

The Search for Clean Cash*

The Massachusetts Institute of Technology has been an innovator of university funding models, says **David Kaiser**. Its 150-year history holds lessons for today.

One hundred and fifty years ago this week, on 10 April, 1861, the Massachusetts Institute of Technology (MIT) received its charter. Though hardly the oldest institution of higher learning in the Anglo-American world—Harvard was already well into its third century by then, and Cambridge and Oxford were each on the cusp of their eighth—MIT quickly became a trendsetter. Founder William Barton Rogers built a curriculum around the school’s motto ‘Mens et Manus’: mind and hand. He and his early faculty incorporated laboratory instruction into the most elementary undergraduate courses and fostered close ties between basic science and the practical arts—pedagogical innovations that quickly inspired many imitators.

Perhaps the most influential of MIT’s many innovations, however, lay not in curricula or textbooks but in patronage. How and by whom should research and teaching be underwritten at a world-class university? Time and time again over its short history, MIT has experimented with novel forms of funding. While preparing a book on MIT[1], I learned just how vigorously the pendulum has swung between government and private funds. Every few decades, a decision inspired impassioned charges about whose money appeared appropriate or tainted, eliciting spirited hand-wringing from faculty, administrators and alumni about what consequences might befall the scholarly community should the wrong choice be made. Each new scheme unleashed a battle for the soul of MIT. Yet proposals that had struck observers as bizarre or brash upon first hearing were quickly absorbed into daily operations, and promptly emulated elsewhere.

Amid today’s economic uncertainty, universities around the world again face difficult questions about how to fund their operations. Reflecting on MIT’s experiences throws these struggles into sharper relief, reminding us that today’s bandits were yesterday’s heroes.

Early trade-offs

Just two days after MIT’s charter was signed, mortar rounds began to fall on Fort Sumter in Charleston, South Carolina: the US Civil War had begun. Though it hardly seemed a propitious start for the young institute, the outbreak of war bought Rogers time to continue searching for funds.

Fifteen months into the fighting, President Abraham Lincoln signed into law the Morrill Land Grant Act. The law, which had been opposed by several southern states before they seceded, allowed individual states to sell federal land and use the profit to fund colleges that focused on applied or practical topics, such as agriculture or engineering. “Land-grant colleges” quickly sprouted across the United States, nearly all of them public institutions. Rogers convinced the state legislature of Massachusetts to donate a handsome portion of its land-grant funds to the fledgling MIT—a private institution—in exchange for promising to offer military instruction to all its students. The

* This is the author’s final pre-publication draft. Final version published in *Nature* vol. 472 (7 April 2011): 30-31, doi:10.1038/472030a

infusion of government cash then enabled Rogers to convince private donors that MIT was worth the investment. From the start, MIT thus functioned as a financial oddity: a private university buoyed by public funds.

By the end of World War I, having fended off several merger attempts from nearby Harvard—which struck faculty and alumni as hostile-takeover bids—MIT found its budget strained to the limit. In 1919, MIT’s president launched a new campaign known as the Tech Plan. Until that time, MIT, like virtually all other US universities, had relied on student tuition, private philanthropy, and occasional grants from local industries to fund research. Unlike those earlier efforts, this ambitious plan re-built MIT’s entire operation around corporate patronage. It created a centralized Division of Industrial Cooperation and Research—the forerunner of today’s ubiquitous ‘technology transfer offices’—to facilitate corporate-funded research projects on campus, open the Institute’s libraries to industrial sponsors, and share alumni records with corporate recruiters. Nothing like this had been attempted before in US higher education. MIT’s Tech Plan immediately attracted hundreds of firms and generated hundreds of thousands of dollars (several million dollars in today’s currency). From the start, it also courted controversy.

A decade after the Tech Plan was established, well over one-third of the faculty were conducting work for a corporate sponsor. What sort of work? Faculty found it difficult to say, because many of the arrangements forbade publication of results without the off-campus sponsor’s approval. Sentiment on campus for the Tech Plan further soured after the stock-market crash of 1929 and the onset of the Great Depression. Annual budgets for departments such as Electrical Engineering plummeted 60% in just four years. A growing chorus concluded that MIT had been short-sighted to rely so heavily on corporate patronage, which, after all, could be as fickle as the latest business cycle. Critics went further: overreliance on industrial funding was corrupting. In pursuit of quick money, the critics charged, MIT had auctioned off its intellectual autonomy.

Government’s turn

The time had come for a new funding model, but few alternatives seemed obvious. The Morrill Act notwithstanding, many fiscally conservative administrators at private universities across the country—from MIT to Stanford—believed that the federal government had no business meddling in local affairs such as higher education. Self-made entrepreneurs, industrialists, and philanthropists were one thing; federal bureaucrats quite another. Their peers at public universities, who relied upon state legislatures for funding, largely agreed. Yet the stark economic realities of the 1930s forced MIT vice-president Vannevar Bush to reconsider federal patronage. No industrial partners could rival the research budgets of huge New Deal projects like the Tennessee Valley Authority, the sprawling, government-owned company founded in 1933 to investigate everything from agricultural productivity to hydroelectric power (see <http://www.nature.com/nature/journal/v457/n7232/full/457959a.html>).

Bush’s administrative solution was to rely upon contracts with the federal government. Both this funding source and the legal arrangement--contracts rather than grants or donations--were novel. To keep up the appearance of fair-market transactions between autonomous agents, Bush insisted that MIT, desperate for cash though it may be, hammer out contracts at the negotiating table like any other private enterprise, rather than

seemingly begging for handouts. Bush took this novel form of research sponsorship with him to the brand-new National Defense Research Committee in June 1940, and its successor, the Office of Scientific Research and Development (OSRD), in 1941. On Bush's watch, the OSRD awarded thousands of research contracts to universities across the United States, for everything from radar to the atomic bomb.

More of those wartime research contracts flowed to MIT than to any other university. By 1945 MIT had secured defense-related research contracts worth three times more than those of stalwart industrial contractors Western Electric (AT&T), General Electric, RCA, DuPont, and Westinghouse combined. More than 90% of MIT's annual operating budget derived from federal research contracts. In short order, MIT's model became the basic template for research universities across the United States. Other institutions—most famously Stanford's energetic dean and later provost, Frederick Terman—studied MIT's transformation and sought to replicate it. After the tremendous upheavals of wartime, few seemed to question anymore whether the federal government was an appropriate source of funding for basic research and university education. The sheer scale of funding—which continued to rise after the onset of the Cold War—quickly cemented the new normal.

During the fifties and sixties, federal patronage drove the steepest expansion of higher education in American history (if not the whole world). The new contracts, largely from military and defense-related agencies, underwrote massive new equipment on campus such as nuclear reactors and electronic computers, opening up unparalleled opportunities for faculty and students. Few questioned the relationship too sharply until the escalation of fighting in the Vietnam War in the late 1960s. Only then did a critical mass of campus voices reconsider whether the Pentagon had any proper role to play in the education business. Government money once again seemed 'dirty'.

The stage was set for some new funding model. Not long after the campus protests had faded, molecular biologists began to worry about potential dangers from recombinant-DNA (rDNA); Cambridge emerged as one of the first cities in the United States to forge its own rules and procedures to allow such research. In short order the area near MIT's campus became known as 'gene town', an incubator for private biotechnology companies, many of which enjoyed close ties to MIT faculty and students.

Modern hybrid

The revolving door that has since existed between MIT life scientists, their students, corporate boards of directors and venture capitalists has surely been a great boon for research. But who benefits? Many critics fear that modern non-disclosure agreements are just as stifling as the corporate censorship rules of the Tech Plan or the Defense Department's classification codes. Other concerns loom as well. How much does MIT benefit when faculty members split their time between campus responsibilities and spin-off, for-profit, start-up companies? Is private investment any more reliable or morally pure than public investment from the federal government?

Since the 1980s, MIT has followed a hybrid funding scheme, with clear roots in its earlier experiments. At last count, MIT receives about one-half of its annual budget from non-military branches of the federal government (the largest share from the Department of Health and Human Services, which includes the National Institutes of

Health); one-sixth from the military; one-quarter from private industries and foundations; and the remaining few percent from state, local, and foreign governments.

Even the category of private foundations comes with baggage. The latest sparkling new building on MIT's campus—the David H. Koch Institute for Integrative Cancer Research, which opened last month—exemplifies the tensions. Billionaire donor David Koch, an MIT alumnus and cancer survivor, paid generously for the new building; he has donated comparable amounts to refurbish medical centers, museums, and theaters across the country. Alongside his philanthropic giving, he has also funded conservative political groups associated with the so-called Tea Party, though he denies any direct connection with that movement. Deserved or not, his name has become polarizing in today's political climate. At the building's grand opening, Koch declared that cancer is “absolutely nonpartisan”[2]. True enough. But patronage, unlike the disease, is all about political choices and intellectual trade-offs.

Since MIT's founding, government sources and industrial sponsors have traded places several times, each held up alternately as *savoir* or poisoned fruit. As its history has shown, no single model can claim the mantle of angels. All patronage involves a delicate balance between opening up new opportunities and mortgaging intellectual autonomy. Rather than focus on the source of cash—public or private—we must remember to scrutinize the inevitable strings attached.

References

[1] David Kaiser, ed., *Becoming MIT: Moments of Decision* (Cambridge, Mass.: MIT Press, 2010).

[2] Stephen Smith, “Center's patron on hand for fete,” *Boston Globe* (4 March 2011).

About the Author

David Kaiser is a physicist and historian at MIT. His latest book, *How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival* (W. W. Norton), will be published this June.