

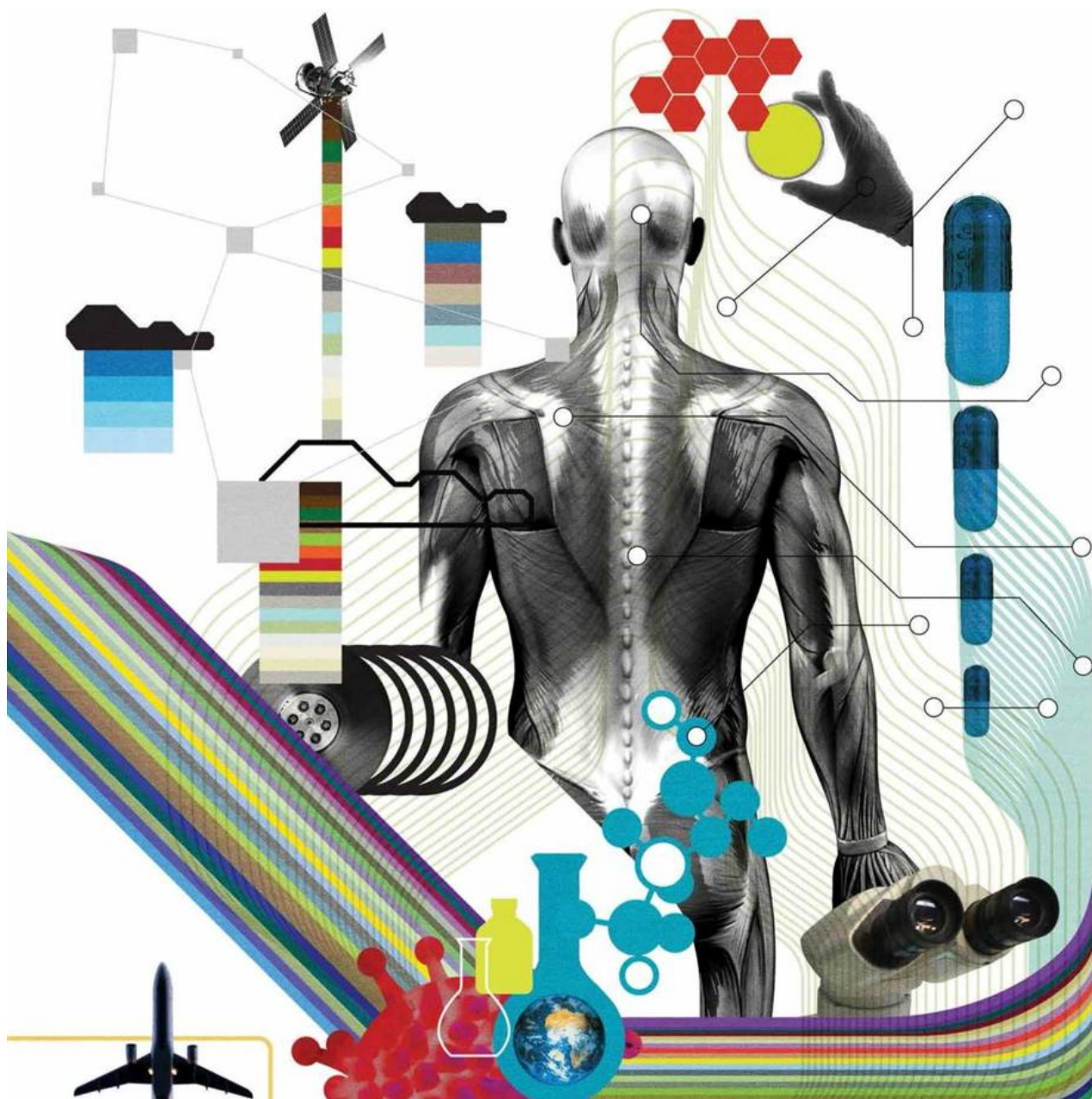


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Battles of tomorrow being waged in Kendall Square

Cancer. Autism. Schizophrenia. Speech recognition technology. Genetics. Cheaper energy. The biggest battles we face as a society are all being waged in Kendall Square, 100 years after MIT moved across the Charles River and turned a dusty strip of warehouses into a capital of innovation.



Used to be nerd was not a kind word. Used to be nerds did not get a lot of respect; in 1904-05 MIT was within a whisker of merging into Harvard, as its engineering department. But fortunately the nerds revolted because, in the words of George Wald in 1890, if MIT got too “close to the easy-going atmosphere of Harvard, its present high standards would inevitably deteriorate.”

MIT has always done things in its own gritty, smart, nerdy way; when other universities were erecting beautiful, individual brick buildings separated by grassy quads and pristine walkways, MIT left spires aside and built out infinite corridors, cramming people, departments, and buildings together closely in ungainly but very efficient ways. (It’s hard to separate disciplines like engineering and urban planning and physics when their students and faculty are constantly bumping into one another up and down miles of common hallways.) MIT attracts particularly productive innovators: For as long as the US Patent and Trademark Office has kept track, MIT has filed more patents than any other single university.

But patents alone won’t save the world, as a patent is just a piece of paper. What sets MIT apart is the link between academic research and the private enterprise that surrounds it, and finding ways to turn those patents into something tangible. On the periphery, it allowed for the birth and growth of isolated islands of focused interdisciplinary excellence, like the Lincoln Lab, the Whitehead Institute, and the Broad Institute, that gave professors greater freedom to pursue their research and commercialize their successes. As the university expanded these isolated outposts, they became core anchors not only for MIT’s future, but for the future of Kendall Square. MIT’s leaders have long held an intuitive understanding for the building blocks of innovation, including minimizing physical distance between researchers, embracing diverse perspectives, bridging disciplines, and partnering with private industry, and their pursuit of these values has played a meaningful role in the development of Greater Boston’s increasingly vibrant economy.

William Barton Rogers founded MIT with the help of a land grant from the state of Massachusetts, and his original vision was to provide students with an education “conducive to the progress of invention and the development of intelligent industry.” The university’s last three presidents have continued this legacy by marrying discovery, techie-cool, and entrepreneurship. In this process, the effervescent and brilliant Chuck Vest, elegant and lightning-smart Susan Hockfield, and soft-spoken, urbane, citizen of the world Rafael Reif built a behemoth that powers not only the Massachusetts economy, but the global one as well. It’s why this year’s 100-year celebration of MIT’s move from Boston to Cambridge is as much about MIT as it is about how MIT gave rise to Kendall Square.

MIT alums are responsible for creating \$2 trillion in annual revenue and millions of good jobs. No wonder nerd is suddenly way chic. The coolest kids left the sports bars for places like Cafe ArtScience, Catalyst, and Area Four. As General Electric CEO Jeff Immelt put it when explaining why his company is moving here: “To look out the window [in Connecticut] and see deer running across, I don’t care about that,” he said. “I want some 29-year-old [graduate of] MIT to punch me right in the nose and say all of GE’s technologies are wrong and you’re about to lose.”

As East Cambridge evolved from a collection of warehouses, parking lots, and old barracks into a thriving ecosystem of research institutes, startups, and multinational companies, it birthed tens of thousands of local jobs in health care, biotech, new media, robotics, and software. About a third of MIT entrepreneurs stick around Massachusetts, which is really good for a region that has long struggled with so-called brain drain. The Cambridge Innovation Center in Kendall Square may be breeding more startups than any other single building on the planet, and it is only one of the MIT-linked incubators. Not surprisingly, Kendall Square is now the most expensive office space in Greater Boston, with lab rents at least twice as costly as those along Route 128.

A core strength of MIT’s wonderful collection of misfit inventors is an ability to consistently re-create and reimagine. MIT is not afraid to experiment, to fail. Failure is part of the nature of sci-tech. It is celebrated. This attitude provides a

feeling of freedom on campus instead of casting a shadow of fear or anxiety. After all, this is a place where the sanitary engineering department evolved into the biology and cancer institutes. Nicholas Negroponte built his Media Lab within the faculty of architecture and urban planning and embraced projects like Cynthia Breazeal's seemingly empathetic robots, Mitch Reznick's lifelong kindergarten, and Pattie Maes's fluid interfaces. When Joi Ito took over the lab, he adopted Negroponte's ethos of learn, grow, mutate and added Ed Boyden's brain lab, a core of Bitcoin privateers, and cameras that can see through walls. Across the street, when Tyler Jacks and Phil Sharp launched their integrative cancer research project, they did so at a university without a medical school or major hospital complex. They recruited mostly engineers and were laughed at. But skeptics were soon overwhelmed by breakthrough papers.

MIT now serves as a local and global example. Every week, legions of policy makers, government types, university officials, and assorted entrepreneurs walk its hallways trying to figure out what makes it tick. Even its neighbor up the river is doing its best to make up for lost time; after a mere century, Harvard decided to build out a quasi-separate engineering school. Enrollment in the concentration tripled in less than a decade.

Harvard's Allston project, which will include over 500,000 square feet of new space for engineering, applied math and physics, and wet labs, wholeheartedly seeks to emulate MIT's ethos of practicality and Kendall Square's spirit of collaboration. Harvard told the Boston Redevelopment Authority that the campus expansion will "promote the translation of research ideas into successful products and services" and create "an intellectual and entrepreneurial ecosystem." If that sort of language sounds familiar, it should. MIT has been talking that way for decades.

Just as Harvard seems to be emulating MIT, Boston could follow in Cambridge's footsteps; in marrying the Harvard Business School's campus to a massive new applied physics, math, and engineering complex, Allston could match and maybe even exceed Kendall Square. Increasing cooperation between MIT and Harvard has

already built research institutes like the Broad and Wyss institutes, where coauthorships and joint appointments take on topics like the origins of life, curing cancer, and understanding the human genome. Perhaps when Boston looks back a few decades from now, the MIT entrepreneurship contagion effect on great institutions like Harvard, Brandeis, Babson, Wellesley, Tufts, Boston University, Boston College, Olin, and dozens of other players, will achieve the unthinkable, making Massachusetts a powerhouse that exceeds Silicon Valley. To do that, the region will have to excel, not just at traditional education, entrepreneurship, and digital apps, but also at further bridging the globe.

While other universities attempt to replicate MIT's secret sauce, MIT is busy finding ways to grow into the new century by breaking down barriers to global collaboration. MIT opened its courses to the world through MITx, its massive open online course platform. Now it is considering going even further. A recent task force proposed allowing MIT students to "work on projects with students from different corners of the world," augmenting the quantity and quality of brainpower focused on our greatest challenges. MITx could become a singular, global platform for learners worldwide by developing a " 'Wikipedia-like' knowledge base to . . . share ideas and best practices." MIT is also adapting the nature of higher education to meet the demands of a modern economy. As employers increasingly value specific skills over formal degrees, one might expect a variety of certifications and professional education programs, granted over a lifetime, that help folks adapt to a fast-changing knowledge and job base. These programs give new meaning to Rogers's original vision of an MIT education for "intelligent industry."

Continuing the theme of embracing intellectual diversity, MIT is also leading a long-overdue transition: increasing gender parity in science and technology. It's not easy. Despite extraordinary contributions like those from Ada Lovelace and Rosalind Franklin, women's tech talents are often not recognized or celebrated. And while MIT admitted its first female student, Ellen Henrietta Swallow, in 1871, it was not immune to gender bias. But, especially after Chuck Vest and Susan Hockfield fought for gender parity, MIT women are now equal in admissions, publications, and awards. In fact, women's GPAs and graduation rates are both

nano-manufacturing, energy storage, and pharmacology. Sangeeta Bathia's bioartificial organs give hope to all whose livers suffered throughout college. Susan Lindquist's recent discovery of how plants memorize, using prions similar to those that lead to mad cow disease in humans, changes our concept of basic evolution. So while many other institutions and countries ponder how to merely include half of humanity, MIT's current dilemma, and perhaps even advantage, is starting to think about how to ensure that the men don't fall too far behind.

All success breeds challenges. What MIT folks are working on will continue to change the world, to shape the future. Not all will work out perfectly, nor will the benefits be equally shared by all. Research, by its very nature, is risky. Some of the bleeding edge research at MIT can be downright scary. Be it agile robots, artificial intelligence, engineered viruses, organs on chips, gene drives, or future humans, these, and many other fields, are unfamiliar and can cause concerns, both legitimate and unwarranted. And there are significant side effects and costs alongside extraordinary success. Housing prices have gone stratospheric. Local school systems need to catch up. Our public transport is, perhaps, adequate for the early part of the last century, hardly for this one. Extremely successful startups can breed extreme income inequality.

But countries and cities that suffer chronic youth unemployment and economic stagnation are desperate to build their own innovation hubs, to grow what we have. Not everyone appreciates this. Famously colorful and ornery Cambridge Mayor Al Vellucci, who attempted to designate the Harvard Lampoon building an official public urinal, worked hard to ban gene splicing from Cambridge (with the support of Harvard Nobel laureate George Wald). Had this movement succeeded, the region would today be a whole lot poorer, and there might not be a modern Kendall Square.

buildings don't matter if they don't attract and retain the world's best minds, and if those minds are not truly productive. It is in all our interest for MIT to thrive, and for Harvard's Allston project to emulate the success, and avoid some of the pitfalls, of Kendall Square and Silicon Valley. But what happens over the next century is fragile. The best and the brightest are now being recruited as aggressively as any football or hockey prodigy ever was. So we have to be very deliberate about keeping our hometown teams of nerds the best on the planet. And we have to welcome their startups and build outs. Now that we have what everyone else wants, the challenge is to maintain that edge.

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