addition, the grant supports the work of Joseph Hogan, professor of biostatistics, who is developing methods and protocols for experimental design and analysis that will help campus- and hospital-based brain science investigators plan new studies and analyze collected data. COBRE funds have also been used to acquire new research equipment, such as eye-tracking systems, and noninvasive neural recording equipment, such as EEGs, and to bolster the Brown's OSCAR computing cluster.

How do our **brains** *decide what is* **relevant** *and what is a* **distraction***? How does that process differ in people with* **autism** *spectrum* **disorders***? How do the* **basal ganglia** *integrate sensory information from the* **cortex** *and motivational information from* **subcortical** *structures to generate* **learning***? Do some* **patients** *on the autism spectrum who have significant* **obsessive-compulsive behaviors** *have a unique subtype of autism*



Sean Deoni (left) with colleague Jonathan O'Muircheartaigh, the Sir Henry Wellcome Postdoctoral Fellow at King's College London, in Brown's Advanced Baby Imaging Lab

BABY, IT'S YOU

Who are we, in our earliest days, before we speak and walk and learn to read? What does the infant brain portend for the life ahead?

With the help of hundreds of tiny collaborators, Assistant Professor of Engineering Sean Deoni is making Brown's MRI facility hum with insight.

Deoni leads Brown's Advanced Baby Imaging Lab, where quiet MRI machines, operating at sound levels as soft as a whisper, image babies' brains as they sleep – without medication. He and his team use a technique that enables imaging of both gray matter – the part of the brain that contains neurons and nerve fibers – and white matter, which contains myelin, the fatty material that insulates the nerve fibers. White matter growth begins shortly after birth and is an important measure of brain development.

In 2013, among other findings, Deoni and colleagues based at Brown and at King's College London showed that:

- **breastfeeding produces better brain development than a combination of breast milk and formula, which in turn trumps formula alone;**
- **infants who carry the Alzheimer's disease gene show increased brain growth in the frontal lobe and decreased growth in other parts of the brain that tend to be affected later in life among symptomatic patients with Alzheimer's;**
- **myelin growth in school-age children accelerates in areas of the brain used for language acquisition, but remains symmetrical throughout the brain in early childhood – suggesting that language acquisition drives brain growth, not the reverse, and highlighting the need for children to grow up in a stimulating environment. By imaging typical infant brains, researchers now have a baseline to compare brain development in children with disorders (such as ADHD, autism, and dyslexia) that affect language development.**

Future work may focus on trying to discover when brain abnormalities associated with behavioral disorders first present – possibly offering a powerful tool for identifying the optimal period for various treatment interventions.

"Data is not destiny," Deoni says. "Our results don't mean that the children in our studies will develop Alzheimer's, for instance. But it's important to establish this baseline data for future studies, and in the cases of our breastfeeding and language acquisition studies, there is clear biological evidence of the impact that parents and other adults can have on the lives of children."

GROWING HOPE

"Our lab's work is rooted in an urgent clinical problem," says Assistant Professor of Biology and Psychiatry Eric Morrow. "There's a significant cohort of children with autism – conservatively speaking, about 30 percent – who don't respond to currently available treatments, which are largely restricted to behavioral therapies. This work is for them."

A physician-scientist, Morrow works in laboratories in Providence's Jewelry District (once the home of the city's world-class jewelry industry and now home to Alpert Medical School and a constellation of laboratories and biotech startups) and at Bradley Hospital, an Alpert Medical School-affiliated children's neuropsychiatric hospital. He is leading a team of post-doctoral fellows, graduate students, and undergraduates who are working to answer two key questions: *What are the differences between the brains of children with autism who do and do not respond to current treatment? Are there genetic indicators of severe autism that could yield new opportunities for diagnosis and treatment?*

Morrow is sensitive to the dangers of raising false hope. He knows the emotional rollercoaster ride taken by families touched by autism.

"In our communication with families and the general public, we need to strike a balance," he says, cautioning against overpromising. "The scientific challenges are substantial and dictate the pace. Yet, we also need to ensure that the public understands that we need to go as fast as we can."

But hope is quite literally growing in Morrow's labs.

Neurons communicate with each other via contact between elaborate cellular protrusion arbors that resemble branches on a tree. Recent research from Morrow's lab demonstrates vastly diminished branching of neurons in the brain of a mouse model of Christianson syndrome, a disorder related to severe autism. To move these findings toward clinical interventions, Morrow's team produced stem cells from the peripheral blood of boys with autism and their unaffected brothers. The lab is now differentiating these stem cells into neurons. These neurons – which are actually derived from the patients themselves, and therefore have the same genetic material as the patients – are also being used to screen candidate drugs for potential efficacy in correcting the cellular deficiencies observed.

The team is also studying a series of genetic markers in patients that may predict or reflect severity of autism, possibly serving as a tool for early diagnosis and stratification to the right treatments. Treatment is currently often trial-and-error, Morrow explains; in the future, a genetic test could help guide patients to the right treatments faster and potentially avoid ill-fated treatments.

"When a child is diagnosed with autism, it's a behavioral diagnosis, not necessarily linked to a medical cause," Morrow explains. "Families are left wondering *why is my child different?* Parents sometimes wonder if it's their fault. They sometimes adopt unproven therapies." However, in recent years, genetic testing has been added to the diagnostic process. Morrow hopes to contribute to making those genetic tests better and better. "A genetic diagnosis provides at least part of the biological explanation for autism, which is a medical condition. Explanations are often very empowering for families. They are also an important way forward for further scientific research."

How do the brain's **multiple neural systems** *help us make* **decisions** *amid a vivid field of* **distractions**? *How does the brain adapt* **conflicting visual stimuli**? *What are the* **differences** *between the* **brains of children** *with autism who do and do not* **respond** *to current* **treatment**? *Are there* **genetic indicators** *of severe autism that could yield* **new opportunities** *for* **diagnosis** *and treatment?*

Eric Morrow serves as director of the Research Committee of the Rhode Island Consortium for Autism Research and Treatment (RI-CART), a statewide coalition of universities, hospitals, private nonprofit organizations, and state agencies that he helped to establish as a vehicle for advancing research, care, and advocacy for people with autism spectrum disorders. Among RI-CART's projects are a study of primary care options for adolescents and adults with autism and the establishment of a statewide data network to link the community affected by autism with researchers.

"Brain science at Brown is driven by the convening of great minds. We are fortunate to have the expertise and resources of a diverse group of scientists from twelve different departments – including life and physical sciences, mathematics, engineering, humanities, and medicine – focused on our shared goal of addressing the effects of disease and disability, while advancing understanding of the healthy brain."

– John Donoghue, the *Henry Merritt Wriston Professor of Neuroscience, Director, Brown Institute for Brain Science*

RACING TIME

In the critical first moments of stroke, survival – as well as post-event functionality and quality of life – is a race against time. It depends on immediate recognition of symptoms, expedient arrival at the hospital, and administration of *tissue plasminogen activator* (tPA) – an enzyme that helps the body to break down deadly clots – within four hours.

Professor of Neurology Karen Furie '87, chair of the Department of Neurology, is working with colleagues at Brown and elsewhere to bring new stroke therapies from bench to bedside – including an alternative that might expand the window for effective therapy. As an investigator on the Acute ROCK Inhibition in Stroke Evolution (ARISE) trial, she has contributed to the development of KD-025, a new compound that may be effective within 12 hours of onset of symptoms – potentially preserving brain tissue and speeding recovery. "ROCK" refers to Rho-associated coiled-coil containing kinases (ROCKs) which are important mediators of inflammation and may contribute to stroke and stroke recovery.

"It's very early, but we are optimistic," says Furie, who is chief of neurology at Rhode Island Hospital, The Miriam Hospital, and Bradley Hospital and executive chief of neurology at Butler Hospital and the Providence VA Medical Center – all Brown-affiliated hospitals – and oversees research programs at Rhode Island Hospital's Norman Prince Neurosciences Institute. "The clinical community is very eager to find new therapies to treat stroke."

"Stroke has multiple phases – prevention, acute stroke, management of the subacute phase, and recovery," Furie explains. "We've made great strides in the area of acute stroke, in the form of tPA, but we need more breakthroughs on the neuroprotection and recovery side. Successfully implementing preventive strategies remains a major challenge. "

Furie is also active on the prevention side, with a nine-year history of involvement in a multi-center, international trial to test the efficacy of pioglitazone, a drug currently used in the treatment of diabetic patients, in preventing recurrent ischemic stroke in stroke patients with insulin resistance. In addition to preventing stroke, investigators believe the compound may have benefit for preventing heart attack and dementia. Furie is working to enhance understanding of stroke risk by working with colleagues in Brazil to study biomarkers for embolic stroke risk in patients who suffer from chagas, a parasitic disease that causes cardiomyopathy.

"The combined assets of BIBS and the NPNI, along with our highly innovative approach to research and teaching, position us well to make significant contributions in brain science," says Furie, noting that a new, two-year neurology/psychiatry clerkship has recently launched, giving students an inpatient immersion experience in their third year of medical school and an outpatient experience in their fourth year. "We now have the opportunity to teach the brain to students in a way that's relevant to both specialties, breaking through the artificial barrier between them. This novel approach really allows us to bring the realities of diseases of the brain home to our students."

How can we **restore the gifts** *of communication and physical function to* **people "locked in" by stroke**? *How do* **neuroscientists**, **engineers**, *computer scientists, neurosurgeons,* **mathemeticians**, *psychiatrists, and others come together in an* **interdisciplinary team** *to explore the uncharted territory of the* **brain**? *How can we develop* **young researchers** *to build a robust pipeline of* **brain**

How can we contribute to the stability and well-being of local and global communities by understanding and addressing the intellectual and visceral experiences of human dignity, economic inequality, and more?

PEACEFUL, JUST, AND PROSPEROUS SOCIETIES

We live in a volatile world, at once rocked by economic, political, and cultural dissonance and illuminated by inspirational human courage and dignity. In 2013, three interdisciplinary academic centers intensified Brown's commitment to fostering stability through justice.

Brown's heritage is one of revolutionary inclusiveness – an 18th-century college open to students without religious restriction that became a 21st-century university which has historically cultivated an ethos of tolerance, and a center of academic freedom that re-engineered its entire curriculum in response to an undergraduate student movement. Brown is a place of scientist-poets, where diversity – of culture, of ethnicity, of gender, of opinion – is celebrated as an essential and esteemed value. It is a place of intense debate and concern for people in need. But, embedded deep in the University's history, is a painful truth: the family for which Brown is named profited from slavery.

The University's Center for the Study of Slavery and Justice – led by the Lyn Crost Professor of Social Sciences and Critical Theory and Professor of Africana Studies B. Anthony Bogues as its inaugural director – was formally established in the 2012-2013 academic year. Creation of the center was a key recommendation of the Steering Committee on Slavery and Justice, which was convened in 2003 to identify approaches for acknowledging the past while addressing urgent contemporary issues. Focusing on international issues of human rights, justice, and freedom, the Center draws on a wide range of academic disciplines and departments campus-wide.

Brown's Watson Institute for International Studies also gained new leadership in 2013, as Professor of Political Science Richard Locke arrived at Brown to direct a dynamic new period of growth at the Institute. Since its establishment in 1991, Watson has hosted scores of thoughtful scholars and world leaders who share interest and expertise in issues of common concern and global importance: globalization, economic uncertainty, security threats, environmental degradation, and poverty. Among other activities, the Institute currently leads formal interdisciplinary initiatives in Brazil, India, China, Latin America, the Caribbean, and the Middle East.

Also in 2013, Professor of Africana Studies Tricia Rose was appointed director of Brown's Center for the Study of Race and Ethnicity in America. Established in 1986, the Center was one of the nation's earliest academic centers dedicated to research, scholarship, and academic exchanges on issues of race and ethnicity. In 1996, it became the home of the newly established concentration in Ethnic Studies, which is now part of the Department of American Studies.

The integrative work of these three visionary centers for scholarship and engagement, in partnership with a rich interdisciplinary community of faculty, students, and off-campus colleagues and organizations, forms the foundation of Brown's future as a leading center for international studies that integrates rigorous scholarship and education with active engagement in the world of international affairs. We are committed to supporting and growing the depth and breadth of scholarship and public discourse to promote social justice and economic prosperity, domestically and internationally.

How can we combine **rigorous scholarship** *with active* **global engagement** *to create a more just and* **peaceful world**? *How can we address* **globa**
ssues *of economic uncertainty, security, environmental degradation, and* **poverty**? *How shall we advance a calm, robust, and* **truthful dialogue** *abo*
sues of **domination and justice**? *What lessons does the 19th century sugar trade carry to us in the* **21st century**? *How can we develop intellectu*

FREE/UNFREE

"The questions we must pose are difficult questions – issues of domination and justice that echo throughout society," says B. Anthony Bogues, the Lyn Crost Professor of Social Sciences and Critical Theory and Professor of Africana Studies and the inaugural director of Brown's Center for the Study of Slavery and Justice (CSSJ). "As an interdisciplinary center concerned with both historical and contemporary experience, we must find ways to advance calm, robust, and truthful dialogue."

Bogues is also affiliated with Brown's Department of Political Science and Department of Modern Culture and Media, previously served as a faculty fellow of the University's Cogut Center for the Humanities, and is a visiting scholar at Rhode Island School of Design, along with several international appointments and affiliations. He has led the CSSJ since it's creation in 2012. The Center is poised to move into a larger, newly renovated permanent home, with room for a growing community of faculty, undergraduate and graduate students, and postdoctoral fellows representing diverse disciplines.

It has spent its initial planning year in a quiet crucible of struggle for equality – Alumnae Hall on Brown's Pembroke Campus, where American women had access to higher education decades before they had the right to vote.

In its first year, the CSSJ hosted an active lecture series and a major exhibition on slave ships, and partnered with Brown's John Carter Brown Library to co-host a conference that explored the history of sugar as an economic force in the early Atlantic world. Programming for 2013-2014 is organized around the themes of Free/Unfree and Race Today. Bogues, an international scholar and author, is engaged in a continuous process of building global relationships for the Center and bringing new voices into the dialogue.

The process that launched the Center provided a strong and evocative foundation for the work, says Bogues. "The Steering Committee on Slavery and Justice was a tremendous exercise in democracy," he recalls. "It was an active writing committee, embracing honest disagreement and dialogue. Its members had to convince each other exactly what words would go into the document."

That spirit of openness and candid discussion will infuse the work of the CSSJ, says Bogues. "Our work is built on two platforms. We will be a scholarly and intellectual center offering programming to understand the history and experience of slavery in Africa and the Americas as integral to a world system of economic production, commerce and trade, and to the very making of the modern world. We will also be an active advocate for justice in all its forms, concerned with the legacy of slavery, its sedimentary deposits in American society, and contemporary forms of human bondage worldwide."

GLOBAL PERSPECTIVE

"Brown students are hungry to be fully immersed in and engaged with the world," says Professor of Political Science Richard M. Locke, the Howard R. Swearer Director of the University's Watson Institute for International Studies. "A key element of our vision is to be a center for blended education and action learning, where faculty and students work together on real-world problems and make an important contribution to international and public affairs."

Brown's open approach to integrative scholarship is one element that attracted Locke to the Watson directorship. The other draw, he says, was the Institute's wealth of talent and potential. "We are very rich in human capital in the areas of global development, security, sustainability, and political economy."

Locke came to Brown from the Massachusetts Institute of Technology, where he served as deputy dean of the Sloan School of Management and head of the political science department, and worked with major international corporations on supply chain issues in the context of promoting and supporting fair labor practices. He chairs Apple's Academic Advisory Board, and is a widely quoted expert on global workforce ethics and practices – the subject of his latest book, *The Promise and Limits of Private Power: Improving Labor Rights in a Global Economy*.

The Watson Institute is home to several centers focused on area studies, allowing researchers to take a truly interdisciplinary, comparative approach and exploit organic cross-pollination of ideas and insights – leading to a deeper understanding of issues and regions and enabling them to contribute in a meaningful way to the pressing issues of our time. Watson researchers are working in diverse areas of interest – under the broad themes of development, security, and governance – in Latin America, China, the Middle East, and South Asia.

Locke notes that the Institute is on a growth trajectory, with eight new faculty positions to be filled over the next two to three years. "We have a very distinctive research program, and we intend to continue to grow our research enterprise as well as our educational programs and public engagement activities."

Watson's integrative approach to solving complex problems is well-calibrated to meet the global challenges of the 21st century, Locke explains.

"We need new thinking about security, for instance. In today's world, security is more than force mobilization and grand strategy. It concerns issues that arise at the intersection of climate/environmental change and security, over struggles over water or the nexus of water, food, energy and land use, or at the intersection of issues of identity/ideology/religion and security," he says. "We must address fundamental challenges around economic development, including massive youth unemployment around the world. We must extend the rule of law and facilitate the delivery of public goods through cooperative efforts by NGOs, private firms, and government partners."

Only by promoting good governance, strong rule of law, and more equitable and sustainable economic development can we address many of today's security challenges, Locke says.

"The world needs help, in everything from achieving political and economic stability to addressing climate change," he continues, "and Brown is well-positioned to provide it through the resources of Watson."

how would our **history be rewritten** *if the voices of the* **unfree** *had been* **heard***? Where are the sedimentary* **deposits of slavery** *in American* **society***? How can we* **identify and address** *contemporary forms of* **bondage***? In what ways do* **global security** *issues rest at the nexus of* **water, food, energy, and land** *use? What are the implications of the phenomenon of* **massive global youth unemployment**

NECESSARY DIALOGUE

Professor of Africana Studies Tricia Rose arrived at Brown in 1986, as a doctoral student in American Studies who wanted to study hiphop culture – work that would lead to her first book, *Black Noise: Rap Music and Black Culture in Contemporary America* (1994). "Brown didn't have an expert in the field at the time, but it offered me an interdisciplinary group of committed advisors on some key aspects of the work. A lot of schools wouldn't have done that. I was the beneficiary of the kind of positive nonconformity that runs through the University."

Rose is bringing the strengths of her creativity and passion for accessible, intellectually-informed dialogue to her role as director of Brown's Center for the Study of Race and Ethnicity in America (CSREA), a post to which she was appointed in 2013. A well-respected scholar and national and international lecturer, active in media commentary and analysis, Rose brings a deep and eclectic perspective to the CSREA.

"Our overarching vision is to consider ways in which race and ethnicity affects us as a society, and to advance that work through expert insight, sophisticated ideas, and accessible language," says Rose. "Our goal is to be a research institute that engages the world. We want to be a hub of both knowledge and public service."

In the last year, the CSREA has convened a scholarly colloquium on race and incarceration, hosted capacity crowds of interdisciplinary faculty from across the University at weekly lunchtime research-sharing sessions called *What I'm Thinking About Now*, and awarded four competitive mini-grants:

- **Race in the Global Asias**
  A faculty and advanced student working group culminating in a half-day faculty symposium examining the shifting boundaries between Asian and Asian American studies

- **Indigenous Performance, Commodities and Politics**
  A faculty and advanced student working group on indigenous performance in the Americas

- **Latino/a Urban Aesthetics**
  A faculty and student research group on the changing conceptions of Latino/a identities especially as it is expressed via urban street art that culminates in a street art discussion and performance panel

- **Educational Inequality in the U.S.**
  A series of events on race, gender and educational inequality including expert speakers, a panel discussion, a screening and public discussion

Rose is considering opportunities for continued dialogue, including the possibility of launching a web-based vehicle that could provide a forum for real-time discussion of emerging issues and events. "What's needed is a way to immediately engage in conversation, galvanize writers and journalists and others, and then serve as an archive after a particular episode is concluded, so that the legacy of the ideas and discussions and artifacts of the time is preserved for future education and analysis."

"The spirit of Brown is to be a place for incubating ideas that are fairly unconventional, where people are open to free-form, improvisational, interdisciplinary work in an environment of intellectual rigor," says Rose. "We're all engaged in creating innovative space for tackling challenging social issues and ideas – which is imperative in our 21st century world."


CSREA
CENTER FOR
THE STUDY
OF RACE
AND ETHNICITY
IN AMERICA
NO HUMAN BEING IS ILLEGAL

SOMETHING TO TALK ABOUT

At least once a week, organized, spirited debate is happening somewhere on campus in a student debate, lecture, lunch seminar, or "conversation" sponsored by The Janus Forum, the student arm of Brown's Political Theory Project. Named for Janus, the Roman God with two faces, the organization was founded by undergraduates on the strength of the belief that there are two sides to every argument and that a healthy society hears all voices.

In addition to providing an outlet for positive civic discourse, the robust programming presented by the Janus Forum sharpens students' rhetorical and critical thinking skills, strengthening Brown as a community of free thinkers and articulate advocates and perhaps preparing them to moderate an increasingly polarized political environment.

Student debates presented by the Janus Political Union are expansive, inclusive, and unpredictable; the entire audience splits into two opposing sides and joins the two students on stage in exchanging opinions and ideas. Free expression is also encouraged during Janus Conversations and Janus Open Seminar Lunches, which are organized around lively, faculty-moderated discussions. Five or six times a year, the Forum brings national experts to campus to debate opposing sides of a rising issue – such as coal divestment, affirmative action, guns in America, and genetic engineering, among other recent topics – and engage with students under the auspices of the Janus Lecture Series.

The Janus Forum is part of Brown's Political Theory Project, an interdisciplinary research center that convenes faculty, post-doctoral research associates, and undergraduate and graduate students from disparate fields – including political science, religious studies, philosophy, economics, sociology, and history – to explore critical issues outside of ideological limitations. The Political Theory Project is currently focusing on three broad areas of inquiry:

- **The American Experiment:** Americans of the Revolutionary War Period described themselves as being engaged in a great experiment – an experiment in liberty. Is America still an experiment in liberty?

- **Market Society and Social Order:** Is the social order of modern societies more a product of conscious design or of unplanned individual actions?

- **Globalization and Development:** What are the impacts of institutional structures, and what are the responsibilities of individuals, in the context of globalization, poverty, cultural creativity, and other forces? Is democracy possible, or desirable, on a global scale?

"Study after study has shown that people tend to converge on political beliefs that they find pleasing rather than those for which they have strong evidence, and the philosopher John Stuart Mill suggested that one is not in a good position to hold one's views until one understands contrary views," says Professor of Political Science John Tomasi, director of the Political Theory Project. "We're out to create intellectual discomfort, to invigorate political thought, and to encourage respectful confrontation, in order to educate people who understand that responsible ideology means confronting contrary views with an open and active mind."

BRYTE IDEA

Every summer, Brown students help to give more than 50 refugee children living in Providence a strong academic start. The Brown Refugee Youth Tutoring and Enrichment (BRYTE) Summer Camp – an off-shoot of the academic-year BRYTE program, which pairs Brown students with students from refugee families for one-on-one instruction – welcomes children between the ages of 7 and 14 years of age to a school or other neighborhood site for six weeks of academic enrichment and fun.

Led by Brown students who serve as camp counselors, the children engage in math races, practice language skills, create art, and do science experiments. They make friends. They play outside, in safety. They go blueberry picking. They go swimming at the YMCA, cheer on the Pawtucket Red Sox, and go to museums. Those who are newly arrived in the United States acclimate and ask questions in a supportive environment, smoothing the transition to school in the fall. For all of the children, the program is designed to minimize summer learning loss and encourage social progress and academic achievement.

"Many refugee students feel somewhat isolated in the school setting," says Alan Flam, director of advising and community collaborations at the Swearer Center for Public Service, which oversees the BRYTE program. "This camp, being made up of all refugees, provides them with a place where they can feel secure."

The BRYTE Summer Camp is expanding – and providing opportunities for more Providence kids. For the last two years, Brown students who serve as senior counselors have been paired with local high school students, also from Providence's refugee community, who serve as junior counselors. Rhode Island Youth Works 411, a program of the Rhode Island Department of Labor and Training, has provided the junior counselors with summer pay.

Jean-Jacques Yves Sibomana '14, a BRYTE Camp senior counselor who came to the United States as a Rwandan refugee, knows how powerful the program can be. "I heard about BRYTE during my first year at Brown, he says. "Knowing what it felt like when I first got here, and thinking about what the kids are going through, I wanted to give back."

Where do issues of identity, ideology, and religion **intersect** *with* **local stability** *and* **global security**? *Where are the* **shifting boundaries** *between Asian and Asian-American* **studies**? *How can we understanding changing* **Latino/a identity** *through examination of* **urban street art**? *What are the critical and urgent issues underlying* **education inequality** *in America? How can we support* **real-time dialogue** *among activists*

The Warren Alpert Medical School of Brown University and the Brown University School of Public Health convene hundreds of students, faculty, and staff in the heart of Providence's downtown business district and historic Jewelry District.

How are hundreds of committed medical students and residents, physicians, researchers, public health experts, and others using Brown research to improve the health status and well-being of people and groups worldwide?

DECIPHERING DISEASE AND IMPROVING POPULATION HEALTH

On campus, in the affiliated teaching hospitals of the Warren Alpert Medical School, and at the Brown University School of Public Health, clinicians and researchers are working to create a healthier world.

In 1975, with the awarding of the first medical degrees by the Warren Alpert Medical School of Brown University – then the Brown Program in Medicine – health care in Rhode Island was transformed. The arrival of hundreds of talented clinicians and medical researchers brought new diagnostic and therapeutic options and new levels of innovation to Brown's home state – while creating a critical mass of intellectual capital that would generate a widening pool of integrated knowledge. That talent pool – along with significant growth in basic science, statistics, health policy, and other fields – had created a fertile environment for growth by the time the Brown University School of Public Health was established in 2013, building on a strong, decades-long record of excellence and innovation in the field.

As a highly-ranked medical school and home of some of the nation's most competitive residency programs, Brown has also trained thousands of researchers and physicians who are creating healthier communities worldwide.

The scientific advances of the past decade – from the mapping and mining of the genome to continuous discoveries and refinements in technology, including the advent of new capabilities in statistical analysis and computation – have yielded new opportunities to improve both individual and population health. At the same time, social and epidemiological trends – including larger numbers of people managing chronic illness and an aging population – are creating new imperatives in research.

A broad, interdisciplinary infrastructure of basic scientists, policy experts, researchers, and clinicians is working in laboratories on the University's historic campus on the East Side of Providence, in affiliated hospitals, at the School of Public Health, and beyond, including diverse sites in Rhode Island and around the world. They are addressing new health challenges and refining culturally appropriate and effective interventions to prevent and treat disease on the local, national, and global levels.

We are committed to intensifying Brown's contributions as an international center for the advancement of healthy populations – taking health care innovations from bench to bedside to community settings everywhere.

How can the **integrated resources** *of medical school and public health faculty and* **students improve** *health on the individual, community and global levels? What is the impact of* **injecting lubricin** *into joints? Will it* **mitigate pain** *and disability from injury and arthritis? How can technology support* **interventions** *for everything from* **addiction** *to teen risk behaviors? Can a potential new* **therapy** *to help* **muscle cells**

CELLS TO CELL PHONES

In 2013, a team of Brown and Rhode Island Hospital researchers, led by Professor of Emergency Medicine and Engineering Gregory Jay, published findings that offer new insight into osteoarthritis – and possibly new potential for treating the debilitating condition.

Jay's team showed that the rubbing of non-lubricated cartilage surfaces under a physiological load – for instance, body weight on a knee joint – causes apoptosis, or death of the cells that make up cartilage, and that a joint protein called *lubricin* can mitigate the cell death.

"The findings suggest a mechanism by which major injury or repeated minor injuries to joints can cause osteoarthritis," Jay explains. "We know that inflammation and injuries — meniscal tears, ACL tears, gout, inflammatory joint conditions — all down-regulate *lubricin*. We also know that injuries are an epidemiologic risk factor for osteoarthritis. So our findings suggest that the loss of lubrication due to the down-regulation of *lubricin* after injury may be a causal link in the etiology of osteoarthritis. Once you cause that down-regulation in *lubricin*, you're creating a vulnerable period for articular cartilage, we believe. We think it's worth investigating the use of *lubricin* in damaged joints before onset of osteoarthritis."

Professor Brian Zink in the Emergency Department at Rhode Island Hospital

Jay is one of ninety academic physicians working in nine divisions within the Department of Emergency Medicine, under the leadership of Brian Zink, the Frances Weeden Gibson-Edward A. Iannuccilli, MD Professor and chair of the department and physician-in-chief in the Departments of Emergency Medicine at Rhode Island Hospital and its Hasbro Children's Hospital. They are driving research on stroke, cardiac arrest, sepsis, brain injury and other traumatic injuries, and a wide range of other challenges, while providing care for more than 210,000 patients annually – including those treated in the Level 1 Trauma Center at Rhode Island Hospital.

In the seven years since Zink's appointment, Brown has developed one of the largest emergency medicine departments in the United States – known for its highly competitive residency program, special features such as the nation's only fellowship in women's emergency medical care, and a robust research program. The department currently holds seven R01 research grants and three K grants for career development from the National Institutes of Health.

"Our research covers a lot of territory – literally going from cells to cell phones," he says, noting that Assistant Professor of Emergency Medicine Megan Ranney is investigating the efficacy of text messaging-based interventions in treating adolescents at risk for depression and violence. "We all have a responsibility to move research forward and get findings into practice, and the opportunity to do that is huge in emergency medicine."

SEIZE TODAY

"Going into the wheelchair was really hard. But the hardest thing is knowing what's coming next."

The words were spoken by the mother of a child afflicted with Duchenne muscular dystrophy, at a recent Food and Drug Administration (FDA) briefing attended by Professor of Medicine Justin Fallon. Fallon has heard a variation of that statement from scores of parents over the years. Their desperation drives his work.

"The tragedy of Duchenne is that it's progressive," says Fallon. "You know what's going to happen. The value of being able to slow progression is very, very high."

Affecting only boys, DMD leaves children unable to produce *dystrophin*, a protein necessary for muscle cells to survive. Over the span of a few years, the absence of *dystrophin* causes almost all of their skeletal muscles to be replaced with scar tissue and fat. By the time they reach adolescence, they lose their mobility. By early adulthood, they lose their lives.

In the absence of a cure, hope takes the form of stasis – making time stand still today, because tomorrow will be worse.

Culminating nearly 15 years of laboratory research, Fallon is now working through Tivorsan Pharmaceuticals, a biotech startup that he co-founded, to take a potential new therapy to clinical trials – a treatment that will, he hopes, buy years of functionality for children who have DMD.

"The therapy would be administered over the entire course of the disease's progression, so we would ideally be able to keep kids walking longer – but there is also tremendous interest in preserving function in children who are already in wheelchairs, helping them to continue feeding themselves or using a computer as long as possible," says Fallon. "These are major events for kids and families living with Duchenne."

Funded by the National Institutes of Health (NIH) and three parent advocacy groups, Parent Project Muscular Dystrophy, Charley's Fund, and Nash Avery Foundation, as well as the Muscular Dystrophy Association, Fallon and his team have proven that a protein called *biglycan* has halved the rate of muscle damage progression in mice. Produced naturally in the body, *biglycan* regulates the production of another protein called *utrophin* – discovered in 1989 – that mimics the functions of *dystrophin*, the protein that boys with DMD cannot produce. All children produce *utrophin*, but produce less as they get older. In a healthy child, the body hands off the muscle-repair function to *dystrophin*. In children with DMD, there is no *dystrophin* – nothing to prevent muscles from withering away.

Biglycan is rare in its class of proteins because the physiologically active form can be manufactured relatively easily using recombinant laboratory techniques. Tivorsan is working on manufacturing and drug delivery questions, using highly specialized assays from Fallon's lab.

At the recent FDA-parent briefing on DMD, Fallon remembers, a father spoke eloquently of his desire to preserve his wheelchair-bound son's current status – the ability to use a keyboard with his two remaining functional fingers.

"That's our motivation," he says.

How can we tailor **HIV/AIDS interventions** *to the cultural constructs and value systems of* **different societies***? What are the* **health ca**
needs of **Providence's** *Southeast Asian* **community***? What are the* **key issues** *in addressing* **Hepatitis C** *in correctional populations? How ca*
campus- and community-based **experts** *come together to address the* **confluence** *of* **critical issues** *impacting early* **childhood health***, educatio*

IMPROVING POPULATION HEALTH ACROSS CULTURES

Chiao-Wen Lan had a "now or never" moment at the age of 18.

Fluent in English and Mandarin Chinese, Lan had just completed a successful first year as a Foreign Languages and Literatures student at National Chiao Tung University. Yet, her academic life felt oddly incomplete. "I really wanted to see the world, and challenge myself … and I felt that, if I didn't do it at that moment, I would never do it," she remembers. "I think it had something to do with conquering fear."

She learned to see the world through its people – one patient at a time.

At the University of California at Berkeley, Lan double-majored in molecular environmental biology and comparative literature, with a minor in dance and performance studies. She also volunteered as a labor coach through Asian Health Service in Oakland, and discovered a passion for public health.

"Access to health care was a big issue," she says. "We served immigrants who didn't know how the system worked, who were struggling with a language barrier. It really grounded me in the importance of population health on both the community and individual levels, and it left me wanting to make a difference."

Today, as a candidate for the Master of Public Health degree at the Brown University School of Public Health, Lan is reaching out over oceans again – exploring what role she can play in addressing HIV/AIDS on an international level, starting with Russia and Eastern Europe. During her internship at The Miriam Hospital's Centers for Behavioral and Preventive Medicine, she first-authored a publication – published in the journal *AIDS and Behavior* – entitled "Alcohol and Sexual Risk Reduction Interventions among People Living in Russia: A Systematic Review and Meta-analysis."

"I'm very interested in how we can develop effective interventions for different populations," she says, "tailoring approaches to nationality, gender, stigma, and other factors that affect transmission rates in different societies."

> "We live in an age where the biologic sciences are exploding with new knowledge, the building blocks of disease pathogenesis are being discovered, new therapeutics and approaches to disease are developing at an unparalleled pace, and health care is undergoing unprecedented alteration. These times were made for the innovators and interdisciplinary scholars of Brown. "
>
> – Jack A. Elias, Dean of Medicine and Biological Sciences

UNDERSTANDING THE UNDERSERVED

John Nguyen has been passionate about public health since his undergraduate days at the University of California-Los Angeles, when he worked with several public health organizations serving the health needs of the Vietnamese population. As a candidate for the Master of Public Health at Brown, he has continued to pursue his interest in studying racial and ethnic health disparities through an internship at the Center for Southeast Asians in Providence.

"Southeast Asian immigrants and their families, who represent about half of Rhode Island's overall Asian population, have different needs than other Asian groups, something that's not always recognized," he says. "I was a consultant on a data analysis project that collected and analyzed secondary data on health issues affecting Rhode Island's Southeast Asian community – reviewing community trends reports, socioeconomic status (SES) indicators, developing a platform for policy and advocacy."

Nguyen's thesis project explores the burden of hepatitis C at Rhode Island's Adult Correctional Institutes (ACI).

"There is a high prevalence of hepatitis C among correctional populations, and we don't actually know how high it is because testing is not mandatory," Nguyen explains. "My goal is to contribute to efforts to address the epidemic by reviewing screening uptake and clinical trends to develop a snapshot of prevalence, linking to cost data associated with new drug therapies for Hepatitis C. There are significant resource allocation implications for the correctional population as well as the community at large. For instance, should we be investing more in screening or in treatment?"

Nguyen was drawn to Brown by the flexibility that the MPH program offers to pursue individual interests. "Brown offers really unique opportunities to apply critical thinking and content knowledge to practical experience," he says. "You also learn how to be proactive about what you need and want, and to become the best learner you can be."

BIG THINKING FOR SMALL CHILDREN

In individual lives and on the community level, so much depends on the quality of a child's first years. An innovative campus-community initiative at Brown is taking an intensive, multi-year look at interconnected aspects of early childhood development, with the ultimate goal of identifying new opportunities to support families with young children, particularly families living in poverty and coping with other challenges to healthy child development.

Brown's TRI-Lab, launched in 2013 through the University's Swearer Center for Public Service, brings multiple disciplines and perspectives together for in-depth research and problem-solving around a critical, complex social issue – the first of which is early childhood development.

TRI-Lab draws its name from the three-part mission of advancing innovative teaching, research, and social impact as well as from the three groups – students, faculty, and community partners – that it convenes. These partners, from across the University and throughout the community, link academic expertise in public policy, health, education, neuroscience, economics, and other fields with the practical and institutional expertise of child care providers; education, health care, and mental health professionals; child advocates; and representatives of community- and state-based agencies that administer programs for young children.

"The most challenging problems we face as a society – and this is particularly true in the case of issues surrounding young children – are so large that we need broad, cross-disciplinary approaches to make a real impact," says Stephen Buka, professor and chair of Epidemiology, who is co-chairing the first TRI-Lab with Elizabeth Burke Bryant, executive director of Rhode Island KIDS COUNT, a children's advocacy and policy organization affiliated with the Annie E. Casey Foundation. "Brown's role is to focus big thinkers on these issues, in close collaboration with community-based change agents and in an integrated scholarship experience that teaches students to connect academic and real-world experience."

This year's core TRI-Lab team consists of 10 students, three faculty members, five community partners, and three professional staff members. The full group meets weekly for a three-hour session, engaging with other partners between sessions to move the work – in areas ranging from infant brain development to family engagement to microfinance strategies to help support low-income families – forward. TRI-Lab working groups are visiting innovative projects nationwide, with a goal of bringing best practices in early childhood programming back to Rhode Island.

"Brown students naturally gravitate to being part of creative teams," says Buka. "TRI-Lab builds on Brown's traditional strengths – drawing on the quality of our students and faculty and the University's deep commitment to service, while fulfilling our goal of accelerating students' ability to contribute to the world by providing valuable real-world experience."

ow can we tailor **HIV/AIDS interventions** *to the cultural constructs and value systems of* **different societies***? What are the* **health ca**
eeds of **Providence's** *Southeast Asian* **community***? What are the* **key issues** *in addressing* **Hepatitis C** *in correctional populations? How ca*
ampus- and community-based **experts** *come together to address the* **confluence** *of* **critical issues** *impacting early* **childhood health***, educatio*

"Our School of Public Health is fueled by the energy of a vibrant, diverse group of talented people who are fiercely committed to rigorous scholarship and to improving the health of communities worldwide – addressing significant health challenges, from HIV/AIDS and other chronic diseases to obesity to environmental toxins, and working here in Providence as well as on virtually every continent. Brown's open, interdisciplinary ethos means that our faculty and students are part of a rich community of collaborators who partner with them in everything from conceptualizing projects to sophisticated data analysis to translating findings into policy and practice."

– Terrie Fox Wetle, Dean, School of Public Health

IN THE BERT GREENHOUSE (clockwise, left to right): Professors Amanda Lynch, Kim Boekelheide, Leah Vanwey, and Jack Mustard.

How can integrated teams of geologists, sociologists, biologists, and researchers in other disciplines focus their passion and expertise on the new properties of our changing planet and the responsibilities of humans to steward its resources?

SUSTAINING LIFE ON EARTH

In the bitter cold of the New England winter, a cactus is growing on a Brown University roof.

There are also orchids, tomatoes, tobacco, even a banana tree – all flourishing in a new, climate-controlled research greenhouse atop Brown's fully renovated, state-of-the-art Building for Environmental Teaching and Research (BERT). The facility, which will significantly expand and enhance capacity for plant research at the University, caps a major strategic investment in environmental science and sustainability scholarship at Brown.

Among the interdisciplinary collaborations underway in BERT and beyond is Brown's Environmental Change Initiative (ECI) – a major research initiative that links more than 50 faculty and hundreds of students from 13 academic departments and research units. Driven by a shared dedication to exploration and stewardship of the earth's resources, they apply expertise in ecology, geology, chemistry, systems biology, economics, sociology, and cultural history to building our understanding of the natural and artificial forces that shape and sustain environmental systems.

Locally and globally, our scientists are observing the shifting dynamics of life on earth.

The ECI embraces researchers who are interested in environmental change on Rhode Island's Narragansett Bay and in neighborhoods throughout the state, as well as on every continent – often working at the intersections of science and policy. Current work focuses on four core areas of inquiry – climate change, land use change, biogeochemistry, and resilience of natural and social systems – and addresses nascent and urgent questions around deforestation, flood dynamics, water quality, wildlife preservation, and more.

Brown researchers headed for the Gulf Coast after Hurricane Katrina to study the factors that might affect a community's capacity for recovery from post-disaster ecological, social, and economic damage. Biologists, ecologists, and geologists are collaborating with sociologists, political scientists, and experts in other disciplines on land use projects in Brazil, collaborating with indigenous people in Australia and Alaska, and studying biological systems in Hawaii. Cross-disciplinary collaboration – and the constant churn of new opportunities and problems worldwide – yield dynamic growth in sustainability research at Brown.

We are deeply committed to continuing to create new knowledge about the relationship of the environment to human societies – understanding the determinants of environmental change, considering ethical issues related to sustainability, contributing to the development of sound environmental policies, and helping to alter norms of human behavior when indicated. This work has implications not only for the future of the natural world, but for human health, global supplies of food and water, and the stability of societies around the world.

How can we create a **physical** *and* **intellectual space** *where scholars of* **many disciplines** *can convene to address critical* **sustainabilit**
sues? How can a university's **daily practices** *make a significant* **difference** *in measurable use of* **energy** *and other* **resources***? What are th*
nvironmental *and* **sociological impacts** *of agricultural* **innovations**, *such as* **double-cropping**, *and population migration in* **Brazi**

OUR SCHOLARSHIP COMPLEMENTS A CAMPUS-WIDE SUSTAINABILITY ETHOS.

Brown has reduced its energy-related carbon footprint by 30.6 percent over the last six years, thanks to an ambitious greenhouse gas reduction plan encompassing transition from heating oil to natural gas at our Central Heat Plant and a major focus on energy-efficient investments – including 387 individual projects involving faculty, students, and staff campus-wide.

Since 2007, we have invested $18.6 million for a total reduction of 22,366 metric tons carbon dioxide equivalent and a $3.3 million reduction in annual energy expense.

These reductions have come in the context of campus growth that has added substantially to the energy density of existing buildings, such as the addition of a high-performing computer lab, expansion of our Metcalf Complex, and a mass spectrometer in our Geo-Chem Building.

We're creating a Brown eco-district … and sharing knowledge on campus and beyond.

Brown's Sustainability Strategic Planning and Advisory Committee, convened by the Provost a year earlier in response to an undergraduate student proposal, presented interim recommendations to the Corporation in spring 2013. The Committee's vision is the re-imagining of the Brown campus as part of an eco-district that provides a conceptual framework for considering water, transportation, air, and energy in all future planning and growth. The Committee will present its final recommendations in 2014.

Brown collaborates with a rich array of community partners on sustainability issues, including:

- **Ivy Plus Sustainability Working Group**, which will convene its annual meeting at Brown in spring 2014
- **Emerald Cities Collaborative**, which is united around the goal of rapidly greening America's cities
- **International Sustainable Campus Network**, a global university sustainability coalition
- **Providence Sustainability Roundtable**, a coalition of Providence universities and companies dedicated to environmental stewardship
- **Energy Efficiency and Resource Management Council,** a Rhode Island-based energy conservation group

STRATEGIC SUSTENANCE

Associate Professor of Sociology Leah Vanwey fell in love with Brazil a decade ago.

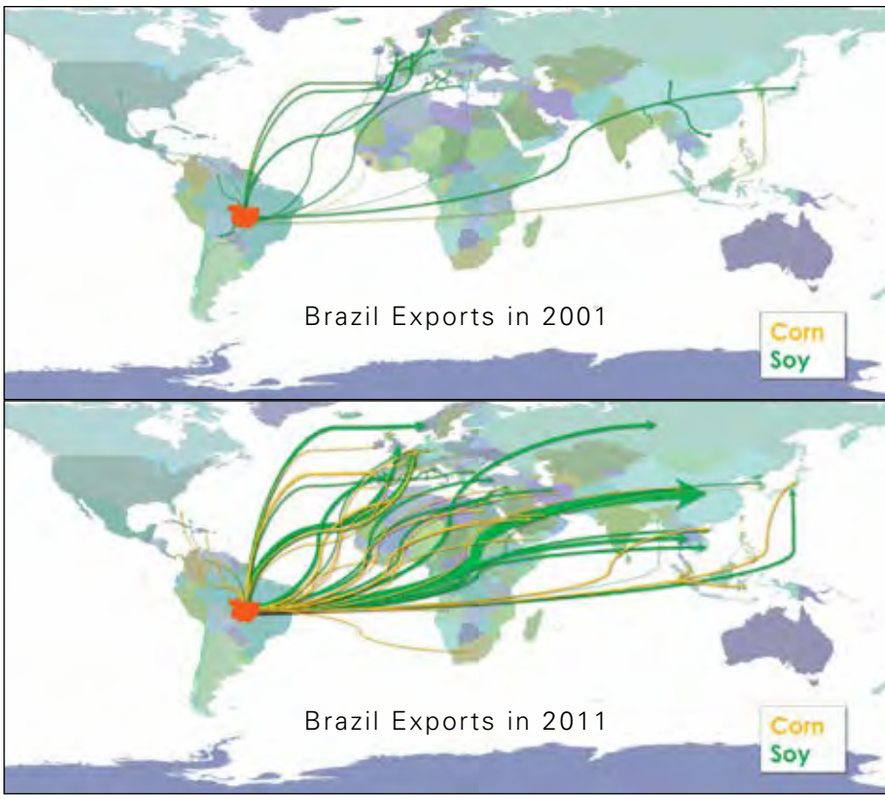
"I was invited to collaborate on a project there and everything about it – from the universities, to the dynamic landscape of the Amazon, to the incredible laboratory it offers for studying social change and environmental change – completely captured my imagination," she says.

Vanwey, a core faculty member of the Environmental Change Initiative (ECI), brought her interest and expertise in Brazil to Brown in 2008.

In 2013, Vanwey published findings concluding that double-cropping – the practice of planting two crops on the same land in one year – has created jobs, increased income, and improved public services such as sanitation and public education in Mato Grosso, Brazil's agricultural epicenter. The same effects were not observed when pasture was converted to single-crop fields – probably because single-crop fields require fewer workers and generate less taxable income, she hypothesized.

Vanwey's research built on analysis of satellite imaging of Mato Grosso by Professor of Geological Sciences Jack Mustard and his graduate student, Stephanie Spera. Every year since 2000, NASA's satellites recorded images of the region every 16 days. By monitoring the number of fields that peaked green twice in each year, Mustard and Spera measured a significant increase in double-cropping. Vanwey and two undergraduates – Rebecca de Sa and Dan Mahr – then matched the land use data to social and economic data.

In addition to studying economic-agricultural patterns in Mato Grosso, Vanwey is exploring the demographic and environmental effects of a large hydroelectric plant that has displaced local farmers, whose lands were flooded to build a major dam, and doubled the population of a nearby city as workers arrived to build the plant. Sociology graduate students Peter T. Klein and Heather Randell, undergraduate Devon Reynolds, and colleagues



at Brown's Population Studies and Training Center are collaborating on her migration study.

"As we continue to build these facilities all over the world, this experience will be increasingly relevant," she says. "Almost all of the research in this area is retrospective. Ours is the first major study that will follow people through the course of displacement and relocation."

The stakes, she says, are high.

"The single most important challenge facing humanity right now is figuring out how to extend ourselves across the planet in a responsible way that sustains natural environments as well as economies and communities," says Vanwey. "This work touches on climate change, global poverty and stability. It's incredibly broad and increasingly critical."

"Through the Environmental Change Initiative, we provide a physical and intellectual space where faculty and students from many departments collaborate on visionary interdisciplinary work that will extend across the campus and around the world, informing the way we think about environmental work."

–Amanda Lynch, *Professor of Geological Sciences, Director, Environmental Change Initiative*

BACK TO EARTH

Professor of Geological Sciences Jack Mustard is perhaps best known for his work on Mars. In 2006, he was part of an international research team that created the most comprehensive mineral record of the Red Planet (published in *Science*), describing three distinct geological eras – the earliest marked by the presence of water. But he is also interested in terrestrial phenomena.

"My goal is to understand Earth's place in space, and you can't understand Earth without understanding the role of humans," he says. "We know that Mars went through a major system change 3.5 million years ago – the kind of reorganization that has occurred on many of the planets – but we don't yet have a good process-based model that allows us to understand that. Earth may be in the midst of a major change, and humans are turning the knobs."

Since the mid-1990s, Mustard has paired his work elsewhere in the solar system with earthbound Land Use-Land Cover Change (LULCC) research – an interdisciplinary field, encompassing economics, demography, sociology, earth science, and ecology, that seeks understanding of what happens at the intersection of human activity and natural processes. A few years ago, Mustard began to collaborate with Associate Professor of Sociology Leah Vanwey on land use studies in Brazil – focusing on the agricultural center of Mato Grosso, which borders both the *cerrada* (savannah) biome and the Amazon rainforest biome.

Over the last 14 years, Mustard's team has used imaging from NASA's Terra satellite to document mass conversion of a large land tract in Mato Grosso – "an area twice the size of Massachusetts," he says – from savannah to agricultural fields. The trend slowed in 2006, when government incentives and global markets encouraged double-cropping. Farmers are now double-cropping soybeans and corn, conserving land and also prompting other significant environmental changes. For instance, Mustard's team has documented decreased rainfall in double-cropped areas.

"A number of people, including our Brazilian colleagues, have been working in this part of the world for a while, in recognition that something big is going on," says Mustard. "The questions are critical: *What happens when you torque an environment? What are the implications of overloading nitrogen into the system? What are the implications of increased or decreased rainfall? Flooding? Biodiversity changes?"*

"Understanding what's going on in Mato Grosso is important to Brazil, of course, in terms of its future as a bread basket for the world and its status as a producer of biofuel from sugarcane," Mustard says. "It also teaches all of us valuable lessons about how environments change in response to human interventions."

DIGGING DEEP

Rhode Island's past looms large in its historic mills and cityscapes. It's also underfoot – and potentially damaging – in the form of toxic chemicals buried deep in the soil.

In 2013, Brown's Superfund Research Program team – now in its ninth year of funding by the NIH National Institute of Environmental Health Sciences – analyzed data of nearly 500 soil samples taken from 31 properties in southern Rhode Island, near old water towers that had once been painted with lead-based paint. They found that, in 13 percent of the properties, samples taken an inch below the surface were lead-safe, while samples taken six to twelve inches below the surface revealed higher lead levels – and that contamination was found up to 400 feet away, double the distance that warrants testing under current regulations. The team has previously tracked levels of environmental toxic chemicals in women of childbearing age, evaluated environmental impacts on early childhood development, and conducted scores of other studies in thirteen project areas.

Professor of Pathology and Laboratory Science Kim Boekelheide, who directs the Superfund Research Program, complements the work with laboratory research focused on the fundamental mechanisms by which toxic chemicals induce injury. Areas of focus include impact of toxicity on fertility and development of improved safety testing models.

"By design, our Superfund research crosses disciplinary boundaries, from biomedical concerns to non-biomedical issues like site remediation," says Boekelheide. "Similarly, our laboratory takes an integrative approach to addressing toxicity."

Boekelheide is working with Agnes Kane, professor and chair of the Department of Pathology and Laboratory Medicine; Jeffrey Morgan, professor of medical science and engineering and co-director of the Center for Biomedical Engineering; Richard Freiman, associate professor of molecular and cellular biology and biochemistry; and Assistant Professor of Engineering Ian Wong to develop new safety testing models.

Using a proprietary technology for growing three-dimensional cellular models, developed in Morgan's lab, the group is currently growing breast tissue and plans to grow prostate tissue in an effort to develop new testing models. (Morgan's team has previously created a living model of a brain tumor and an "artificial ovary" capable of developing oocytes.) "It's a uniquely simple model that can replicate cellular interactions and allow us to monitor estrogen pathways, morphological changes, and other phenomena in a way that two-dimensional cultures can't," Boekelheide explains.

"We spend billions on safety testing of chemicals, using outdated, animal-based models established in the 1930s – and there are about 80,000 substances that have not been tested," says Boekelheide. "We need to develop new testing models that speed throughput, are cost-effective, and minimize the need for testing in animals. There is a revolution underway to change the way we test for safety, and Brown is at the forefront of the work."

do **environments change** *in response to* **human interventions**? *How* does **soil contamination** *from long-ago* **lead** *sources* go? *What is the impact of* **toxicity on fertility**? *How can a team of* **engineers** and **pathologists** *develop new,* **animal-free** *approaches to* **chemical testing**? *How can the world accommodate the needs of* **double-cropping** *in Brazil affecting* **rainfall**? *How*

SEA CHANGE

Olivia Santiago ’16 first felt the pull of personal mission on a flight to Haiti to help construct her high school’s sister school, SOPUDEP, during her senior year. Viewed from above, Hispaniola’s sharp divide – between the Dominican Republic’s lush tropical green and Haiti’s devastated landscape – was impossible to miss.

“It was mind-blowing,” she remembers. “You could see this huge mountain that was completely deforested. It was clear evidence of the impact of the two countries’ environmental policies.”

As an environmental sciences concentrator and a member of Brown’s women’s water polo team, Santiago is building a rich undergraduate experience that blends her interests in sustainability, policy, and human life in the natural world – particularly in island culture. “I really love small island countries,” she says.

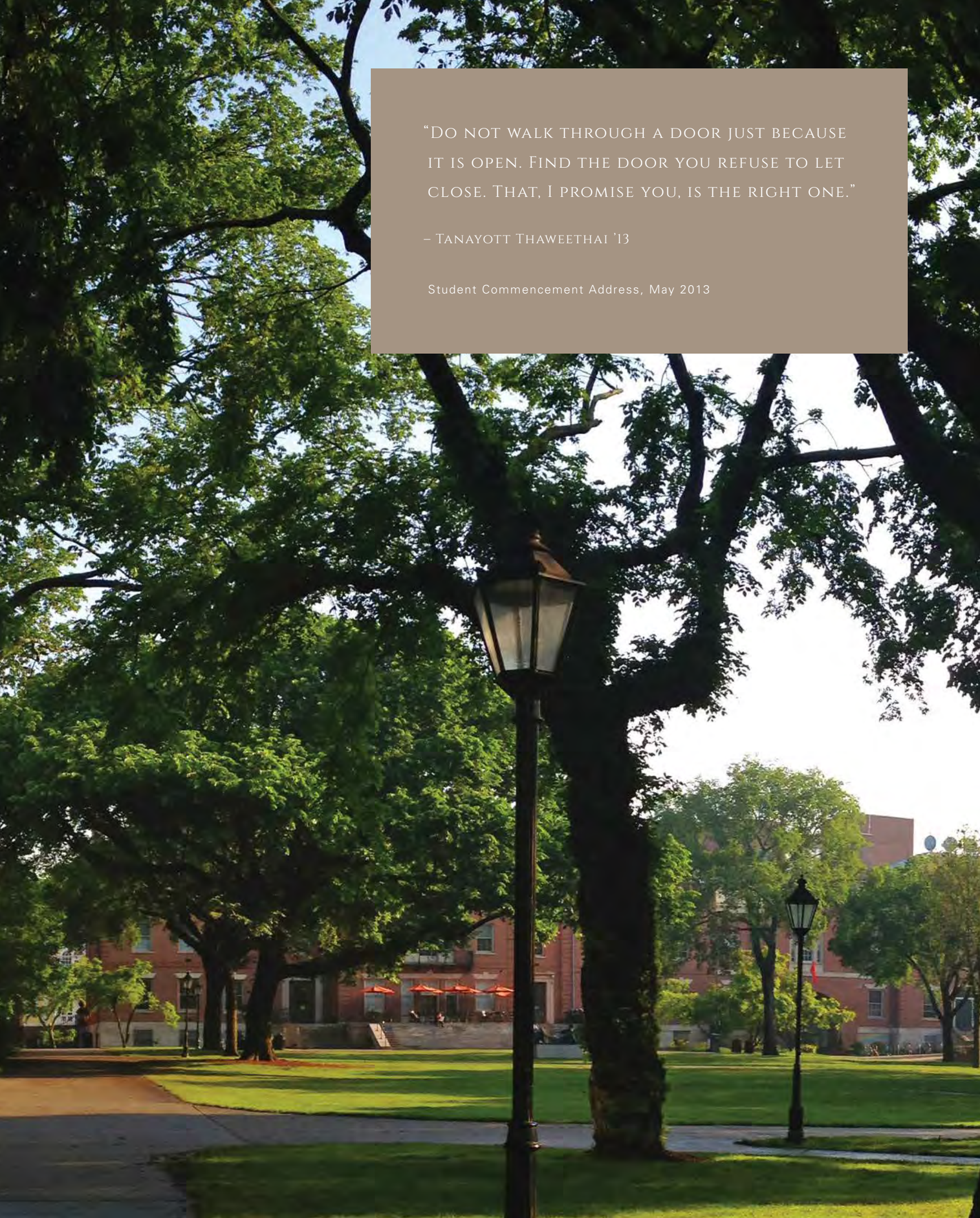
Funded by a Royce Fellowship, Santiago spent the summer of 2013 in Trinidad, working with the Trinidad-Tobago Ministry of Sport – a relationship brokered through the Caribbean Sport and Development Agency – to teach children how to swim.

The program was about safety as well as recreation, she explains. “Although the ocean is within sight every day for almost everyone, it’s alarming how few people in the Caribbean know how to swim. There is widespread fear of the water. It’s also an issue of resources. Access to swimming lessons in public pools is very limited.”

Santiago plans to spend the summer of 2014 at the Bonn Climate Change Conference in Bonn, Germany, as a research assistant to Ronald Jumeau, Permanent Representative of the Republic of the Seychelles to the United Nations and Ambassador to the United States. She met Jumeau during a fall 2013 trip to the United Nations Framework Convention on Climate Change in Warsaw, Poland with Ittleson Professor of Environmental Studies and Sociology J. Timmons Roberts and Dawn King, visiting assistant professor at the Center for Environmental Studies, and the undergraduates and graduate students of Brown’s Climate and Development Lab.

Olivia Santiago celebrates the last day of school with student’s at FOPAD Elementary School in Port-au-Prince, Haiti.

“I’m going to dedicate the rest of my education at Brown to small island nation politics and environmental policy – to exploring the challenges faced by people who are directly affected by sea level changes caused by climate change,” she says. “As a world community, we have a responsibility to address the needs of climate-displaced people who can’t even be called *climate refugees* because they have no home to go back to. Where do they go? How do we meet their needs?”



"Do not walk through a door just because it is open. Find the door you refuse to let close. That, I promise you, is the right one."

– Tanayott Thaweethai '13

Student Commencement Address, May 2013

FACULTY HONORS AND AWARDS

Susan Alcock
Joukowsky Family Professor of Archaeology and Classics, Professor of History of Art and Architecture, Professor of Anthropology, Director of Early Cultures, Director of Archaeology and the Ancient World
British Academy Fellow

Geri Augusto
Visiting Associate Professor of Africana Studies
Fulbright Scholar Research Fellowship

Wesley Bernskoetter
Manning Assistant Professor of Chemistry
Sloan Fellowship

Mark Bertness
Robert P. Brown Professor of Biology
Fulbright Scholar Research Fellowship

Alexander Braverman
Associate Professor of Mathematics
Simons Foundation Fellow

Kenneth Breuer
Professor of Engineering
Fellow of the American Society of Mechanical Engineers (ASME)

Melani Cammett
Associate Professor of Political Science
Andrew W. Mellon Foundation New Directions Fellowships

David Cane
Vernon K. Krieble Professor of Chemistry
Alfred Bader Award in Bioorganic Chemistry and American Academy of Arts and Sciences Fellow

Robyn Creswell
Assistant Professor of Comparative Literature
Roger Shattuck Prize for Criticism

Roquinaldo Ferreira
Vasco da Gama Associate Professor of Early Modern Portuguese History
National Endowment for the Humanities Fellowship

Andrew Foster
Professor of Economics, Director of the Population Studies and Training Center
President, Bureau for Research and Economic Analysis of Development

Kim Gans
Professor of Behavioral and Social Sciences
American Public Health Association, Food and Nutrition Section's Mary C. Egan Award

James Green
Professor of History and Professor of Portuguese and Brazilian Studies
Audre Lorde Article Prize (American Historical Association) and Joseph T. Criscenti Article Prize (New England Council on Latin American Studies)

Francoise Hamlin
Hans Rothfels Assistant Professor of Africana Studies and History
Lillian Smith Book Award (Southern Regional Council and University of Georgia Libraries)

Johanna Hanink
Robert Gale Noyes Assistant Professor of Humanities
Onassis Fellow

Omur Harmansah
Assistant Professor of Archaeology and the Ancient World and Assistant Professor of Egyptology and Ancient Western Asian Studies
Donald D. Harrington Faculty Research Fellow

James Head
Louis and Elizabeth Scherck Distinguished Professor of Geological Sciences
Norman L. Bowen Award from the American Geophysical Union

Maurice Herlihy
Professor of Computer Science
W. Wallace McDowell Award from the IEEE Computer Society

Steven Houston
Dupee Family Professor of Social Science and Director of Early Cultures
Tatiana Proskouriakoff Award, Peabody Museum, Harvard and the Alfred H. Barr Jr. Award for Museum Scholarship

Robert Hurt
Professor of Engineering
Charles E. Pettinos Award from the American Carbon Society

George Karniadakis
Charles Pitts Robinson and John Palmer Barstow Professor of Applied Mathematics
J. Tinsley Oden Medal, Association for Computational Mechanics

Eunsuk Kim
Assistant Professor of Chemistry
NSF Early Career Award and American Chemical Society Global Experiences, Exchanges and Training Program Award

Ross Kraemer
Professor of Religious Studies and Professor of Judaic Studies
President, New England Regional Society of Biblical Literature

W. Curt LaFrance, Jr.
Assistant Professor of Psychiatry and Human Behavior (research)
American Academy of Neurology's Dreifuss-Penry Epilepsy Award

Robert Lee
Associate Professor of American Studies
Fulbright Scholar Research Fellowship

Adam C. Levine
Assistant Professor of Emergency Medicine
Global Emergency Academy's Inaugural Humanitarian Service Award

Dore Levy
Professor of Comparative Literature and Professor of East Asian Studies
Dumbarton Oaks Visiting Fellow

Eng Beng Lim
Assistant Professor of Theatre Arts & Performance Studies
Center for Lesbian and Gay Studies Fellowship (CUNY)

Catherine Lutz
Thomas J. Watson Jr. Family Professor of International Studies and Professor of Anthropology
John Simon Guggenheim Memorial Foundation Fellowship

John Marston
Professor of Physics
American Physical Society Fellow

Rose McDermott
Professor of Political Science
American Academy of Arts and Sciences Fellow

Vincent Mor
Professor of Health Services Policy and Practice
National Hospice and Palliative Care Organization's 2013 Distinguished Researcher Award and John M. Eisenberg Excellence in Mentorship Award

Elias Muhanna
Assistant Professor of Comparative Literature
Bruce D. Craig Prize (Mamluk Studies Review)

Dietrich Neumann
Professor of History of Art and Architecture and Professor of Urban Studies and Professor of Italian Studies
Berlin Prize, American Academy in Berlin

Samuel Perry
Assistant Professor of East Asian Studies
Japan Foundation Research Fellowship

Thomas Powers
Professor of Engineering and Professor of Physics
American Physical Society Fellow

Kavita Ramanan
Professor of Applied Mathematics
Institute of Mathematical Statistics Fellow

Eric Renault
C.V. Starr Professor of Commerce, Organizations, and Entrepreneurship
President, Society for Financial Econometrics

Björn Sandstede
Professor of Applied Mathematics and Chair of Applied Mathematics
Society for Industrial and Applied Mathematics Fellow

Thomas Schestag
Associate Professor of German Studies
John P. Birkelund Fellow, American Academy in Berlin

Roberto Serrano
Harrison S. Kravis University Professor of Economics, Chair of Economics
Econometric Society Fellow

Tracy Steffes
Assistant Professor of Education and Assistant Professor of History
American Council of Learned Societies Fellowship

Richard Stratt
Newport Rogers Professor of Chemistry
American Chemical Society Fellow

Walter Strauss
L. Herbert Ballou University Professor of Mathematics
Fulbright Scholar Research Fellowship and American Academy of Arts and Sciences Fellow

Joan Teno
Professor of Health Services Policy and Practice
Robert Wood Johnson Foundation Investigator Award

Leslie Thornton
Professor of Modern Culture and Media
John Simon Guggenheim Memorial Foundation Fellowship

Joshua Tucker
Assistant Professor of Music
Wenner-Gren Foundation Fellowship

James Valles, Jr.
Professor of Physics, Chair of Physics
American Physical Society Fellow

Michael Vorenberg
Associate Professor of History
National Endowment for the Humanities Fellowship

Lai-Sheng Wang
Professor of Chemistry
Earle K. Plyler Prize in Molecular Spectroscopy and Dynamics

Martin A. Weinstock
Professor of Dermatology
American Academy of Dermatology's Lila and Murray Gruber Cancer Research Award

Terrie Fox Wetle
Dean of the School of Public Health
American Public Health Association's Aging and Public Health Section Lifetime Achievement Award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FY 2013 FINANCIAL REVIEW & OPERATING PERFORMANCE

FY 2013 Financial Review

Brown University posted strong financial results for fiscal year 2013, as our finances continue to recover from the global economic recession of 2009.

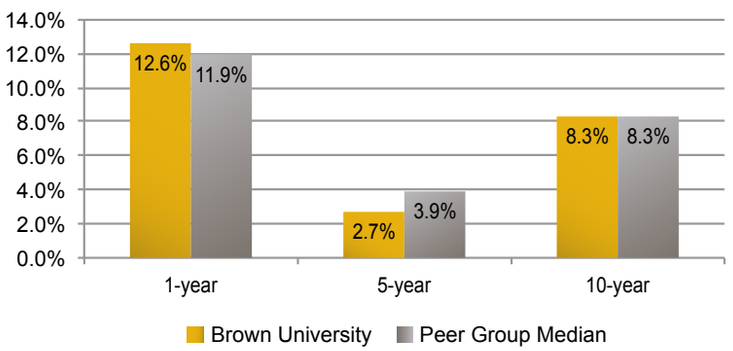
Operating Performance

From an operating budget perspective, Brown ended the fiscal year better than expected. With the approved financial plan for fiscal 2013 the University continued on a path of steady, modest growth, supporting its broad academic mission and carefully targeting resources to sustain excellence in research and teaching. In developing the 2013 financial plan, we had expected that the University would incur $871 million of expenses against $862 million of operating revenue, requiring about $9 million of reserves and balances (funds set aside in prior years) to support current operations. Brown planned for this use of reserves to ensure that the University could support critical academic and research priorities while we simultaneously developed plans to expand revenues and continue to manage and control our expenses. At year-end, revenue from tuition and fees was higher than expected and expenses for financial aid were lower. As a result, the operating budget shortfall was held to $5.5 million. The use of reserves amounted to a little more than one-half of one percent of our total operating budget.

During fiscal year 2013, Brown alumni, friends and parents generously contributed close to $176 million in cash gifts for current use, endowment and capital projects. More than 35,000 members of the Brown community contributed nearly $36 million to the 2012-13 Brown Annual Fund. The extraordinary support from the Brown community has been essential to the progress made in recent years and will be critical to the success of the Building on Distinction strategic plan.

For the fiscal year ended, June 30, 2013, the Brown endowment earned a 12.6-percent return. The market value grew to almost $2.7 billion – reflecting investment return, more than $62 million in new gifts, and distribution of $126 million toward the operating budget. The endowment has effectively recovered all the value it lost in 2008 during the global financial crisis. The three-, five-, and 10-year annualized returns for the endowment as of June 30, 2013, are 10.5 percent, 2.7 percent and 8.3 percent, respectively. Over the past decade, the average annual return of 8.3 percent is on par with the median return for our peer group of the 50 largest U.S. endowments.

Brown vs. Peer Group Average Annual Compound Returns Periods ending June 30, 2013



In June 2013, Brown hired Joseph L. Dowling III as our new vice president and chief investment officer. Since his arrival, Dowling has been working to assess the University's investment strategy and recommend modifications to the Investment Committee of the Brown Corporation. Brown uses both qualitative and quantitative approaches in setting its asset allocation, incorporating informed judgment as well as rigorous modeling and testing. Brown's portfolio continues to be well diversified, and the University's long-term investment policy is reviewed and revised as necessary. At June 30, 2013, the long-term investment pool had 89 percent invested in equities (25 percent in public equity, 6 percent in equity-like credit, 24 percent in hedged strategies, 21 percent in private equity, and 13 percent in real assets), 10 percent in fixed income, and 1 percent in cash.

Asset Allocation as of June 30, 2013

Public Equity	25.0%
Equity Like Credit	6.0%
Hedged Strategies	24.0%
Private Equity	21.0%
Real Assets	13.0%
Total Equity	**89.0%**
Fixed Income	**10.0%**
Cash	**1.0%**
Total Portfolio	100%

The University's endowment spending policy balances the need for current income with the equally important goal of preserving the endowment's value in order to provide funding for future generations. For fiscal year 2013, the endowment provided $126 million to support the University's operating budget, which was equivalent to about 5.1 percent of the endowment's market value at the start of fiscal year 2013. The endowment contributed 14 percent of the University's fiscal 2013 operating budget, supporting need-blind admissions, professorships, graduate student fellowships, library acquisitions, the Division of Biology and Medicine, more than 60 academic programs, all varsity sports, and building maintenance.

FY13 Financial Statements

The pages that follow present Brown University's audited financial statements. These statements reflect the University's financial condition at the close of fiscal year 2013 in accordance with U.S. generally accepted accounting principles. The audited financial statements follow FASB accounting conventions, which treat some revenue and expense items differently than we do in our operating budget. The major differences include the presentation of financial aid (as a discount from revenue rather than an expense), the use of depreciation rather than actual principal repayments on debt, and recognizing unconditional pledges as revenue.

As shown on the Balance Sheet, at June 30, 2013, the University reported total assets of $4.4 billion, liabilities of $963.2 million, and net assets – total assets minus liabilities – of $3.5 billion. Net assets increased by $290 million, or 9.2 percent, from 2012, reflecting the rise in value of the University's investments and growth in new gifts.

Total assets increased by $262.7 million to $4.4 billion in fiscal year 2013, largely due to the performance of our investments, growth in new gifts, and increased investment in plant. Brown's investment portfolio – the endowment plus short-term investments net of investment-related liabilities – increased $361 million, or 13.3 percent, from $2.7 billion on June 30, 2012, to $3.1 billion on June 30, 2013. In addition to the strong investment returns, there was a significant reduction in the liabilities related to investments due to improvement in the year-end market valuations of our debt-related interest rate swaps and our pension obligations. The depreciated value of Brown's land, buildings, and equipment increased during the year from $953.3 million to $1 billion due to improvements to campus infrastructure and investments in facility renewal for both academic and student services buildings.

Liabilities decreased in total by $26.9 million, ending FY2013 at $963.2 million, the net of adding a modest

amount of new debt for capital projects and a significant decrease in liabilities related to investments. Total debt as of June 30, 2013 was $751.3 million, an increase of $91.2 million from the prior year. In July 2012, Brown issued $118.2 million of tax-exempt debt with an average life of 9.5 years to undertake some critical capital projects. Moody's and Standard and Poors reaffirmed our ratings of Aa1 and AA+, respectively, and gave Brown a "stable" outlook for the future.

As shown on the Statement of Activities, the change in net assets from operating activities, which includes interest and depreciation expenses, was a positive $2.4 million. Total operating revenues increased by 3.9 percent to $732.1 million, primarily the result of increases in net tuition revenue and endowment payout. Total expenses, before depreciation, increased at just 2.8 percent to $663.2 million.

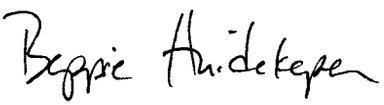
The University derives its operating revenue from five main sources: student tuition and fees (net of scholarships and fellowships), grants and contracts, contributions, endowment payout, and sales and services of auxiliary enterprises (such as dining and housing).

Student tuition and fees (not including room and board) continue to represent the largest portion of revenues, totaling $400 million, up 10.9 percent from the prior year. This large increase was due to planned increases in undergraduate, graduate and medical enrollment. Tuition, room and board for 2012-2013 increased by 3.5 percent from the prior year. Scholarships for undergraduate and graduate students, which are shown as an offset to tuition and fees, totaled $141.9 million, an increase of 15.4 percent from the 2012 level.

Brown received a total of $162.3 million in direct and indirect support from external sponsors of research grants and training programs, a decrease of 6.2 percent from the prior year, as federal budget constraints and sequestration had an impact on grant funding. Endowment payout distributed for operating support increased by 8.1 percent to $125.9 million. The amount distributed in fiscal year 2013 represented 5.1 percent of the endowment's market value at the start of the fiscal year.

Operating expenditures, excluding depreciation, totaled $663.2 million in fiscal year 2013, up less than 3 percent from the previous year. Salaries, wages, and benefits, which account for about 59 percent of total expenses, increased overall by 5.2 percent, primarily due to small increases in the total number of faculty and staff. Graduate student support increased by 25.3 percent, due primarily to a change in the tuition policy for these students. Due to energy savings and lower unit costs for oil and gas, the cost of utilities decreased by more than 8 percent, from $19.2 million to $17.6 million. The University has been aggressive about locking in energy prices when rates are favorable. As a result, even as Brown adds new buildings and more space, we have been able to reduce our utilities budget. Interest expense totaled $22.5 million and was just 3.4 percent of Brown's total expenses excluding depreciation. Finally, plant and equipment depreciation totaled $66.6 million.

Brown's financial position is stable and our endowment has performed well. Constraints on our resources, however, are likely to continue, as the economy struggles to recover, federal support for research remains uncertain and family incomes remain stagnant. But the Brown community – faculty, staff, students and alumni – is as committed as ever to sustaining our tradition of excellence, enhancing our reputation for innovation in education, and advancing our place among the world's great universities.



Elizabeth C. Huidekoper
Executive Vice President for Finance and Administration

SELECTED STATISTICS

	2009	2010	2011	2012	2013
Enrollment*					
Undergraduates	5,846	5,989	6,076	6,096	6,133
Graduate School	1,719	1,817	1,893	1,916	1,947
Medical School	408	416	410	417	467
Total Enrollment	**7,973**	**8,222**	**8,379**	**8,429**	**8,547**
Undergraduate Admissions					
Number of applicants	24,988	30,135	30,944	28,743	28,918
Admit rate	11%	9%	9%	10%	9%
Yield (% accepted who matriculate)	54%	53%	55%	56%	59%
First-year students receiving University scholarship	41%	46%	46%	46%	42%
Graduate Admissions					
Number of applicants	7,202	9,045	9,319	9,473	9,245
Admit rate	17%	15%	15%	15%	17%
Yield (% accepted who matriculate)	47%	44%	42%	44%	43%
Tuition and Fees					
Undergraduate & Graduate tuition	$36,928	$38,048	$39,928	$41,328	$42,808
Total tuition, fees, room, board	47,740	49,128	51,360	53,136	55,016
Medical School tuition	39,824	41,016	43,064	45,216	47,480
Number of Faculty**	689	687	682	688	713
Square Footage of Campus Facilities	6,882,112	6,905,481	6,929,870	6,984,524	6,939,550
Endowment Market Value	$2,035,869	$2,175,546	$2,522,133	$2,477,352	$2,695,316
Financial Data and Ratios (Dollars in thousands)					
Total assets	$3,398,653	$3,729,250	$4,184,940	$4,152,666	$4,415,343
Total liabilities	(673,837)	(856,917)	(953,250)	(990,067)	(963,178)
Net assets	$2,724,816	$2,872,333	$3,231,690	$3,162,599	$3,452,165
Pledges receivable, net	$208,007	$194,664	$161,136	$158,784	$146,051
External debt	$492,400	$609,160	$629,493	$660,096	$751,335
Facilities, net of depreciation	$777,539	$820,133	$897,578	$953,334	$1,019,875
Total resources to debt	4.8X	4.2X	4.6X	4.4X	4.4X
Expendable resources to debt	2.8X	2.5X	2.8X	2.6X	2.6X
Debt service to operations	3.5%	4.3%	4.4%	4.3%	3.9%

*Degree candidates only.

** Includes all regular faculty, including those in Biology, Medicine and Public Health. It does not include 103 campus-based research faculty, 644 Medical and Public Health academic faculty, and 1,348 voluntary clinical faculty.

INDEPENDENT AUDITORS' REPORT

The President and Corporation
Brown University:

We have audited the accompanying financial statements of Brown University, which comprise the balance sheets as of June 30, 2013 and 2012, the related statements of activities and cash flows for the years then ended, and the related notes to the financial statements.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with U.S. generally accepted accounting principles; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the organization's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the organization's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Brown University as of June 30, 2013 and 2012, and the changes in its net assets and its cash flows for the years then ended in accordance with U.S. generally accepted accounting principles.

KPMG LLP

Providence, Rhode Island
October 29, 2013

BALANCE SHEETS

YEAR ENDED JUNE 30, 2013
(DOLLARS IN THOUSANDS)

	2013	2012
Assets		
Cash and cash equivalents	$14,009	52,890
Receivables for investments sold	21,287	79,720
Accounts receivable and other assets	38,535	72,168
Contributions receivable, net	146,051	158,784
Notes receivable, net	32,960	32,202
Funds held in trust by others	66,463	17,333
Investments	3,076,163	2,786,235
Land, buildings and equipment, net	1,019,875	953,334
Total assets	$4,415,343	4,152,666
Liabilities and Net Assets		
Liabilities:		
Accounts payable and accrued liabilities	$46,182	64,384
Liabilities associated with investments	7,276	78,423
Student deposits and grant advances	52,913	50,806
Federal student loan advances	24,590	24,671
Split-interest obligations	26,640	23,143
Other long-term obligations	54,242	88,544
Bonds, loans and notes payable	751,335	660,096
Total liabilities	963,178	990,067
Net assets:		
Unrestricted	934,271	717,741
Temporarily restricted	1,262,860	1,262,796
Permanently restricted	1,255,034	1,182,062
Total net assets	3,452,165	3,162,599
Total liabilities and net assets	$4,415,343	4,152,666

See accompanying notes to financial statements.

STATEMENT OF ACTIVITIES

YEAR ENDED JUNE 30, 2013

(DOLLARS IN THOUSANDS)

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Operating revenues:				
Tuition and fees	$400,020	—	—	**400,020**
Less university scholarships	(141,914)	—	—	**(141,914)**
Net tuition and fees	258,106	—	—	**258,106**
Grants and contracts – direct	121,931	—	—	**121,931**
Grants and contracts – indirect	40,355	—	—	**40,355**
Contributions	55,527	14,978	—	**70,505**
Endowment return appropriated	119,966	5,892	—	**125,858**
Sales and services of auxiliary enterprises	84,947	—	—	**84,947**
Other income	30,436	—	—	**30,436**
Net assets released from restrictions	3,137	(3,137)	—	—
Total operating revenues	714,405	17,733	—	**732,138**
Operating expenses:				
Salaries and wages	294,674	—	—	**294,674**
Employee benefits	94,185	—	—	**94,185**
Graduate student support	58,869	—	—	**58,869**
Purchased services	59,420	—	—	**59,420**
Supplies and general	85,086	—	—	**85,086**
Utilities	17,567	—	—	**17,567**
Other	30,889	—	—	**30,889**
Interest	22,495	—	—	**22,495**
Operating expenses before depreciation	663,185	—	—	**663,185**
Net change from operating activities before depreciation	51,220	17,733	—	**68,953**
Depreciation	66,597	—	—	**66,597**
Change in net assets from operating activities	(15,377)	17,733	—	**2,356**
Nonoperating activities:				
Contributions	50,966	9,065	64,185	**124,216**
Net investment return	72,772	212,013	4,592	**289,377**
Endowment return appropriated	(21,867)	(103,991)	—	**(125,858)**
Other changes, net	127,425	(132,145)	4,195	**(525)**
Net assets released from restrictions	2,611	(2,611)	—	—
Change in net assets from nonoperating activities	231,907	(17,669)	72,972	**287,210**
Change in net assets	216,530	64	72,972	**289,566**
Net assets, beginning of year	717,741	1,262,796	1,182,062	**3,162,599**
Net assets, end of year	**$934,271**	**1,262,860**	**1,255,034**	**3,452,165**

See accompanying notes to financial statements.

STATEMENT OF ACTIVITIES

YEAR ENDED JUNE 30, 2012

(DOLLARS IN THOUSANDS)

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Operating revenues:				
Tuition and fees	$360,794	—	—	360,794
Less university scholarships	(122,940)	—	—	(122,940)
Net tuition and fees	237,854	—	—	237,854
Grants and contracts – direct	130,002	—	—	130,002
Grants and contracts – indirect	43,031	—	—	43,031
Contributions	58,539	9,980	—	68,519
Endowment return appropriated	111,937	4,488	—	116,425
Sales and services of auxiliary enterprises	81,583	—	—	81,583
Other income	26,979	459	—	27,438
Net assets released from restrictions	10,323	(10,323)	—	—
Total operating revenues	700,248	4,604	—	704,852
Operating expenses:				
Salaries and wages	281,635	—	—	281,635
Employee benefits	87,954	—	—	87,954
Graduate student support	46,997	—	—	46,997
Purchased services	58,697	—	—	58,697
Supplies and general	86,907	—	—	86,907
Utilities	19,170	—	—	19,170
Other	38,067	—	—	38,067
Interest	25,792	—	—	25,792
Operating expenses before depreciation	645,219	—	—	645,219
Net change from operating activities before depreciation	55,029	4,604	—	59,633
Depreciation	59,601	—	—	59,601
Change in net assets from Operating activities	(4,572)	4,604	—	32
Nonoperating activities:				
Contributions	6,618	19,864	68,483	94,965
Net investment return	(1,513)	13,262	(401)	11,348
Endowment return appropriated	(32,248)	(84,177)	—	(116,425)
Other changes, net	(52,207)	(13,777)	6,973	(59,011)
Net assets released from restrictions	49,992	(49,992)	—	—
Change in net assets from Nonoperating activities	(29,358)	(114,820)	75,055	(69,123)
Change in net assets	(33,930)	(110,216)	75,055	(69,091)
Net assets, beginning of year	751,671	1,373,012	1,107,007	3,231,690
Net assets, end of year	$717,741	1,262,796	1,182,062	3,162,599

See accompanying notes to financial statements.

STATEMENTS OF CASH FLOWS

YEARS ENDED JUNE 30, 2013 AND 2012

(DOLLARS IN THOUSANDS)

	2013	2012
Cash flows from operating activities:		
Change in net assets	$289,566	(69,091)
Adjustments to reconcile change in net assets to net cash used in operating activities:		
Net realized and unrealized gains on investments	(294,498)	(19,010)
Realized loss on partial swap termination	2,600	2,767
Depreciation	66,597	59,601
Amortization of bond premium	(3,658)	—
Loss from disposals of land, building and equipment	591	4,056
Change in funded status of pension obligation	(11,109)	11,805
Change in fair value of interest rate swap liabilities	(23,577)	29,989
Change in asset retirement obligation	384	43
Change in estimate of split-interest obligations	5,765	4,817
Contributions restricted for plant and endowment	(72,745)	(77,129)
Change in accounts receivable and other assets	33,633	(16,702)
Change in accounts payable and accrued liabilities	(8,753)	(541)
Change in other operating assets, net	672	15,458
Change in other operating liabilities, net	2,026	(6,349)
Net cash used in operating activities	(12,506)	(60,286)
Cash flows from investing activities:		
Additions to land, buildings and equipment	(143,178)	(119,113)
Purchases of investments	(933,127)	(1,521,797)
Sales and redemptions of investments	979,988	1,590,401
Notes (advanced to) repaid by students and others	(758)	988
Change in funds held in trust by others	(49,130)	10,610
Net cash used in investing activities	(146,205)	(38,911)
Cash flows from financing activities:		
Contributions restricted for plant and endowment	72,745	77,129
Payments under split-interest obligations	(2,268)	(2,252)
Payment for partial swap termination	(2,600)	(2,767)
Payments on long-term debt	(5,910)	(84,525)
Proceeds from issuance of debt, including premium	149,807	80,630
Proceeds from commercial paper programs	9,220	35,000
Payments on commercial paper programs	(58,220)	—
Proceeds from secured borrowings for investment purposes	—	55,005
Payments on secured borrowings for investment purposes	(55,005)	(79,998)
Cash collateral posted under swap agreements	(2,000)	(35,300)
Cash collateral returned under swap agreements	14,500	22,800
Advance from line of credit	—	566
Payment of advance from line of credit	—	(566)
Bond issuance costs	(439)	(606)
Net cash provided by financing activities	119,830	65,116
Change in cash and cash equivalents	(38,881)	(34,081)
Cash and cash equivalents, beginning of year	52,890	86,971
Cash and cash equivalents, end of year	$14,009	52,890

See accompanying notes to financial statements.

NOTES TO FINANCIAL STATEMENTS
(DOLLARS IN THOUSANDS)

1 | SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

A | ORGANIZATION
Brown University is a private, not-for-profit, nonsectarian, coeducational institution of higher education with approximately 6,400 undergraduate students and 2,400 graduate and medical students. Established in 1764, Brown University offers educational programs for undergraduates in liberal arts and engineering, professional training for students pursuing a career in medicine, and graduate education and training in the arts and sciences, engineering and medicine.

B | BASIS OF PRESENTATION AND TAX STATUS
The accompanying financial statements are presented on the accrual basis of accounting in accordance with U.S. generally accepted accounting principles (GAAP) and present balances and transactions according to the existence or absence of donor-imposed restrictions.

The John Nicholas Brown Center for the Study of American Civilization; Fairview Incorporated, a real estate holding company; and KARING, a Rhode Island not-for-profit corporation that holds certain property of the Warren Alpert Medical School, are all separate legal entities that are consolidated in the financial statements. Brown University and these consolidated entities are collectively referred to herein as the University. All significant inter-entity transactions and balances have been eliminated.

The University is a not-for-profit organization as described in Section 501(c)(3) of the Internal Revenue Code, as amended, and is generally exempt from income taxes. The University assesses uncertain tax positions and determined that there are no such positions that have a material effect on the financial statements.

C | CLASSIFICATION OF NET ASSETS
The University is incorporated in and subject to the laws of Rhode Island, which contain the provisions outlined in the Uniform Prudent Management of Institutional Funds Act (UPMIFA). Under UPMIFA, the net assets of a donor-restricted endowment fund may be appropriated for expenditure by the Corporation of the University in accordance with the standard of prudence prescribed by UPMIFA. The University has classified its net assets as follows:

- *Permanently restricted net assets* contain donor-imposed stipulations that neither expire with the passage of time nor can be fulfilled or otherwise removed by actions of the University and primarily consist of the historic dollar value of contributions to establish or add to donor-restricted endowment funds.

- *Temporarily restricted net assets* contain donor-imposed stipulations as to the timing of their availability or use for a particular purpose. These net assets are released from restrictions when the specified time elapses or actions have been taken to meet the restrictions. Net assets of donor-restricted endowment funds in excess of their historic dollar value are classified as temporarily restricted net assets until appropriated by the Corporation and spent in accordance with the standard of prudence imposed by UPMIFA.

- *Unrestricted net assets* contain no donor-imposed restrictions and are available for the general operations of the University. Such net assets may be designated by the Corporation for specific purposes, including to function as endowment funds.

D | FAIR VALUE MEASUREMENTS
Investments, funds held in trust by others, and interest rate swaps are reported at fair value in the University's financial statements. Fair value represents the price that would be received upon the sale of an asset or paid upon the transfer of a liability in an orderly transaction between market participants as of the measurement date. The University uses a three-tiered hierarchy to categorize those assets and liabilities based on the valuation methodologies employed. In addition, classification of certain alternative investments within the fair value hierarchy is based on the University's ability to timely redeem its interest rather than the valuation inputs. The hierarchy is defined as follows:

- Level 1 – Valuation based on quoted prices (unadjusted) in active markets that are accessible at the measurement date for assets or liabilities;

- Level 2 – Valuations based on inputs other than quoted prices that are observable for the asset or liability either directly or indirectly, and also includes alternative investments redeemable on or near the measurement date; and

- Level 3 – Valuation based on unobservable inputs used in situations in which little or no market data is available, and also includes alternative investments not redeemable near the measurement date.

The fair value hierarchy gives the highest priority to Level 1 inputs and the lowest priority to Level 3 inputs. The University utilizes valuation techniques that maximize the use of observable inputs and minimize the use of unobservable inputs to the extent possible. Transfers between categories occur when there is an event that changes the inputs used to measure the fair value of an asset or liability, or when alternative investments become more or less redeemable because of term or other changes. Transfers between fair value categories are recognized at the end of the reporting period.

E | STATEMENTS OF ACTIVITIES

The statements of activities separately report changes in net assets from operating and nonoperating activities. Operating activities consist principally of revenues and expenses related to ongoing educational and research programs, including endowment return appropriated by the Corporation of the University (the Corporation) to support those programs. Nonoperating activities consist of net investment return, an offset for endowment return appropriated for operating activities, noncapitalized plant expenditures, changes in fair values of interest rate swaps and early termination thereof, change in pension plan and other longterm obligations, contributions for longterm purposes and other programs, net assets released from donor restrictions for property placed in service, and other activities not in direct support of annual operations.

Revenues are derived from various sources, as follows:

- Tuition and fees are recognized at established rates, net of financial aid and scholarships provided directly to students, in the period in which the sessions are primarily provided. Deposits and other advance payments are reported as a liability. Sales and services of auxiliary enterprises are recognized at the time the services are provided.

- Contributions, including unconditional promises from donors reported as contributions receivable, are recognized at fair value in the period received and are classified based upon the existence or absence of donor-imposed restrictions. Expirations of donor-imposed restrictions are reported as net assets released from restrictions. Contributions subject to donor-imposed stipulations that are met in the same reporting period are reported as unrestricted revenue. Bequest intentions and conditional promises are not recorded in the University's financial statements.

- Government grants and contracts normally provide for the recovery of direct and indirect costs, subject to audit. The University recognizes revenue associated with direct and indirect costs as direct costs are incurred. The recovery of indirect costs is pursuant to an agreement which provides for a predetermined fixed indirect cost rate. Payments received in advance of grant and contract expenditures are reported as a liability.

- Dividends, interest and realized and unrealized gains (losses) on investments are reported as increases (decreases) in (1) permanently restricted net assets if the terms of the contributions require them to be added to principal; (2) temporarily restricted net assets if the terms of the related contributions impose restrictions on their availability or use; or (3) unrestricted net assets in all other cases. Investment return attributable to donor-restricted endowment funds is reported as temporarily restricted to the extent not appropriated and spent.

Expenses are reported as decreases in unrestricted net assets.

F | CASH EQUIVALENTS

For purposes of the statements of cash flows, cash equivalents, except for those held by investment managers, consist of money market funds and investments with original maturities of three months or less and are carried at cost, which approximates fair value.

G | ACCOUNTS RECEIVABLE AND OTHER ASSETS AND NOTES RECEIVABLE

Accounts receivable and other assets include amounts due from students, reimbursements due from sponsors of externally funded research, accrued income on investments, inventory and prepaid expenses, and cash held as interest rate swap collateral, and are carried at net realizable value, which approximates fair value. Notes receivable are presented net of an allowance for uncollectible amounts and consist primarily of loans to students that may have significant restrictions and long maturities, and it is not practicable to estimate their fair value.

H | LAND, BUILDINGS AND EQUIPMENT

Land, buildings and equipment are stated at cost of acquisition or construction (including capitalized interest) or, to the extent received as a gift, at estimated fair value at the time of receipt, and are presented net of accumulated depreciation. All other expenditures for maintenance and repairs are charged to operating activities as incurred.

Depreciation is calculated using the straight-line method with estimated useful lives of 30to40 years for buildings, 20-to-30 years for building improvements, and 10 years for equipment. Equipment is depreciated over a range of 3-to-15 years, depending upon asset class.

I | FUND HELD IN TRUST BY OTHERS

Funds held in trust by others represent funds that are held and administered by outside trustees, including perpetual trusts established by donors of $12,848 and $12,127 at June 30, 2013 and 2012, respectively. The University receives all or a specified portion of the return on the underlying assets of such trusts, which is primarily restricted for scholarships. The University will never receive the assets held in trust. These are classified in Level 3 in the fair value hierarchy because they are held by the trustees in perpetuity. Other trusteed funds of $53,615 and $5,206 at June 30, 2013 and 2012, respectively, represent debt proceeds to be utilized for construction projects or otherwise required to be held in reserve in accordance with debt or similar agreements. These are classified in Level 1 in the fair value hierarchy.

J | FEDERAL STUDENT LOAN ADVANCES

The University holds certain amounts advanced by the U.S. government under the Federal Perkins Loan Program and the Health Professions Student Loan Program (the Programs). Such amounts may be re-loaned by the University after collection; however, in the event that the University no longer participates in the Programs, the amounts are generally refundable to the U.S. government.

K | COLLECTIONS

The University's collections include works of art, historical treasures, and artifacts that are maintained in the University's libraries and museums. These collections are protected and preserved for education and research purposes. The collections are not recognized as assets in the financial statements of the University.

L | LIABILITIES ASSOCIATED WITH INVESTMENTS

The University participated in a repurchase agreement under which the University periodically borrowed funds collateralized with certain of its securities for other investment purposes. These amounts are reflected both as investments and liabilities associated with investments as of June 30, 2012, and amounted to $55,005. The University discontinued this program in fiscal 2013. Liabilities associated with investments also may include payables for securities purchased.

M | USE OF ESTIMATES

The preparation of financial statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosures of contingent assets and liabilities at the dates of the financial statements, and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates.

N | RECLASSIFICATIONS

Certain 2012 financial information has been reclassified to conform to the 2013 presentation.

2 | CONTRIBUTIONS RECEIVABLE

The University's contributions receivable are recognized net of discounts at rates commensurate with the risks involved and after allowance for uncollectibles are reported at net realizable value, which approximates fair value. Contributions receivable were as follows at June 30:

	2013	2012
Contributions expected to be received in:		
Less than one year	$57,596	50,727
Between one and five years	101,819	120,913
More than five years	9,818	11,006
Gross contributions receivable	169,233	182,646
Unamortized discount (at rates ranging from 0.2% to 2.5%)		
and allowance for uncollectibles	(23,182)	(23,862)
Contributions receivable, net	$146,051	158,784

3 | INVESTMENTS

INVESTMENT STRATEGY

In addition to traditional stocks and fixed-income securities, the University may also hold shares or units in institutional funds as well as in alternative investment funds involving hedged, private equity and real asset strategies. Hedged strategies involve funds whose managers have the authority to invest in various asset classes at their discretion, including the ability to invest long and short. Funds with hedged strategies generally hold securities or other financial instruments for which a ready market exists and may include stocks, bonds, put or call options, swaps, currency hedges and other instruments, and are valued accordingly. Private equity funds employ buyout and venture capital strategies and may focus on investments in turnaround situations. Real asset funds generally hold interests in public real estate investment trusts (REITs), commercial properties or commodities, or oil and gas, generally through commingled funds. Private equity and real asset strategies therefore often require the estimation of fair values by fund managers in the absence of readily determinable market values.

Investments also include assets related to donor annuities, pooled income funds, and charitable remainder trusts. Certain of these funds are held in trust by the University for one or more beneficiaries who are generally paid lifetime income, after which the principal is made available to the University in accordance with donor restrictions, if any. The assets are reported at fair value and related liabilities, which are reported as split-interest obligations, represent the present value of estimated future payments to beneficiaries.

BASIS OF REPORTING

Investments are reported at estimated fair value. If an investment is held directly by the University and an active market with quoted prices exists, the market price of an identical security is used to report fair value. Fair values for shares in registered mutual funds are based on published share prices. The University's interests in alternative investment funds are generally reported at the net asset value (NAV) reported by the fund managers and assessed as reasonable by the University, which is used as a practical expedient to estimate the fair value of the University's interest therein, unless it is probable that all or a portion of the investment will be sold for an amount different from NAV. As of June 30, 2013 and 2012, the University had no plans or intentions to sell investments at amounts different from NAV.

Because of the inherent uncertainties of valuation, these estimated fair values may differ significantly from values that would have been used had a ready market existed, and the differences could be material. Such valuations are determined by fund managers and generally consider variables such as operating results, comparable earnings multiples, projected cash flows, recent sales prices, and other pertinent information, and may reflect discounts for the illiquid nature of certain investments held.

The following tables summarize the University's investments within the fair value hierarchy by strategy type as of June 30, 2013 and 2012:

JUNE 30, 2013	Level 1	Level 2	Level 3	Total
Investments:				
Equities:				
U.S. equities	$25,753	110,693	57,103	193,549
Non-U.S. equity funds	167,101	273,744	67,555	508,400
Fixed income:				
Domestic	4,704	136,264	148,010	288,978
U.S. Treasury inflation-protected	72,654	7,577	15,155	95,386
Hedged strategies:				
General arbitrage funds	—	116,620	46,115	162,735
Distressed funds	—	—	47,698	47,698
Global/Non-U.S. funds	—	77,583	502,850	580,433
Private equity:				
Buy-out funds	—	—	408,798	408,798
Venture funds	—	—	188,306	188,306
Real assets:				
Real estate and timber	1,735	1,121	198,726	201,582
Commodities, oil and gas	—	—	59,682	59,682
Cash and cash equivalents	340,616	—	—	340,616
Total	$ 612,563	723,602	1,739,998	3,076,163

JUNE 30, 2012	Level 1	Level 2	Level 3	Total
Investments:				
Equities:				
U.S. equities	$16,330	99,700	47,813	163,843
Non-U.S. equity index funds	83,696	—	—	83,696
Non-U.S. equity funds	162,812	201,794	60,989	425,595
Fixed income:				
Domestic	4,907	153,492	82,868	241,267
U.S. Treasury inflation-protected	76,467	8,124	16,248	100,839
Hedged strategies:				
General arbitrage funds	—	117,221	14,449	131,670
Distressed funds	—	—	55,762	55,762
Global/Non-U.S. funds	—	142,324	411,867	554,191
Private equity:				
Buy-out funds	—	—	430,559	430,559
Venture funds	—	—	188,350	188,350
Real assets:				
Real estate and timber	976	1,790	210,741	213,507
Commodities, oil and gas	52	—	48,819	48,871
Cash and cash equivalents	148,085	—	—	148,085
Total	$493,325	724,445	1,568,465	2,786,235

Registered mutual funds and directly held equity securities are classified in Level 1 of the fair value hierarchy. The University's fixed income strategy includes directly held U.S. corporate bonds, which although readily marketable are valued using matrix pricing and are classified in Level 2. Most investments classified in Levels 2 and 3 consist of shares or units in non-registered investment funds as opposed to direct interests in the funds' underlying securities, which may be readily marketable or not difficult to value. Because the NAV reported by each fund is used as a practical expedient to estimate the fair value of the University's interest therein, its classification in Level 2 or 3 is based on the University's ability to redeem its interest at or near the date of the balance sheet date. If the interest can be redeemed in the near term, the investment is classified in Level 2. Accordingly, the inputs or methodology used for valuing or classifying investments for financial reporting purposes are not necessarily an indication of the risks associated with those investments or a reflection of the liquidity of or degree of difficulty in estimating the fair value of each fund's underlying assets and liabilities.

Certain hedge funds of funds contain rolling lockup provisions. Under such provisions, tranches of the investment are available for redemption once every two or three years, if the University makes a redemption request prior to the next available withdrawal date in accordance with the notification terms of the agreement. Private equity and real assets are held in funds that have initial terms of seven to eight years with extensions of one to three years, and have an average remaining life of approximately six to seven years.

The following tables present the activities for the years ended June 30, 2013 and 2012 for the University's investments classified in Level 3:

2013

Level 3 roll forward	Equities	Fixed income	Hedged strategies	Private equity	Real assets	Total
Fair value as of June 30, 2012	$108,802	99,116	482,078	618,909	259,560	1,568,465
Acquisitions	2,000	36,874	104,000	56,298	36,355	235,527
Dispositions	(2,521)	(52)	(92,329)	(167,020)	(43,234)	(305,156)
Net realized and unrealized gains	16,377	27,227	102,914	88,917	5,727	241,162
Fair value at June 30, 2013	**$124,658**	**163,165**	**596,663**	**597,104**	**258,408**	**1,739,998**

2012

Level 3 roll forward	Equities	Fixed income	Hedged strategies	Private equity	Real assets	Total
Fair value as of June 30, 2011	$150,881	47,154	532,863	583,079	250,141	1,564,118
Acquisitions	4,000	49,600	31,089	69,152	27,236	181,077
Dispositions	(11,475)	(32)	(81,703)	(77,992)	(22,903)	(194,105)
Transfers	(25,169)	(8,124)	—	—	—	(33,293)
Net realized and unrealized (losses) gains	(9,435)	10,518	(171)	44,670	5,086	50,668
Fair value at June 30, 2012	**$108,802**	**99,116**	**482,078**	**618,909**	**259,560**	**1,568,465**

Fiscal 2012 transfers of $33,293 represent the expiration of lockups.

Total investment return is included in the statements of activities as follows for the years ended June 30:

	2013	2012
Operating:		
Endowment return appropriated	$125,858	116,425
Included in other income	13,883	13,019
Nonoperating activities:		
Net investment return	289,377	11,348
Endowment return appropriated	(125,858)	(116,425)
Total return	$303,260	24,367

Total investment management and advisory expenses, including internal costs, were $16,817 and $22,158 for the years ended June 30, 2013 and 2012, respectively, and have been netted against the total return.

A | LIQUIDITY

Investment liquidity as of June 30, 2013 is aggregated below based on redemption or sale period:

	Daily	Monthly	Quarterly	Semi-annually	Subject to rolling lock-ups	Illiquid	Total
Equities	$186,729	118,252	307,835	20,873	61,551	6,709	701,949
Fixed income	218,708	85,939	—	—	79,717	—	384,364
Hedged strategies	—	154,456	39,747	43,725	445,540	107,398	790,866
Private equity	—	—	—	—	—	597,104	597,104
Real assets	2,856	—	—	—	—	258,408	261,264
Cash and cash equivalents	340,616	—	—	—	—	—	340,616
Total	$748,909	358,647	347,582	64,598	586,808	969,619	3,076,163

Investments with daily liquidity generally do not require advance notice prior to withdrawal. Investments with monthly, quarterly, and semiannual redemption frequency typically require notice periods ranging from 15 to 90 days.

B | COMMITMENTS

Private equity and real asset investments are generally made through limited partnerships. Under the terms of these agreements, the University is obligated to remit additional funding periodically as capital or liquidity calls are exercised by the manager. These partnerships have a limited existence, generally ten years, and such agreements may provide for annual extensions for the purpose of disposing portfolio positions and returning capital to investors. However, depending on market conditions, the inability to execute the fund's strategy, and other factors, a manager may extend the terms of a fund beyond its originally anticipated existence or may wind the fund down prematurely. As a result, the timing and amount of future capital or liquidity calls expected to be exercised in any particular future year is uncertain. The aggregate amount of unfunded commitments associated with private equity and real asset investments as of June 30, 2013 was $173,776 and $86,504, respectively. Additionally, some marketable investments require capital to be phased in over time. The aggregate amount of unfunded commitments associated with other alternative investments as of June 30, 2013 was $43,350.

C | INVESTMENT DERIVATIVES

The University's endowment investment portfolio includes derivative financial instruments that have been acquired to reduce overall portfolio risk by hedging exposure to certain assets held in the portfolio. The endowment also employs certain derivative financial instruments to replicate long or short asset positions more cost effectively than through purchases or sales of the underlying assets. The University has established policies, procedures, and internal controls governing the use of derivatives.

4 | ENDOWMENT

The University's endowment consists of approximately 2,600 individual funds established for a variety of purposes, including both donor restricted endowment funds and funds designated by the Corporation to function as endowments. Net assets associated with the endowment are classified and reported based upon the existence or absence of donor imposed restrictions. The 2012 endowment information has been reclassified to reflect the removal of $62,553, consisting of previously appropriated but unspent return on donor restricted endowments and split interest agreements outside of the University's long-term pool. In addition, in 2013, upon further analysis of the endowment, $97,143 associated primarily with accumulated returns on Corporation designated funds was reclassified from temporarily restricted to unrestricted net assets and is included in other changes, net on the 2013 statement of activities. This change had no impact on total expendable net assets or the total endowment.

Endowment net assets consist of the following at June 30, 2013:

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Donor-restricted endowment funds	$(7,126)	1,067,832	1,126,878	2,187,584
Corporation-designated endowment funds	423,905	58,459	—	482,364
Total endowment net assets	$416,779	1,126,291	1,126,878	2,669,948

Endowment net assets consist of the following at June 30, 2012:

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Donor-restricted endowment funds	$(22,176)	1,061,044	1,065,141	2,104,009
Corporation-designated endowment funds	300,994	57,535	—	358,529
Total endowment net assets	$278,818	1,118,579	1,065,141	2,462,538

Changes in endowment net assets for the year ended June 30, 2013 are as follows:

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Endowment at June 30, 2012	$278,818	1,118,579	1,065,141	2,462,538
Investment return, net	62,797	211,197	—	273,994
Endowment return appropriated	(21,867)	(103,991)	—	(125,858)
Contributions	—	1,669	59,959	61,628
Reclassifications and other changes	97,031	(101,163)	1,778	(2,354)
Endowment at June 30, 2013	$416,779	1,126,291	1,126,878	2,669,948

Changes in endowment net assets for the year ended June 30, 2012 are as follows:

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Endowment at June 30, 2011	$310,069	1,189,438	999,422	2,498,929
Investment return, net	2,260	11,042	—	13,302
Endowment return appropriated	(32,248)	(84,177)	—	(116,425)
Contributions	57	1,154	57,681	58,892
Reclassifications and other changes	(1,320)	1,122	8,038	7,840
Endowment at June 30, 2012	$278,818	1,118,579	1,065,141	2,462,538

A | INTERPRETATION OF RELEVANT LAWS

The portion of donor-restricted endowment funds that is not classified as permanently restricted net assets is classified as temporarily restricted net assets until those amounts are appropriated for expenditure by the University in a manner consistent with the standard of prudence prescribed by UPMIFA. In accordance with UPMIFA, the University considers the following factors in making a determination to appropriate or accumulate donor-restricted endowment funds:

- The duration and preservation of the fund
- The purposes of the University and the donor-restricted endowment fund
- General economic conditions
- The possible effect of inflation and deflation
- The expected total return from income and the appreciation of investments
- Other resources of the University
- The investment policies of the University

B | FUNDS WITH DEFICIENCIES

From time to time, the fair value of assets associated with an individual donor-restricted endowment fund may fall below the fund's historic dollar value. Deficiencies of this nature, which are reported in unrestricted net assets, aggregated $7,126 and $22,176 as of June 30, 2013 and 2012, respectively. These deficiencies resulted principally from investment losses and continued appropriation for certain programs that was deemed prudent by the Corporation. Subsequent gains that restore the fair value of the assets of these endowment funds to their historic dollar value will be classified as increases in unrestricted net assets.

C | RETURN OBJECTIVES AND RISK PARAMETERS

The University has adopted investment and spending policies for endowment assets that attempt to provide a predictable stream of funding to programs supported by its endowment while seeking to maintain the purchasing power of the endowment assets, including both donor-restricted and designated funds. The longterm investment return objective is formulated to maintain purchasing power after accounting for both inflation and spending. The Corporation has set a longterm return goal at 5.5% above the higher education price index. Actual returns in any given year or period of years may vary from this amount.

D | STRATEGIES EMPLOYED FOR ACHIEVING OBJECTIVES

To satisfy its longterm rate-of-return objectives, the University relies on a total return strategy in which investment returns are achieved through both capital appreciation (realized and unrealized) and current yield (interest and dividends). The University targets a diversified asset allocation to achieve its longterm return objectives within prudent risk constraints.

E | SPENDING POLICY AND HOW THE INVESTMENT OBJECTIVES RELATE TO SPENDING POLICY

The University invests its endowment funds and allocates the related return for expenditure in accordance with the total return concept. The endowment utilization is determined in accordance with the policy adopted by the Corporation. This policy fixes the spending range between 4.5% and 5.5% of the average fair value of applicable endowments over the prior twelve quarters, with the objective being to hold the spending rate to no more than a 5% average over time. Applicable endowments include Corporation-designated and donor-designated endowment funds.

5 | LAND, BUILDINGS AND EQUIPMENT

Land, buildings and equipment include the following at June 30:

	2013	2012
Land	$72,241	62,649
Buildings	631,411	623,218
Improvements	808,426	752,617
Equipment	140,142	115,033
Construction in progress	100,305	68,925
	1,752,525	1,622,442
Accumulated depreciation	(732,650)	(669,108)
Land, buildings and equipment, net	**$1,019,875**	**953,334**

Outstanding commitments on uncompleted construction contracts total $43,555 at June 30, 2013.

6 | BONDS, LOANS AND NOTES PAYABLE

The University has entered into various agreements primarily for the purpose of financing the acquisition, renovation, and improvement of its facilities. The bonds, loans and notes payable outstanding for these purposes are as follows:

Name of issue	Interest rate(s)	Type of rate	Final maturity	Balance at June 30 2013	Balance at June 30 2012
Rhode Island Health and Education Building Corporation (RIHEBC) Facilities Revenue Bonds:					
Series 2003A	3.70% – 4.85%	Fixed	2037	$41,145	42,050
Series 2003B	0.04%	Variable	2043	42,975	43,385
Series 2004	3.75% – 4.75%	Fixed	2025	16,535	17,480
Series 2005A	0.04%	Variable	2035	85,500	85,500
Series 2007	4.25% – 5.00%	Fixed	2037	90,010	90,010
Series 2009	5.00%	Fixed	2039	70,795	70,795
Series 2011	2.50% – 5.00%	Fixed	2032	66,950	70,600
Series 2012	5.00%	Fixed	2022	118,240	—
Tax-exempt commercial paper, revolving through 2042	0.13%	Fixed	Revolving	1,000	50,000
Taxable standard commercial Paper Notes, Series A, revolving through 2036	0.14% – 0.18%	Fixed	Revolving	50,000	50,000
Brown University Taxable Bonds:					
Series 2005	5.09%	Fixed	2016	17,000	17,000
Series 2009	4.57%	Fixed	2019	100,000	100,000
Loans payable – community:					
Development entities	1.22%	Fixed	2041	13,748	13,748
Total bonds, loans and notes payable before premium				713,898	650,568
Unamortized premium				37,437	9,528
Total bonds, loans and notes payable				**$751,335**	**660,096**

A | TAX EXEMPT BONDS

The University's tax exempt debt, primarily Facilities Revenue Bonds, is issued through RIHEBC, a state agency serving as a conduit issuer of tax exempt debt. The University is required under certain of its financing agreements with RIHEBC to appropriate funds from operating and other net assets for payment of principal and interest and for maintenance of the related properties. The Revenue Bonds currently outstanding were issued primarily to finance new and ongoing capital projects for research, student housing, academic and administrative buildings, and infrastructure. In July 2012, the Series 2012 Facilities Revenue Refunding Bonds were issued in the amount of $118,240 to refinance $50,000 of RIHEBC tax-exempt commercial paper and $8,220 in taxable commercial paper, with the remaining proceeds to be used for capital projects. The Series 2012 Bonds included an original issue premium of $31,567, which will be amortized over the life of the debt.

B | TAXABLE BONDS AND OTHER DEBT

The University's outstanding debt includes two taxable bond issues. Series 2005 Taxable Bonds were issued to finance a portion of the acquisition cost of an office building. Series 2009 Taxable Bonds were issued to provide liquidity and to protect against a tightening in liquidity markets. In addition, the University implemented a Taxable Commercial Paper Program in November 2005. The program provides for the issuance, up to $50,000, of Taxable Standard Commercial Paper Notes, Series A, and Taxable Extendible Commercial Paper Notes, Series B. The Taxable Commercial Paper Program has a number of individual notes that are issued at various times, amounts and staggered maturity dates. The notes are issued at market prices which at June 30, 2013 ranged from 0.14% to 0.18%. During the life of the note, 1 day to 270 days, the rate is fixed. As an individual note matures, new notes are issued to pay for the maturing notes. The agreement allows the University to continue this revolving process until 2036.

The University also maintains a tax exempt commercial program through RIHEBC. Proceeds from the tax exempt commercial paper program must be used within 18 months, however, once debt is issued the University can continue to rollover the tax exempt commercial paper until the end of the program in 2042. The issuance of new money requires renewal by RIHEBC every three years. The program was renewed in 2012 and as of June 30, 2013, $1,000 had been drawn and utilized.

Principal payments of bonds, notes and loans payable as of June 30, 2013 for each of the succeeding five fiscal years ending June 30 and thereafter are as follows:

Fiscal year:	
2014	$6,125
2015	6,415
2016	25,370
2017	8,910
2018	9,180
Thereafter	657,898
Total	$713,898

The University's bonds, loans and notes payable are stated at face value. The University's bonds trade periodically in a limited market. Utilizing available market pricing information provided by a third-party, the University determined that the aggregate estimated fair value of its debt as of June 30, 2013 and 2012 was approximately $764,000 and $701,000, respectively. These estimated fair values are based on significant observable inputs categorized in Level 2 of the fair value hierarchy.

The University has a revolving line of credit available up to $40,000. As of June 30, 2013, the full amount of $40,000 was available at a rate of 0.94%.

The University provides the initial liquidity for each of its variable rate bond issues and commercial paper programs. Additionally, the University has backup liquidity facilities at two separate banks currently totaling $150,000 in the event the debt is unable to be re-marketed. These facilities are available exclusively for the temporary repayment of debt.

C | INTEREST RATE SWAPS

At June 30, 2013 and 2012, the University had two interest-rate swap agreements in place to effectively convert a portion of its variable-rate debt to fixed rates until maturity of the associated bonds. The swaps' notionals for the JPMorgan swap and the $85,500 Goldman Sachs swap match and amortize at the same rate as the associated debt principal.

In fiscal 2012, the Series 2001B bonds synthetically fixed by the $17,363 Goldman Sachs swap were refunded with fixed rate debt resulting in an unmatched swap. For economic reasons the University terminated approximately one-third of the original notional value of this swap in each of the years ended June 30, 2013 and 2012. As a result, the University recognized a realized loss on partial swap termination of $2,600 and $2,757, in fiscal 2013 and 2012, respectively, which is recorded in nonoperating activities in other changes, net in the statement of activities.

As of June 30, the following interest-rate swap agreements were outstanding:

Counterparty	Associated debt	Expiration date	June 30, 2013 remaining notional value	Swap fixed rate	Fair value of liability at June 30 2013	2012
JP Morgan	Series 2003B	9/1/2043	$42,975	3.732%	$(10,929)	(16,943)
Goldman Sachs	Series 2005A	5/1/2035	85,500	3.979	(14,426)	(26,702)
Goldman Sachs	None	9/1/2032	17,363	3.891	(2,460)	(7,747)
					$(27,815)	(51,392)

The variable rate on the two Goldman Sachs swaps is based on the USDBMA Municipal Swap Index. The variable rate on the JPMorgan swap is based on 67% of one-month LIBORBBA. The Goldman Sachs swaps require posting of collateral by either party at thresholds based on their respective credit ratings. Cash collateral must be posted by the University if the aggregate mark-to-market liability payable by the University exceeds $25,000. The JPMorgan swap stipulates that if the University meets a minimum credit rating there are no collateral posting requirements. This rating was maintained by the University at June 30, 2012 and 2013.

Interest rate volatility, remaining outstanding notional value and time to maturity will affect each swap's fair value at subsequent reporting dates. To the extent the University holds a swap through its expiration date, the swap's fair value will reach zero. Because the swap fair values are based predominantly on observable inputs corroborated by market data, they are classified in Level 2 of the GAAP fair value hierarchy.

7 | RETIREMENT BENEFITS

The University participates in two contributory retirement plans. The expense to the University, representing its contributions to the accounts of faculty and staff, was $23,278 and $22,279 for the years ended June 30, 2013 and 2012, respectively.

The Brown University Food Services and Plant Operations Employees' Pension Plan is a qualified, noncontributory defined benefit plan which provides pensions for certain full-time weekly paid employees. The policy of the University is to fund pension costs in accordance with the Employee Retirement Income Security Act of 1974, as amended.

Information regarding the defined benefit pension plan for the years ended June 30 is as follows:

	2013	2012
Change in projected benefit obligation:		
Projected benefit obligation at beginning of year	$71,621	54,097
Service cost	3,286	2,314
Interest cost	2,857	2,954
Benefits paid	(1,889)	(1,837)
Actuarial (gain) loss	(6,668)	14,093
Projected benefit obligation at end of year	$69,207	71,621

The projected benefit obligation was determined using the following assumptions as of June 30:

	2013	2012
Discount rate	4.67%	4.01%
Rate of compensation increase	3.00	3.00

The following is a summary of activity under the plan for the years ended June 30:

	2013	2012
Change in plan assets:		
Fair value of plan assets at beginning of year	$46,542	40,823
Actual return on plan assets	4,714	1,056
Contributions	5,870	6,500
Benefits paid	(1,889)	(1,837)
Fair value of plan assets at end of year	55,237	46,542
Projected benefit obligation at end of year	(69,207)	(71,621)
Funded status included in other long-term obligations	$(13,970)	(25,079)

	2013	2012
Net periodic pension cost:		
Service cost	$3,286	2,314
Interest cost	2,857	2,954
Expected return on assets	(3,540)	(3,312)
Amortization of unrecognized loss and prior service cost	1,637	378
Net periodic pension cost	$4,240	2,334

Net periodic pension cost was determined using the following assumptions for the years ended June 30:

	2013	2012
Discount rate	4.01%	5.57%
Rate of compensation increase	3.00	3.50
Expected long-term rate of return	7.50	7.50

The expected rate of return on plan assets was derived based upon assumptions of inflation, real returns, anticipated value added by the investment manager and expected asset class allocations.

Net periodic pension cost is reflected in operating activities on the statements of activities. As of June 30, 2013 and 2012, items not yet recognized as components of net periodic pension cost are unrecognized prior service cost of $709 and $471, respectively, and a net unrecognized actuarial gain of $15,147 and an actuarial loss of $24,863, respectively. These changes affecting the funded status of the plan are included in other changes, net in nonoperating activities in the statements of activities.

The plan assets at June 30, 2013 and 2012 consist of variable annuity investments with various equity and fixed income focuses measured at NAV and are classified in Level 2 in the GAAP fair value hierarchy because of the plan's ability to redeem its interests at or near the balance sheet date.

The investment strategy for the Plan takes into account several factors consistent with the characteristics of an employee pension plan. As such, the strategy recognizes a longterm time horizon where a substantial allocation to equities is appropriate and will help to maximize returns; broad diversification in order to increase return and reduce risk; and investment in institutional retirement annuities that serves to reduce administrative costs.

The actual asset allocation for the pension plan as of June 30, 2013 and 2012, and the weighted average asset targeted allocation are as follows:

		Actual	
	Target	2013	2012
Equity funds	65%	65%	65%
Fixed funds	35	35	35
Total	100%	100%	100%

The University's estimated contribution for 2014 is $3,000.

Estimated future benefit payments as of June 30, 2013 are as follows:

Fiscal year:	
2014	$2,271
2015	2,399
2016	2,568
2017	2,758
2018	3,026
2019 – 2023	18,956

8 | RESTRICTED NET ASSETS

The University's restricted net assets as of June 30 are as follows:

	2013		2012	
	Temporarily restricted	Permanently restricted	Temporarily restricted	Permanently restricted
Endowment	$1,126,291	1,126,878	1,118,579	1,065,141
Contributions receivable	57,401	88,650	77,200	81,584
Donor-restricted purposes	79,168	28,632	67,017	25,009
Student loans	—	10,874	—	10,328
Total	$1,262,860	1,255,034	1,262,796	1,182,062

9 | FUNCTIONAL CLASSIFICATION OF EXPENSES

Functional categories are reported after allocating, on a square footage basis, expenses for operation and maintenance of plant, interest on indebtedness, and depreciation. Operating expenses incurred in the fiscal years ended June 30 were as follows:

	2013	2012
Instruction and departmental research	$285,170	265,010
Sponsored programs	116,112	124,211
Academic and student support	137,943	134,218
Auxiliary services	85,170	85,831
Institutional support	105,387	95,550
	$729,782	704,820

10 | COMMITMENTS AND CONTINGENCIES

All funds expended in conjunction with government grants and contracts are subject to audit by governmental agencies. In the opinion of management, any potential liability resulting from these audits will not have a material effect on the University's financial position.

The University is a defendant in various legal actions arising in the normal course of its operations. Although the final outcome of such actions cannot currently be determined, the University believes that the ultimate unrecognized liability, if any, will not have a material effect on the University's financial position.

11 | RELATED PARTY TRANSACTIONS

Members of the Corporation and senior management may, from time to time, be associated either directly or indirectly with companies doing business with the University. The University has a written conflict of interest policy that requires annual reporting by each Corporation member and University senior management. When such relationships exist, measures are taken to mitigate any actual or perceived conflict, including requiring that such transactions be conducted at arms' length, based on terms in the best interest of the University.

12 | SUPPLEMENTAL DISCLOSURE OF CASH FLOW INFORMATION

Following is information intended to supplement the statements of cash flows for the years ended June 30:

	2013	2012
Cash paid for interest, including recurring swap settlements	$30,460	27,962
Noncash investing activities:		
(Decrease) increase in accounts payable for land, buildings and equipment	(9,449)	802
Decrease in payables for purchases of investments	(16,142)	(32,100)
(Decrease) increase in receivables for investments sold	(58,433)	34,715

13 | SUBSEQUENT EVENTS

The University considers events or transactions that occur after the balance sheet date, but before the financial statements are issued, to provide additional evidence relative to certain estimates or to identify matters that require additional disclosure. These financial statements were issued on October 29, 2013, and subsequent events have been evaluated through that date.

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PRODUCED BY:
The Office of Public Affairs and
University Communications

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PHOTOGRAPHY:
Michael Cohea; Patrick O'Conner Photography,
Sylvia Ann Soares '95, Mark Turek, Photography RI,
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hinking generate ***new knowledge*** *and* ***novel solutions****? Wh*

eople and environments? Shall we ***dance****? How do public spaces infor*

nequality*? How does a* ***dynamic research enterprise*** *enrich u*

experience *inform* ***great research****? What skills are necessary for*

questions*? How can we build* ***global understanding*** *and inform*

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social responsibility *drive* ***positive change****? Shall we revel in*

nd ***make change****? How can we understand and influence* ***human ex***

ur ***intellectually independent,*** *creative, principled, and* ***collab***

ationally and ***globally****? Shall we* ***celebrate life's great opportu***

How shall we envision our ***technological future****? How can we contribu*

What are the forces, aspirations, and strengths that will ***shape tomo***

nequality *in America? How does the* ***written and spoken wo***

an we channel the ***power of the sun*** *to create* ***living environ***

positioned to think about our own ***powers and powerlessness*** *in*

ge in which technology is changing the ***boundaries of the body*** *a*