



BROWN **TECHNOLOGY** INNOVATIONS

2022 Annual Report



The Year in Review

Dear Colleagues,

As the University's resource for patenting, startups and industry-sponsored research, Brown Technology Innovations saw the maturation of its programs to yield strong growth in fiscal year 2022. We had almost 3x growth in our intellectual property licensing activity from the previous year. Research funding programs and startup initiatives came together to see the development of research to intellectual property to new ventures. Downstream reimbursement and royalty income hit new highs.

Challenges remain, such as in industry-sponsored research, but Brown's commitment to doubling its research program in the next five years will be sure to provide momentum. After two and a half years of executing our strategy, we are pleased to see the establishment of strong working relationships between Brown Technology Innovations and our two main customer groups — our faculty who drive Brown innovation and the investors/entrepreneurs/companies who seek to grow and commercialize it.

Take a look at our accomplishments highlighted in this FY22 annual report. I am also excited to report on some of our new initiatives for FY23 — all designed to grow innovation at Brown and help ensure that our research expands beyond the campus to impact society.

Sincerely,

Neil Veloso
Executive Director

Brown Technology Innovations Industry and Investor Advisory Board

Our advisory board members are experienced executives, investors and entrepreneurs who inform our strategy and connect us to entrepreneurs who can help develop commercial pathways for Brown faculty inventions. They represent a variety of disciplines and perspectives that help shape the trajectory of our growth.

Kristopher Brown, Partner, Goodwin Law

Neil Cohen, Chairman, Emerald Development Managers

Rich Ganz, Executive Chairman, Sentien Biotechnologies Inc.

Walter Jin, Chairman and Chief Executive Officer, Pager Inc.

Keith Kerman, M.D., Operating Partner and Senior Advisor, The Riverside Company

Rajiv Kumar, M.D., Co-Founder, Brown Angel Group

Kirsten Leute, Partner, University Relations, Osage University Partners

Annie Mitzak, Principal, Omega Funds

Sara Nunez-Garcia, Co-Founder, Partner, Forty51 Ventures

Jeff Pootalal, Managing Director, Sixth Street Partners

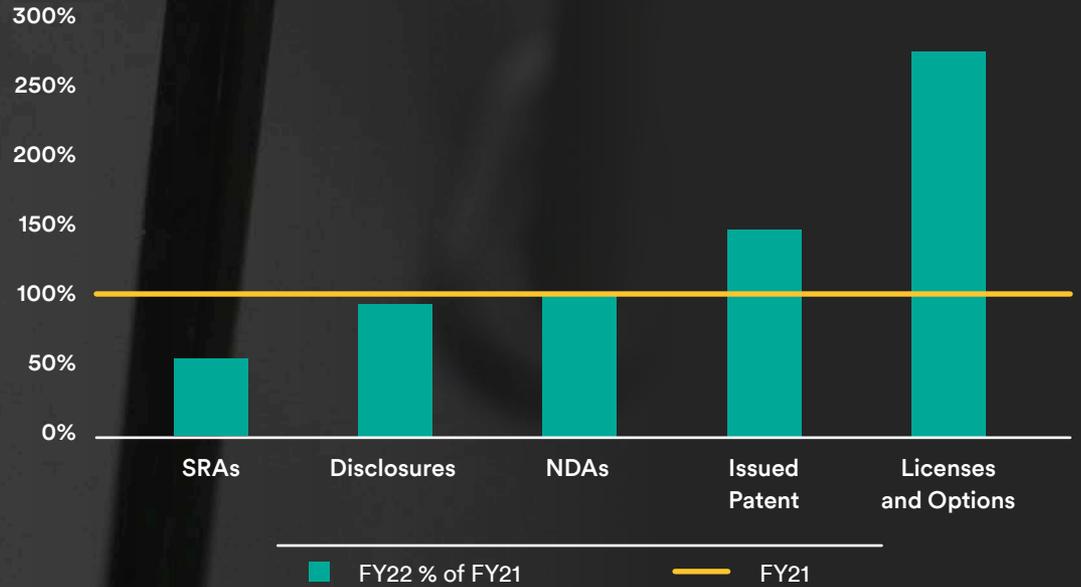
Greg Sieczkiewicz, J.D., Ph.D., Executive Partner and Chief IP Counsel, MPM Capital

A Year in Numbers:

2021–22

Brown Technology Innovations

Selected growth in deals



Brown Technology Innovations' Activity Metrics, FY21 vs. FY22

STRATEGIC PRIORITY	Put Brown Technology First	Steward Brown Inventions	Amplify Marketing + Networking Tactics	Streamline Deal Execution	
	Disclosures	Patents Issued	CDAs	Options + Licenses	SRAs
Q1	18	13	20	7	2
Q2	22	3	14	6	4
Q3	26	5	24	9	2
Q4	21	4	8	8	7
FY21	90	17	66	11	28
FY22	87	17	66	30	15

CDAs: Confidential Disclosure Agreement; SRAs: Sponsored Research Agreement

Strategy Report

FY22 represented a continuation of plans from the previous fiscal year. Brown Technology Innovations saw a maturation and yield from initiatives such as Entrepreneur Connect and Brown Biomedical Innovations to Impact. There has been an increased focus on innovation at Brown, as well as celebration of the efforts of our faculty and the startups emerging from their research. The fiscal year was not without challenges, as we faced headwinds in our industry Sponsored Research Agreement (SRA) volume. However, the real highlight of FY22 was an almost tripling of license and option deal flow.

➤ Goal 1:

Put Brown Technology First

Prioritize areas of strength and high potential, focus on technology and inventions, and connect to industry interests and market needs

The 87 invention disclosures this year nearly matched the record totals of FY21 and are a testament to the creativity of Brown's research faculty. In an especially hectic environment, Brown's inventors found ways to balance their teaching, advising and research with developing these new innovations.

Leading sectors of innovation at Brown (from school to departments) can be inferred from the disclosure numbers. There is generally an even split between "life science" disclosures and "high-tech" ones. BioMed and the School of Engineering were the leading schools for disclosures, with 33 and 25, respectively. Pathology and Laboratory Medicine was the leading department for disclosures at Brown with 17, followed by Chemistry with 12.

New Awards: Inventor of the Year and Startup of the Year

Each spring, Brown's Office of the Vice President for Research holds a Celebration of Research, which recognizes outstanding research faculty across a range of disciplines. Because of COVID-19, this year's celebration was the first in-person one to take place since 2019. Two new awards were introduced at the program: Inventor of the Year and Startup of the Year.

Wafik El-Deiry, the Menco Family University Professor of Medical Science and professor of pathology and laboratory medicine, received the Inventor of the Year Award, which recognizes the Brown inventor who had the most invention disclosures the previous year. With nine invention disclosures in 2021, El-Deiry has been a top inventor for Brown Technology Innovations.

"I was surprised and deeply honored to receive the inaugural Inventor of the Year Award from Brown University," El-Deiry said. "I think it reflects something important about the institution's rise as a research university. I am thrilled to be part of the environment that fosters innovation and to work with Brown's amazing students and colleagues. With all of my inventions, there is an underlying theme: the development of novel therapeutics, especially for the treatment of cancer. I also seek to understand the mechanisms of therapy



Brown University's 2021 Inventor of the Year, Wafik El-Deiry (left), who had nine invention disclosures, with Provost Richard Locke.

resistance so as to work around it. What is perhaps most rewarding about all my research is that it is always directed toward clinical application.”

Startup of the Year honors a startup venture that both licensed a Brown technology and raised the most investment during the previous year. The awardee was Bolden Therapeutics, which was co-founded by **Ashley Webb**, the Richard and Edna Salomon Assistant Professor of Molecular Biology, Cell Biology and Biochemistry; **Justin R. Fallon**, professor of neuroscience and professor of psychiatry and human behavior; and **Johnny Page**, a former student in Fallon’s lab and current Brown medical student. Bolden’s goal is to develop a way to tap into stem cells in the adult brain, to replenish neurons lost in neurodegenerative diseases such as Alzheimer’s and conditions such as stroke.



Ashley Webb (center), co-founder of Bolden Therapeutics, accepting the award for Brown University’s 2021 Startup of the Year from Provost Richard Locke and Vice President of Research Jill Pipher.

“We are honored to receive this award,” Webb said. “Neurodegenerative diseases such as Alzheimer’s are among the most difficult-to-treat conditions — there is currently no way to replace neurons in patients with these diseases once they are lost. At Bolden, our goal is to develop a therapeutic that replenishes these neurons. A major line of investigation in my lab has been to determine the mechanisms that support the formation of new neurons from stem cells in the adult hippocampus. It is gratifying now to have the opportunity to work on translating basic scientific findings into effective treatment.”

➤ Goal 2:

Steward Brown Inventions

Provide excellent service to the faculty customer and manage intellectual property budget to maximize benefit to investors and inventors



Issued patent plaques are given to both inventors and their departments for display.

Customer service to our faculty inventors is a key component of Brown Technology Innovations' strategy. We've looked to increase our service levels and offerings by bolstering the team and deploying its members to cover specific schools and departments. **Andrew Bond** joined the office in November 2021 with significant experience in Boston-based biotech startups. He covers the life science sector at Brown, particularly BioMed. Every business development director is allocated a patent budget that they can use to grow their portfolios to drive transactions. This structure emphasizes independent decision making, and has resulted in consecutive years of balanced patent budgets.

Brown benefited from a strong increase (47%) in issued U.S. patents this year. While this rate changes based on outside factors, the jump in issued patents is helpful to our licensing efforts. The office commissioned commemorative plaques for each U.S.-issued patent to give to inventors and departments. Brown's high-tech inventions led the way this year in issued patents, with the majority of patents going to Engineering, Chemistry and Computer Science inventions.

The Brown Technology Innovations compliance function, staffed by **Jennifer Vieira** and **Len Katzman**, blossomed in its second full year of operation. Tasked with engaging with licensees (including both established companies and startups) to ensure that each party fulfills its license obligations, the compliance team has increased reimbursement (>90% rates) and helped Brown licensees solve complex issues from patenting to partner reimbursement. Their accurate reporting and accountability has also allowed the office to track and project its revenue and spending.

Brown Biomedical Innovations to Impact

In FY22 the Brown Biomedical Innovations to Impact (BBII) program continued to support the translation of biomedical technologies into commercializable products that can make a substantial impact in health care. Since the program was launched in 2018, BBII has completed four proposal/award cycles and made 17 awards supporting 15 faculty inventors and their technologies — a total of \$1.8 million in funding. This summer in the fourth cycle, BBII made three new awards, funding projects to develop two medical devices and one life science platform tool.

We are also seeing the impact of the BBII program on startup companies. Four new startup companies have been formed to further develop and commercialize BBII-funded technologies. Examples include PedialyDx, a company using the work of **Barry Lester** to build diagnostic tools based on the acoustic signatures of infants' cries, and XM Therapeutics, which is creating biomaterials from cultured human cells as therapeutics to aid in patient recovery from heart failure. In both cases, BBII and Brown Technology Innovations collaborated through Brown's Entrepreneur Connect program to identify a CEO to pair with the faculty inventors to form the startup.

➤ Goal 3:

Marketing and Networking

Connect with high-potential customers through multiple channels and engage advisor network to inform strategy and refer entrepreneurs



Ari Gabinet,
Stephanie Endy,
Nicole Picard



Brown Technology Innovations' FY22 marketing strategy yielded results from work started the previous year. Entrepreneur Connect is our initiative to connect serial entrepreneurs with faculty innovation to create fundable startups. Since the program's inception, Brown Technology Innovations has connected with 106 entrepreneurs. A recent medtech conference alone yielded over 20 new connections — primarily executives, entrepreneurs and investors, all interested in innovation. Two entrepreneurs, **Peter O'Neill** and **Frank Ahmann**, successfully connected with Brown faculty members around their technologies and formed PedialyDX and XM Therapeutics, respectively. Further showing the connectivity within the Brown innovation ecosystem, the core technologies behind PedialyDX and XM were funded by Brown Biomedical Innovations to Impact, the University's life science accelerator fund.

Business of Innovation Panel

Brown Technology Innovations hosted a panel discussion on "The Business of Innovation" for an audience of faculty, postdocs and graduate students. **Ari Gabinet** of the Watson Institute for International and Public Affairs led presentations by **Stephanie Endy** of the Office of the Vice President for Research and **Nicole Picard** of the Office of General Counsel around regulatory compliance for academic researchers. Brown alumni **Kristopher Brown** and **Johnny Page** (also CEO of Bolden Therapeutics) and investor **Thorne Sparkman** joined **Neil Veloso** for a discussion on "High Tech Startups — Founders and Funders Speak Out."

Innovation Fellows

Complementing Entrepreneur Connect, Brown Technology Innovations spent FY22 laying the groundwork for the launch of our Innovation Fellows program. This paid internship for postdocs and graduate students allows those with an interest in innovation and startups to experience and learn about intellectual property and business development. Additionally, the program seeks to put participants in external programs at venture capital firms.



A discussion on high-tech startups, part of "The Business of Innovation"

➤ Goal 4: Deal Execution

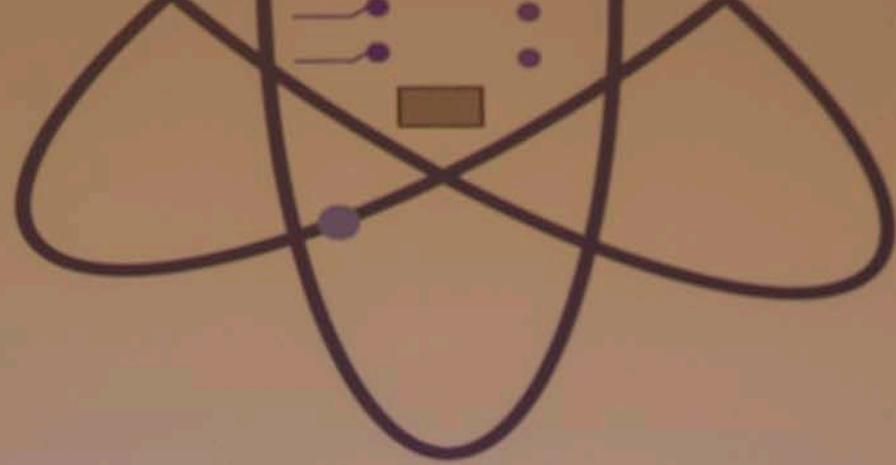
Focus on patent licensing and industry-sponsored collaborations, to streamline processes and mechanisms to ensure the highest-quality deals

Brown Technology Innovations' deal execution work focuses on patent option and licensing activities and industry-sponsored research agreements. The FY22 industry-sponsored research results were particularly surprising, with a 46% drop in deal flow from the previous year's record numbers. Of the 15 Sponsored Research Agreements (SRAs), there was an even split between high-tech and life science-oriented projects. We are examining best practices to regrow our SRA volume, including holding interviews with faculty with recurrent SRAs and marketing "thematic" research projects in areas such as sustainability and personalized neuromedicine, which include the research of multiple faculty members.

The highlight of our FY22 campaign has been our patent option and license results. We saw a 2.72x gain in deal flow. The bulk of this was paced by non-exclusive licenses of Brown copyrighted and tangible materials. The patent option and exclusive license work in FY22 was primarily driven by deals with startup companies, which has been the primary outlet for University commercialization over the past several years.

Brown Technology Innovations put out three new startup companies in FY22: Bolden Therapeutics (based on licensed technology from the labs of **Justin Fallon** and **Ashley Webb**); PedialyDX (**Barry Lester**); and XM Therapeutics (**Jeff Morgan**). All three companies are in the life science space. The PedialyDX and XM Therapeutics deals particularly stand out because they are outcomes of collective efforts such as BBII and Entrepreneur Connect that Brown has put in place to spur innovation and commercialization. For both startups, the original research programs received BBII accelerator funding, and through the Entrepreneur Connect program, Brown Technology Innovations was able to identify and match CEOs with the faculty inventors to form the nucleus of each startup.





AtomICS

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News in Focus:
Our Top Stories from FY22

BROWN *Invents* 

AtomICS wins first-place venture prize

AtomICS, a joint student-faculty venture focused on harnessing small molecules for digital information storage took first place at the Nelson Center for Entrepreneurship's Venture Prize pitch night in March 2022. Brenda Rubenstein (Chemistry) and Jacob Rosenstein (Engineering) lead this venture with two graduate students.

➤ Read: [Press release](#)

Brown Licensee RIC is a 2022 Prism Award Finalist

Research Instruments Corporation (RIC) was named a 2022 Prism Award finalist in December 2021. RIC has developed an X-ray source that produces clearer images while using less radiation. The Prism Award recognizes top new optics and photonics products on the market.

➤ Read: [Press release](#)

Theromics Receives Small Business Grant and Patent

Brown licensee Theromics Inc. was awarded a Small Business Technology Transfer grant and a patent (US11076916) in November 2021. The technology, a thermal accelerant, is a joint development between Brown and Rhode Island Hospital/Lifespan. The thermal accelerant is used during hyperthermal tissue ablation, a non-surgical treatment to destroy tumor tissue. The accelerant is deposited at the tumor boundary and promotes faster heating in fields farther away from an antenna used to provide heat. The result is more precise tumor removal and protection of nearby, healthy tissues.

➤ Read: [Press release](#)

Deeplite Wins AI Tech Award

Montreal-based startup company Deeplite licensed Brown technology that was developed by Sherief Reda (Engineering) with the goal of making computing faster and more accessible. Deep neural networks, a facet of artificial intelligence (AI), are capable of data modeling and prediction, with applications that include facial recognition. Faster neural networks minimize cloud and hardware requirements, which can translate to lower costs and supporting AI on smaller devices. Deeplite's effort and progress were recognized in October 2021 at the largest AI development meeting to date, AI DevWorld, where the company was awarded Best in Deep Learning Technology.

➤ Read: [Press release](#)

Bolden Therapeutics Awarded Small Business Technology Transfer Grant

In September 2021, Brown startup Bolden was awarded a Small Business Technology Transfer grant of \$500,000 from the National Institute on Aging. Bolden Therapeutics is a biotechnology company that develops therapeutics to promote neurogenesis — the formation of new neurons in the brain — in patients with diseases that affect cognition, such as Alzheimer's. Bolden has licensed several patents produced from Brown University faculty inventors. The projects funded by the grant will be completed in collaboration with the labs of Justin Fallon, (Neuroscience) and Ashley Webb, (Molecular Biology, Cell Biology and Biochemistry). Fallon and Webb have identified molecular pathways whose activity stimulates neurogenesis. Bolden plans to develop therapeutics that could promote neurogenesis and improve memory in Alzheimer's patients.

➤ Read: [Press release](#)

Exclusive Insights

Exclusive Insights is a series of articles from Brown Technology Innovations that highlights two types of success at Brown: large-scale, multidisciplinary work in a foundational field like AI and work that exploits the potential of a specific discovery. The first story, an overview of Brown's accomplishments in AI, encompasses the field's scientific and technical bases, medical and biomedical applications, and social and ethical ramifications. The second story focuses on the startup PedalyDX, which is working to expand the capabilities of its Baby Cry, a technology that uses machine learning to identify acoustic signatures from a baby's cries to find signals about the baby's health.

➤ [Artificial Intelligence at Brown](#)

➤ [A Doctor and Developer: Shaping Brown's Newest Startup](#)

BAM Features "Malaria Hunter" and Inventor Jake Kurtis

In its January-March 2022 issue, Brown Alumni Magazine featured Professor of Pathology and Laboratory Medicine Jake Kurtis, who has dedicated his research efforts to developing a vaccine against malaria. The article highlights the work of Kurtis and Assistant Professor of Pathology Dipak Raj to identify the treatment for Plasmodium falciparum malaria.

➤ Read: [Press release](#)



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