MIT Media Lab Spawns International Offshoots

Famed for its fun, quirky, high-tech research and for zipping together industry and academia, the MIT Media Lab is expanding at home and abroad.

Wearable computers, networked shoes, functional LEGO® pieces, and human-powered generators are a taste of the things that scientists think about at the MIT Media Lab. Founded in 1985, the lab has begun exporting its style of inventing. In 2000 it helped set up Media Lab Europe in Dublin, Ireland. Now it's partnering with the government of India to start a media lab there. And there's talk of additional offshoots in Korea, South America, and Australia. At home in Cambridge, Massachusetts, the original media lab is growing too, with plans to double in size in the next few years.

For a university research lab, the MIT Media Lab is unusually glitzy. A building designed by internationally known architect I. M. Pei houses more than 30 research groups, blending science—including physics, math, computer science, engineering, biology, chemistry, and anthropology—with publishing, art, music, epistemology, and other fields. Just as unusual as the multidisciplinary atmosphere is the tight coupling between academia and industry. MIT Media Lab students and faculty regularly rub shoulders with visitors from industry; on any given day, several guests are regaled with demonstrations of ongoing work. More than 90% of the lab's nearly $40 million annual budget comes from 170 corporate sponsors. Perhaps most avant-garde of all, those sponsors share free access to intellectual property developed at the lab.

"It's a time of great change here," says Neil Gershenfeld, who leads the media lab's physics and the media group. "In its first epoch, what the media lab did was to free information from its physical package." Now one of the most compelling things, he adds, "is to see how bits relate to their physical embodiment. In quantum computing, for example, you can't easily separate the device doing the computing from the theory. You can't view it as software that has no connection to machine architecture."

Broadly, Gershenfeld says, the two areas of growth at the media lab are technology for development "of both kids and countries" and "enabling bits to meet atoms."

Bits and atoms

Gershenfeld heads MIT's Center for Bits and Atoms, which is just getting started with the help of the media lab and $13.75 million from NSF. Research areas foreseen for the CBA include quantum computing, the programming of molecular machinery to self-assemble, electronic interfaces to molecular machinery, and analog circuitry. "The CBA seeks to bring together in one place and time the intellectual and physical resources required to simultaneously shape both logical and physical structures across these scales," says Gershenfeld. "By looking at different systems . . . we are learning how to program by taking advantage of inherent computational possibilities of molecules." Much of this research is inspired by biology, he adds.

"Many of our projects are lining up around the idea of 'personal fabricators'—machines that print active functions in three dimensions," Gershenfeld continues. "Say you wanted a clock radio that did this and that and ran other machines in your house. In a world of personal fabricators, people could shape their own physical environments. We are at the early stages. It's one of our grandest challenges."

A new building, slated to open in 2004, will house the CBA, the MIT Media Lab's Okawa Center for Future Children, which was endowed three years ago, and an art center. The building is itself an experiment: It will have clean rooms, nanofabrication labs, chemistry and biology labs, and a bay for large-scale assembly; indoor walls will be movable so that spaces can be rearranged. And, says Gershenfeld, "to keep track of the needs of both the occupants and machines in the building, it is being developed as a testbed for Internet-enabling the whole physical plant." Every device, down to light switches and environmental sensors, will have built-in algorithms and be hooked to the Internet.

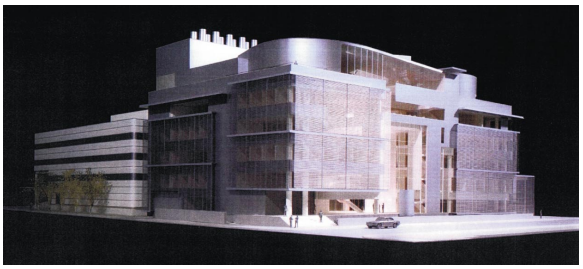
Not just a clone

The media lab's first international outpost kicked off in Dublin with Irish £28 million (roughly $31 million) for four years from the Irish government. Media Lab Europe has $11 million more from industrial sponsors, and it's aiming for $20 million a year and 250 researchers by 2008. So far, it's built up nine research groups—three led by professors who moved there from MIT—and 50 researchers total.

"Just cloning the MIT Media Lab is not enough," says John Callinan, the new lab's chief operating officer. "We want to take the best bits and develop them in a European environment, where issues and sensitivities are different." For example, one project involves real-time translating of conversations between speakers of differ-

STEFAN AGAMANOLIS/MEDIA LAB EUROPE

RESEARCHERS AT MEDIA LAB EUROPE in Dublin, housed in a former Guinness brewery, use an evolving multimodal teleconference link to stay in touch with colleagues at MIT.



MAKI AND ASSOCIATES

MODEL of the MIT Media Lab's planned expansion, designed by architect Fumihiko Maki.

ent languages. Other research topics at Media Lab Europe include chaos and complex systems and biofeedback—a two-way link between man and machine that researchers hope could lead, for instance, to waking people from comas.

Media Lab Europe hosts students from MIT and universities in Europe and may someday grant master's degrees and PhDs. The lab is also forming an incubator program called media lab ventures, intended, says Callinan, as a "halfway house between the research lab and the cruel world of start-ups."

A 10-year contract not only arranges for the Cambridge- and Dublin-based media labs to share inventions and knowledge, but also assures the Irish government that the parent MIT Media Lab won't create new satellites in Europe—for which, media lab members say, there is no shortage of interest.

Technology serving the masses

"We have had many projects using technology in the services of the masses—geodesic domes, minitractors, water prospecting instruments, and now computer-based lessons," says Shrinath Kalbag, who, after retiring as head of the engineering science division of Unilever in India, moved to a rural village near Pune to start the Vigyan Ashram. "Our main objective is to reform the educational system of India, which I believe is the root cause of all our problems," he says. "We also have many needs, where our lack of knowledge is the hurdle in developing or using technology. This is where Media Lab Asia comes in."

"We didn't wake up one day, and say, 'Let's go to India and give them gadgets,' " agrees Gershenfeld, who is coordinating technology for Media Lab Asia. "We were pulled in. Media Lab Asia is based on the belief that many of the hardest problems in development need not the lowest, but the highest, technology. We found an amazing overlap between their problems and the capabilities we could help provide. It's demand driven."

NEIL GERSHENFELD

NEIL GERSHENFELD (right) visits officials in the new Indian state of Chattisgarh to discuss applying information technology for handling local land records.

Gershenfeld tells of a visit to a rural village in India: "They wanted roads that don't wash out, a hospital, and a network of computers to replace their written land records, which determine taxes and benefits and are a source of great corruption. They didn't use these words, but what they were asking for was a low-cost computer that could be powered by people, not batteries; that is multilingual and multimodal—the villagers are illiterate; that has secure encryption; and that could integrate data with geographical information so they could learn about disasters as they happen. If you start assembling that string, it goes far beyond what a laptop does today. These are hard problems that are emerging in computing technologies. And, to be deployable on the scale of India, they have to be made locally by micro-entrepreneurs—they can't feasibly be produced and customized at a distance."

Chikan embroidery is another example, says MIT's Michael Best, one of Media Lab Asia's directors. "There is some work on building a printing technology that would allow women to get the patterns off the Net and iron them onto fabric. They are entrepreneurial women who are interested in taking this process in directions that allow them to engage in the market economy."

Media Lab Asia is planned as a partnership of the Indian government, India's prestigious Institutes of Technology, corporations, and rural nongovernmental organizations. Unlike the US and European media labs, it is starting out as a network. Sites in Mumbai, New Delhi, Kanpur, and Chennai will focus on developing various aspects of computer operating and networking systems for local needs, such as multilingual computer systems, computers for kids and for people who don't read, wireless systems, and a non-desktop interface. Microsoft® Windows®, says Best, "makes use of a metaphor called the desktop. Why should a community that doesn't value the desk want to use a desktop? There will be learning and education, but local culture will be the background music to all of these projects."

Media Lab Asia starts out with $12 million from India's Ministry of Information Technology, of which about $1.7 million goes to the MIT Media Lab. After a year, the two will negotiate a 10-year plan, with a total budget of $500 million to $1 billion, most of which will have to be raised from industrial sponsors. "We anticipate that the lab will impact all 1 billion people in India in some meaningful way. It may have a pan-Asian, or even a global reach," says Best.

In the media lab expansions at MIT and abroad, says Gershenfeld, "the hopes and fears are the same—organizational scaling. One danger is that we could overextend. Another danger is becoming the establishment. But that's one more reason we are doing all these changes—to reset, to bring new energy."

TONI FEDER

Math and Science Suffer in Education Bill

On 19 December, less than a week before Christmas, members of the House of Representatives were scrambling to wrap up several pieces of legislation so they could leave for the holidays. One item on the agenda was the final appropriations report for an education bill that would authorize $26.5 billion in federal spending in 2002—about $8 billion more than in 2001.

The hundreds of millions of federal dollars that in past years supported training of elementary school math and science teachers have been redirected into new math and science partnerships, and the result may be less money for the teachers.

The bill, promoted by President Bush as the No Child Left Behind Act, had passed both the House and Senate with overwhelming majorities and the president was eager to sign it into law. But Representatives Vern Ehlers (R-Mich.) and Rush Holt (D-N.J.), the two physicists in Congress, were not happy. A complex interplay of political ideologies and inattention had caused the final bill to be stripped of millions of dollars intended primarily for training elementary-school teachers to better teach science and math. The two scientists-turned-politicians used a procedural device called a colloquy