

IT:

College of Science and Engineering:

The Institute of Technology Years (1935-2010)

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IT:

Introduction: 75 Years of the Institute of Technology

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**At left: Minneapolis
campus and city (1925)**

Minnesota is an intriguing state. Years ago it chopped down its forests and dug up its high-grade iron ore and more recently it closed down its flour mills, and yet its citizens are among the wealthiest in the country. The state has the 12th largest land area in the nation, but the relatively compact metropolitan Twin Cities accounts for more than 60 percent of the entire state's population, a larger fraction than any other state but Arizona. Minnesota is justly known for its cows and turkeys, as well as its lakes and forests, and yet it is also the seedbed of notable high technology industries. Minnesota geologists discovered some of the very oldest rocks on the planet, and one breathed new life into the iron ore industry just after the Second World War. Minnesota's scientists and engineers today are charting new possibilities for innovation and new paths for economic growth. For 75 years the Institute of Technology has been at the center of this remarkable story. In this history we hope to explain its origin, development, and contributions to the university, the state, and the wider world.

Minnesota created a distinctive land-grant system of higher education. The Morrill Act of 1862 gave some 17 million acres of federal land to the states, provided they created educational opportunities for “such branches of learning as are related to agriculture and the mechanic arts,” the contemporary term for what today we call technology. Most other states separated their new institutions of agriculture and technology offerings from their schools of science, liberal arts, and professions. While this model spawned great football rivalries between the “university” and the “state” teams in some other states, it also divided the sources of economic innovation and commercial growth. Minnesota placed the new agriculture and technology programs alongside the established science, professional, and liberal arts programs. This integration reinforced geographical concentrations of factories, warehouses, and commercial services, as well as population growth in the metropolitan area.

In the 20th century, high technology innovations reinforced this pattern of urban growth. IT graduates created a distinctive high technology economy two decades before California’s Silicon Valley in the 1970s. “I was fortunate in having an instructor at the University of Minnesota who was looking after me,” recalled one electrical engineering graduate of 1949. “When I said, ‘What’s next?’ he said, ‘If I were you, I’d just go down the street here to Engineering Research Associates, and I’d think you’d like what they’re doing there.’”¹ Engineering Research Associates in St. Paul gave the graduate, one Seymour Cray, his first job and invaluable experience in designing computers. His innovative designs for “supercomputers” powered the Control Data Corporation, a later spin-off from ERA, toward becoming a billion-dollar a year concern by the late 1960s. After two decades of further growth, Control Data,

Sperry Rand Univac, Honeywell, IBM–Rochester, and a host of smaller companies employed 68,000 Minnesotans in the computer industry, a sizable fraction of the state’s workforce. Another electrical engineering graduate, Earl Bakken (1948), developed the first wearable pacemaker in 1957. His Medtronic company became the seed from which grew a nationally renowned medical devices industry. Today Minnesota’s “LifeScience Alley” has over 600 member organizations including the Mayo Clinic and the University of Minnesota.

The 4,000 companies IT graduates have founded and the 175,000 jobs they created in the state by 2005 defy easy or even coherent summary. It’s easy to spotlight achievements of IT faculty. Among them were physicist Alfred O.C. Nier who separated uranium-235 for the nuclear research leading to the Manhattan Project and mechanical engineer James J. “Crash” Ryan whose work led to automotive seatbelts, as well as mining engineer E. W. Davis whose taconite process saved the Minnesota iron ore industry. Chemist Izaak Kolthoff’s recipe for “cold process” rubber was the basis for the synthetic rubber industry in the United States. We can add notable contributions of IT alumni such as Art Fry (chemical engineering class of 1955) who launched Post-It notes for 3M.²

Education in technical subjects began at the University of Minnesota roughly two decades after its founding in 1851 with the implementation of the Morrill Act of 1862 which provided land grants to endow the “liberal and practical education of the industrial classes in the several pursuits and professions of life.” Engineering, mining, architecture, and chemistry units were welded together as the “Institute of Technology” in 1935. The unique structure of IT emerged in the 1960s when the physical science departments merged

with IT's engineering departments as well as mathematics and computer science, to create an environment extraordinarily conducive to interdisciplinary research and teaching.³

IT's origins and early character arose in the pioneering schools of chemistry, mines, and engineering, which figured in a gradually emerging vision for an "institute of technology" that was realized in 1935. Growing contacts between IT and Minnesota industry created opportunities for research and educational innovation in new chemical, electronic, and metallurgical industries that had eclipsed the industrial mills powered by St. Anthony Falls, a site for research by university professors of hydraulics. IT expanded to include physics, mathematics, and geology by the early 1960s, as these fundamental sciences increasingly interacted through more permeable disciplinary boundaries with IT's other departments. These developments occupy the first three chapters of the history that follows.

The next three chapters assess IT's responses to new challenges: the transformation of the engineering fields from industrially grounded enterprises into academic disciplines based on mathematics and the sciences. For example, chemical engineering became the foremost department in the nation as it synthesized mathematics, physics, chemistry, and computer modeling into a new engineering science as well as transformed metallurgy into materials science, one of the new disciplines based on physics and chemistry. Faculty in mechanical engineering gained national prominence for developing engineering science approaches to heat and mass transfer. During World War II and the subsequent Cold War, IT entered a close and ongoing relationship with government funding agencies. Federal support for research enriched science and engineering with new tools, programs, and opportunities that IT faculty were quick to pursue. While

national missions provided funding, the new environment presented dilemmas between open inquiry and secrecy as well as academic freedom and national security. Since the 1970s, interdisciplinary centers and initiatives have modified IT's department-centric structure as described in case studies of the Institute for Mathematics and its Applications (IMA), the Center for Interfacial Engineering (CIE), and university initiatives in supercomputing. Our final chapter indicates how these centers and departments constituted the new College of Science and Engineering that became IT's heir and successor in 2010.