

# Thirty years of micro-nano innovation

*CMC Microsystems connects Canadian industry and university researchers.*



CMC ARCHIVES

*CMC lab in the early 1990s. The network's earliest computers were disc-driven and had 512KB of RAM.*

The “smart phone” existed only in spy fiction when a pioneering student-industry initiative launched at Queen's in 1980 quietly began changing the country's electronics landscape.

At the time, Queen's was one of a handful of Canadian universities doing research and training students in integrated circuit design. (The building blocks of the postwar electronics boom, integrated circuits were made by combining thousands of transistors on a single silicon chip.) This exploratory work was valuable to industry, but its potential was hobbled by lack of access to facilities for making the chips.

Inspired by university activity in the U.S., Jim Mason, Lloyd Peppard and Sid Penstone of Queen's Department of Electrical and Computer Engineering convinced Bell Northern Research (later Northern Telecom), then Canada's only silicon fabrication facility, to manufacture the students' designs. “This was important because the only way you could find out if your design worked was if you could make it and test it,” Professor Penstone says.

The experiment proved so successful that, in 1982, BNR made its facilities available to all Canadian universities – on the condition that Queen's coordinate the process. The Queen's turned to one of their own, Dan Gale, Sc'76, MSc'78, an electrical engineering graduate with a background in optical signalling, to manage the activity. (It was a prescient move. Today, there is increased mixing of optical and electrical signals, and Gale, VP and CTO of CMC, has encouraged Canadian leadership in this field.)

Thus began a unique, national ecosystem that has been building Canada's strength in micro-nano innovation ever since. Envisioned by BNR's Douglas Colton (and president of CMC, 1984-93),

and Andy Salama of U of T, and established in 1984 with support from the Natural Sciences and Engineering Council, it comprised a Canada-wide National Design Network of researchers, students and BNR, and an administrative body at Queen's called the Canadian Microelectronics Corporation (now CMC Microsystems).

CMC enabled the Network's groundbreaking work by managing the university-industry projects, sourcing, loaning and supporting industry-calibre equipment for enabling excellent research and, years ahead of the internet, facilitating cross-country knowledge-sharing via electronic networks.

In the 30 years since, with the support of NSERC and the Canada Foundation for Innovation, CMC's offerings, expertise and activities have expanded, and increasing numbers of Canadian companies are finding their competitive edge through working with the NDN and CMC.

Today, the National Design Network links almost 1,000 professors, 7,000 other innovators (from undergrads to postdoctoral fellows) and research staff at 54 institutions across Canada with more than 600 industry collaborators (including at least 50 NDN startups), more than 30 fabrication partners, and numerous related national and international organizations. NDN innovations span electronics and computing to health care, energy, the environment, transportation and aerospace.

“The core value of CMC is research excellence, in the belief that this leads to long-term wealth creation that benefits all Canadians,” says Ian McWalter, President and CEO of CMC. “The NDN supports this value-add by being an ‘honest broker’ in the development of collaborations among researchers and between universities and industry.”

That value-creation also means keeping the Network at the forefront of technological change through strategic change. CMC has already begun this shift, with a focus on future-oriented technologies, processes and expertise for building Canadian strength in advanced manufacturing. “Microsystems and nanotechnologies are the innovation enablers in Canada,” says Dr. McWalter. “The university-based facilities and prototyping capability of our network provide a bridge to a new manufacturing economy. The NDN has the people, the experience and the know-how to drive this manufacturing renaissance.”

■ **Mary Anne Beaudette, Ed'96**