Lemelson–MIT Program

In FY2008, the Lemelson–MIT Program (LMIT) successfully went through the second cycle of the relaunched awards program and integration of the EurekaFest celebration with the InvenTeams Odyssey—all in pursuit of its mission to recognize outstanding inventors, encourage sustainable solutions to real-world problems, and enable and inspire young people to pursue creative lives and careers through invention.

Strategic collaborations and creative experimentation were again the hallmark of LMIT operations in FY2008. Working with various partners, LMIT shared and implemented novel ideas to drive invention and innovation through two main programmatic thrusts: recognition/awards and mentoring.

Annual Invention Awards (Recognition)

2008 Lemelson–MIT Prize

Presented to an outstanding living American inventor-innovator who has significantly benefited society, the $500,000 Lemelson–MIT Prize is the program's most prestigious vehicle for creating excitement about invention and innovation. This is the second year we are awarding to a midcareer individual. Our intent is that the award will be more likely to act as a catalyst for a recipient's inventive work(s) and he/she will be a more accessible role model for youth. Feedback suggests that this year's winner was highly inspiring for youth attending EurekaFest.

The Lemelson–MIT Prize Committee awarded Dr. Joseph DeSimone, chancellor's eminent professor of chemistry at the University of North Carolina at Chapel Hill and William R. Kenan, Jr., distinguished professor of chemical engineering at North Carolina State University, the 2008 $500,000 Lemelson–MIT Prize. DeSimone was recognized for extensive inventions and inventive applications of polymer chemistry. Specifically, he has invented environmentally friendly carbon dioxide–based chemistries and processes for synthesizing polymeric materials, for garment cleaning, and for advanced microelectronics processing; helped to design fully bioabsorbable, drug-eluting stents that are now in clinical trials; and is currently pioneering microelectronics manufacturing processes to make shape-specific organic nanocarriers for use in nanomedicine. According to Dr. Robert Langer, DeSimone's nominator and recipient of the $500,000 Lemelson–MIT Prize in 1998, "much of what Professor DeSimone does is centered around his connection to young people: in the classroom, in the academic laboratory and in entrepreneurial activities that he has led. Almost all of his patents have students as co-inventors. He encourages students to look at the interface between fields or concepts as great opportunities for innovations." This concept of finding invention and innovation at boundaries and by employing different ways of thinking and approaches—which LMIT and others explain with the term "transgressive thinking"—is tremendously important. The growth of interdisciplinary programs of study in universities and the inventive thinking that stems from them, which is a recurring theme among LMIT award winners—student prize and beyond—is evidence of this. Transgressive thinking was an aspect of our 2004 report "INVENTION: Enhancing inventiveness for quality of life, competitiveness, and sustainability."

For more information visit http://web.mit.edu/invent/n-pressreleases/n-press-08LMP.html.

2008 Lemelson–MIT Award for Sustainability

Created to address the growing importance of sustainability—both for the developing world and industrialized nations—the $100,000 Lemelson–MIT Award for Sustainability recognizes and supports inventors who are working to safeguard the well-being of our communities and planet.

The second annual $100,000 Lemelson–MIT Award for Sustainability was presented to Martin Fisher, cofounder and CEO of KickStart. Fisher was honored for his creation of a line of human-powered irrigation pumps that have had a significant impact on poor, small-scale farming families and entrepreneurs in Kenya, Tanzania, and Mali, providing them with the tools to escape poverty.

For more information visit http://web.mit.edu/invent/a-winners/a-fisher.html.

2008 Lemelson–MIT Student Prize

Awarded annually since LMIT's inception to a MIT senior or graduate student who created or improved a product or process, applied a technology in a new way, redesigned a system, or demonstrated remarkable inventiveness in other ways, the $30,000 Lemelson–MIT Student Prize continues to serve as a highlight of our recognition activities.

At a press conference on February 27, 2008, Dorothy Lemelson announced Timothy Lu, a candidate in the Harvard–MIT Division of Health Sciences and Technology (Lu earned his PhD in medical engineering and medical physics in early 2008) as the prizewinner.

Lu invented a series of bacteriophage platforms that offer more effective and enhanced treatment, which promise to permeate defenses of antibiotic-resistant bacteria and bacterial biofilms and combat infections. Lu's antibacterial catalysts can be quickly and inexpensively designed and produced to thwart infections from bacteria that breed on a multitude of surfaces, including medical, industrial, and food-processing equipment.

More information about Lu can be found at http://web.mit.edu/invent/n-pressreleases/n-press-08SP.html.

We introduced three new aspects to the Lemelson–MIT Student Prize this year—all well-received:

- To increase visibility, we relocated the press conference to a room directly off MIT's main thoroughfare, the Infinite Corridor.
- To begin to build broader recognition of inventive students at MIT, we encouraged our judges to identify finalists, if appropriate; Erez Lieberman and Manu Prakash were selected as finalists and during the announcement displayed posters of their work, were recognized, and received $1,000 awards. The additional students, their parents, and mentors made for a more rewarding event.

- To encourage students to take next steps, we hosted a NCIIA Advanced Invention to Venture during MIT's spring break and sponsored our winner's and finalists' attendance.

The Lemelson–MIT Student Prize received extensive local and national press, with significant coverage in low-circulation, field-specific trade channels in the winner's field:

- National: *Science* (circulation: 133,000), *Chicago Sun-Times* (circulation: 350,000), NPR/WBUR (impressions: 2.7 million)
- International: *The Vancouver Sun* (circulation: 350,000)
- Local: *Boston Globe* (circulation: 360,000), *Boston Metro* (circulation: 166,000), *BostonNow* (circulation: 112,000) and television and radio coverage on Fox 25, WBZ-TV, WFXT-TV, NECN, WBZ-AM.

National Student Prizes

2008 marked the second year of our collegiate student prize collaboration with Rensselaer Polytechnic Institute and the University of Illinois at Urbana–Champaign. Recipients of this year's $30,000 Lemelson–Rensselaer Student Prize and the $30,000 Lemelson–Illinois Student Prize, respectively, were Martin Schubert, who developed a polarized light-emitting diode (LED), which could vastly improve liquid crystal display (LCD) screens, conserve energy, and lead to ultraefficient LEDs; and Patrick Walsh, who invented a battery-powered, solar-charged LED lamp. Per our commitment to the Lemelson Foundation, we have contracted to extend this successful program to CalTech in 2009. One to-be-determined school will be added in 2010.

EurekaFest

June 25–28, 2008, LMIT held its second annual EurekaFest—a multiday celebration designed to empower a legacy of inventors through activities that inspire youth, honor role models, and encourage creativity and problem solving. Presented in collaboration with the Museum of Science, Boston, EurekaFest offered a series of activities in Boston and Cambridge to celebrate the inventive spirit.

EurekaFest was held later than in the previous year so it could be integrated with the InvenTeams Odyssey. This integration allowed us to better highlight the pipeline of inventive careers and provide opportunities for youth and accomplished inventors to interact and to be inspired by one another. Mentoring and inspiration were significant themes: award winners were asked to invite the person who had most inspired them to the event, Lemelson collegiate student prize winners and finalists were presenters and mentors, InvenTeams students underwent a specially designed Advanced Invention-to-Venture training for high school students, and Excite Award Teachers (finalists for InvenTeams grants) participated in active learning workshops on tools (presented by an editor of *Make* magazine), electronics, and the invention process and were able to learn about the InvenTeams experience from teachers and students. It was an ambitious program. In addition, there were other sympathetic educational programs running at MIT the week of EurekaFest including MITES and the MIT Science and Engineering Program for Teachers with whom we engaged in activities.

This year's EurekaFest featured collaborations with fellow Lemelson Foundation grantees: the AI2V with the National Collegiate Inventors and Innovators Alliance and the Lemelson Center's hands-on invention activities during EurekaFest at the Museum of Science on Saturday, June 28.

LMIT aggressively marketed EurekaFest to the broader MIT Community (e.g., postcards to all members) and the public (e.g., events calendars). Attendance at the EurekaFest Lemelson–MIT Award Winner presentations—which included InvenTeams and Lemelson Student Prize winners from all three universities—was well above 325. Dr. Martin Fisher, the 2008 winner of the $100,000 Lemelson Award for Sustainability drew a significant crowd and inspired the youth attendees.

For the first time, the Lemelson–MIT Awards ceremony was open to the public and attracted more than 200 guests, above the 170 InvenTeams students, teachers, educators, mentors, and other members of the public who were able to watch the event on screens throughout the building. MIT president Susan Hockfield presided over the 14th annual awards ceremony, with dean of MIT Engineering Subra Suresh and Lemelson Foundation director Robert Lemelson presenting the $500,000 Lemelson–MIT Prize and the $100,000 Lemelson–MIT Award for Sustainability, respectively. Dr. Timothy Swager, the 2007 recipient of the $500,000 Lemelson–MIT Prize and several past Lemelson–MIT Student Prize winners in the greater Boston area attended the festivities or were active participants. Nathan Ball, 2007 Lemelson–MIT Student Prize winner, entertained the InvenTeams on the first evening; gave a tour of his company's operations to a group of Lemelson Foundation representatives, grantees, and Dr. DeSimone; and was the emcee for the design challenge at the Museum of Science: "Heavy Metal: Amped on Wind Power." Similarly, 2006 and 2001 Lemelson–MIT Student Prize winners Carl Dietrich and Andrew Heafitz gave a tour of Terrafugia, their start-up company that aims to bring a "roadable aircraft" into existence in the next few years.

EurekaFest at the Museum of Science featured "Heavy Metal," a challenge to design and build a wind-powered device to lift a metal trashcan to the ceiling of the museum. More than 200 high school students from across the country (InvenTeams and MITES) were placed on 30 mentored teams with complete strangers. Lemelson–Illinois and Lemelson–Rensellaer Student Prize winners and finalists were mentors, along with instructors from MITES and InvenTeams alumni. There were at least three all-girl teams, including one that won an award for the most daring design. More than 20 teams were able to design and build devices that lifted cans more than 10 feet, with at least 12 reaching the maximum height. The challenge finale was kicked off by performances from air guitar champions and culminated with the dropping of all 30 cans from the maximum height. The challenge was prototyped earlier in the spring with local students and schools.

In addition to the design challenge, InvenTeams teachers and Lemelson–Illinois Student Prize finalists gave presentations on assistive device projects and inventions to the public. More than 80 families from local battered women's shelters were invited to and attended the event—enjoying the LMIT Center's invention activities.

Participants and attendees at EurekaFest were enthusiastic, positive, and volunteered for future years. Along with constructive feedback to improve the event, fellow Lemelson

Foundation grantees and members of the MIT community were overheard saying that this was the "best event yet."

Media reception was extremely positive in tone from a local and national level. To date, EurekaFest media relations activities resulted in more than 12.8 million impressions. Media highlights of note include coverage in the *Boston Globe*, *Boston Metro*, *Boston.com*, *Christian Science Monitor*, *Chronicle.com*, *Discovery.com*, *MAKEzine Blog*, *Mass High Tech*, *Technology Review*, *WBUR.org*, and *WBZTV.com*. A number of additional opportunities are in progress with coverage pending in the following outlets: *Cambridge Chronicle*, *Discover Magazine*, *Inventor's Digest*, and Westwood Radio's nationally syndicated program "America in the Morning." Select articles are attached.

We look forward to developing, in collaboration with the Lemelson Foundation and grantees, the 2009 EurekaFest (June 2009). Significant among our adaptations for 2009 will be a strengthening of the programming and public components, possibly including a general call for, and showcasing of, inventors of sustainable technologies. LMIT aims to continue to expand the inventor network and forge connections to inspire others to invent and highlight inventiveness in the community. Ultimately, we will create an internationally recognized premiere event for inventors and the public, with emphasis on youth and inventiveness for sustainable development.

Lemelson–MIT InvenTeams (Mentoring)

InvenTeams, LMIT's grants initiative supporting high school invention teams, continued as a national program in FY2008. In October 2007, 17 new grants were awarded through LMIT's national InvenTeams initiative. The grantees were a diverse group from 14 states. InvenTeam prototypes yielded two consumer products, two assistive devices, 10 health/safety or environmental inventions, and two affordable technology devices.

More than 250 students and 50 teachers and mentors were involved in these projects; 35% of the schools were urban based, 41% were suburban, and 24% were rural. This year, 11 of the 17 grantees were public high schools. We noted a creditable 32% female and 34% underrepresented participation on the teams. Young women led three of the teams; female teachers coached one team. MIT alumni participated as mentors with one team. In addition, local companies provided mentors or funding to 13 teams from previous years as part of our practice to encourage schools with follow-on grants.

On the basis of interviews we conducted with experienced InvenTeams teachers, we adjusted our follow-on grants structure so that teams would receive up to $4,000 from us each year for three years. For the first, second, and third follow-on years, teams are to use $2,000, $3,000, and $4,000, respectively, as a stipend for teacher(s), with the remainder for project expenses. This change was intended to make InvenTeams competitive with other compensation opportunities.

Testimonials from students, teachers, and mentors reflected a positive spirit to continue their inventiveness, in addition to showing much gratitude to have been afforded the opportunity to participate in an enriching project under the umbrella of MIT.

During the grant year, Cisco Systems' Boxborough, MA, location supported our use of WebEx, a communications platform. WebEx was received with mixed results.

Georgia Pacific has expressed interest in sponsoring several teams near their midwest facilities and recruited two applicants. Similarly, Embraer and the National University of Singapore have expressed strong interest.

Partnerships with other companies and organizations—including SolidWorks, igus, Parallax, Vernier, and the National Engineering Design Challenge—continue to enrich the InvenTeams experience through their generous provision of materials, equipment, advice, and networks. Potential collaborations with WGBH, the Boy Scouts, Girl Scouts, Ashoka Youth Venture, and 4-H will open additional channels for invention education. In addition, we have begun to leverage our existing invention education materials to develop content for MIT's OpenCourseWare portal.

InvenTeams received much local and national press again this year:

- National: *CNETNews.com* (impressions: 15.3 million), *FoxNews.com* (impressions: 5.9 million), *NEAToday.com* (impressions: 2.8 million), *Engadget.com* (impressions: 1.3 million), The Osgood File
- Local (Boston and local to InvenTeams' locations): *Newsday* (circulation: 500,000), *Boston Globe* (circulation: 435,000), *Boston Herald* (circulation: 203,000), *Boston Metro* (circulation: 170,000), *El Nuevo Herald* (circulation: 83,000), *BostonHerald.com* (impressions: 1 million), *Oregonian* (circulation: 336,000), *Oregonlive.com* (impressions: 900,000), *MiamiHerald.com* (impressions: 265,000), WBUR.

In FY2009, LMIT will continue to ramp up its efforts to target companies and organizations suitable for supporting and mentoring InvenTeams. Moreover, we will work hard to position InvenTeams to benefit from MIT's growing interest and sense of urgency to have an impact in K–12.

Lemelson–MIT Invention Index

In FY2007, LMIT took a hiatus from the Invention Index—our annual survey of American attitudes toward invention. After the August 2007 Lemelson Foundation Board meeting when support for the Index was voiced, the decision was made to reinstate the initiative—better aligned with programmatic interests (e.g., science, technology, engineering, and mathematics education; hands-on learning; youth and invention attitudes). In January 2008, LMIT released the results of a nationwide survey of teens and adults on their ability to invent solutions to the world's pressing challenges and thoughts on their own preparation for careers in technology and engineering. The results support LMIT's activities and received coverage in *Science Daily* and *The Chronicle of Higher Education* (The Wired Campus).

More information about this year's Invention Index can be found at http://web.mit.edu/invent/n-pressreleases/n-press-08index.html.

Lemelson–MIT Support for MIT Programs and Classes

MIT IDEAS Competition

LMIT helped sponsor the seventh annual MIT IDEAS competition, organized by MIT's Edgerton Center, Public Service Center, and International Development Initiative. The team-based competition provides awards for students to develop inventions and innovations that will make a positive change in the world. Winning teams must use prize money to refine their ideas or products and evaluate their performance in the field. While the competition invites creative solutions to community problems locally, nationally, and internationally, LMIT focuses its support to the MIT IDEAS competition on technological innovations for the developing world. This year, LMIT sponsored two awards ($10,000) and provided slightly greater operational support ($5,000) for the program than in previous years. In FY2009, LMIT funding for IDEAS may decrease to $10,000.

WiiHabilitation received the $5,000 IDEAS award cosponsored by LMIT for its system that adapts virtual reality gaming technologies to function as rehabilitation aids for stroke patients in contexts where there are few healthcare professionals. The $7,500 LMIT-sponsored International Technology Award went to Leveraged Freedom Chair, a mobility aid for people with disabilities in developing countries that can morph between a standard wheelchair (small enough to use indoors) and a long-distance lever-powered traveler (designed to efficiently harness upper body power to cope with rugged terrain and extremely poor road conditions). More information about the IDEAS competition can be found at http://web.mit.edu/ideas/www/index.htm.

Product Engineering Processes

In 2.009 Product Engineering Processes, a senior-level mechanical engineering class, students work in teams of 14–16 individuals to design and build working alpha prototypes of new products. In this highly interactive and stimulating class, students develop skills in product design, creativity, innovation, group dynamics, team management, consensus building, and communication. Working within a budget, they engage in a unifying engineering experience.

This year, projects had a "reduce, reuse, and recycle" theme. Guided by professor David Wallace, students designed useful products that can be used to decrease negative environmental impacts and/or improve quality of life. Products developed this year included a solar-powered bin that automatically sorts recyclable bottles and cans dumped into it (Recycl-o-sort), insulation made from recycled plastic bottles (Bottleation), a human-powered shea nut processing machine (SheaCycle), a system for sorting coffee beans (Sorter), a shower system that automatically reduces water flow while a person is lathering up (IntelliShower), a human-powered TV remote control (PowerClick), and a machine to extract the maximum amount of oil from old oil filters to reduce the pollution caused by their disposal (Cyclos).

Final projects were presented in early December 2007 in what is a highly educational, thought-provoking, and entertaining evening event for the MIT community and class sponsors. The students, instructors, and professors of 2.009 continue to be a terrific source of recruiting information and inspiration for InvenTeams. Moreover, the student

impact data collected parallel InvenTeams' findings regarding changes in attitudes toward invention and product design.

LMIT funds are used primarily for team project budgets, but they also provide resources for the students to participate in a number of engaging, creativity-enhancing, and hands-on learning experiences. In FY2009, funding for 2.009 will continue at $25,000. More information about 2.009 Product Engineering Processes can be found at http://web.mit.edu/2.009/www/.

Personnel Changes

Jennifer Montana, awards program officer, joined LMIT in November 2007 and decided to return to private consulting in February 2008. During FY2008, LMIT welcomed one new staff member: Stacy Pyron, assistant to the executive director. In late June, after significant work with faculty director Merton Flemings, MIT's School of Engineering, and MIT Human Resources, Joshua Schuler announced a reorganization of LMIT to better meet the Program's programmatic and strategic objectives. The reorganization is expected to be complete by mid-September 2008.

Joshua Schuler
Executive Director

More information about the Lemelson–MIT Program can be found at http://mit.edu/invent/.