Lemelson-MIT Program

Goals, Objectives, Priorities, and Accomplishments

The Lemelson–MIT Program (LMIT) successfully executed plans to meet several strategic goals in FY2011. Several of our accomplishments are described below.

Annual Innovation Award

One of our goals for our Annual Innovation Award program was to continue to increase the number of competitive female applicants for the Lemelson-MIT Prize. The number of female nominees increased to four—one more than last year. Three were among the top 10 finalists.

Another goal was to continue to increase private sector representation among the Lemelson-MIT Prize nominees. This year, 10 of the 29 nominees were from private industry, compared to six last year.

A further goal was to continue to increase the representation of innovators working on technologies for developing countries in the nominee pool for the $100,000 Lemelson-MIT Award for Sustainability. Twenty of the 34 nominees this year focused explicitly on international development issues. Of the first-time nominees, 14 of 18 were focused on international development issues.

We also sought to continue to bolster publicity and improve communications for the Lemelson-MIT Collegiate Student Prizes. This year, media impressions increased from approximately 123 million to 159 million.

Communications

One of our communications goals was to increase overall media coverage of LMIT. This year, we reached 872 million impressions, valued at approximately $26 million; last year's numbers were 714 million and $21 million, respectively.

Another goal was to refresh Lemelson-MIT's image. This year, we rebranded the Lemelson-MIT Program, with a new logo and new look and feel for our materials in preparation for an upcoming website redesign.

Invention Education

One of our goals for Invention Education was to hold a satellite EurekaFest™ event. EurekaFest at the Oregon Museum of Science and Industry was held in October 2010.

Another goal was to engage more of the public at EurekaFest. This year, we expanded and increased public engagement at EurekaFest in June 2011, especially during EurekaFest at the Museum of Science, at which 1,200 people participated in the hands-on activities offered. These included engineering design challenges for children up to age 9—and their grown-ups—such as engineering a satellite to hover in a vertical wind tube, creating sails to push a raft across a finish line, engineering a paper bridge, and

designing the most efficient wind turbine blades. The event also offered participants opportunities to meet local inventors from Continuum and to explore their inventions, including the Reebok Pump© and One Laptop Per Child computer.

We also sought to continue to engage schools with a high percentage of students from low-income households. This year, one-third of InvenTeams were from schools with a student population of which 40 percent or higher were eligible for free or reduced-price lunch through the National School Lunch Program.

Administration

One of our main administrative goals in the past year was to relocate from Building E60. We relocated from E60 to 10-110, where we share space with two strategically aligned entities: the Lemelson Foundation–funded MIT International Development Initiative and the office of the dean for undergraduate research and director of the Edgerton Center, Kim Vandiver.

Initiatives

Annual Innovation Awards

2011 $500,000 Lemelson-MIT Prize

Presented to an outstanding mid-career American inventor who is dedicated to improving our world through technological invention and innovation, the $500,000 Lemelson–MIT Prize is the program's most prestigious vehicle for creating excitement about invention and innovation. This is the fifth year we have honored a mid-career individual.

Ongoing efforts to secure competitive female candidates further increased the number of female nominees and finalists this year. Furthermore, LMIT had identified a trend among our prize recipients, in that most of them were from academia. Continuing efforts we began in FY2010, we targeted private sector entities to nominate individuals and cultivated relationships that will further broaden the overall pool of nominees.

The Lemelson-MIT Prize Committee awarded the Lemelson-MIT Prize to Dr. John A. Rogers, the director of the National Science Foundation's Nanoscale Science and Engineering Center and holder of the Lee J. Flory-Founder Chair in Engineering Innovation at University of Illinois, Urbana-Champaign, where he also holds joint appointments in the departments of Materials Science and Engineering, Chemistry, Mechanical Science and Engineering, and Electrical and Computer Engineering.

With more than 300 published papers, 80 patents or applications (50 of which are licensed or in active use), and a MacArthur Fellowship in 2009, Rogers is hailed as one of the most accomplished mid-career inventors in the country. His work demonstrates expertise as an entrepreneurial innovator, bringing lab work to multi-industry marketplaces. He is cofounder and director of mc10, Inc. and Semprius, Inc., among other companies, and has helped create revolutionary products that are integral to human health, fiber optics, semiconductor manufacturing, and solar power, with many currently in commercial use.

2011 $100,000 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 individuals whose technological innovations improve the lives of impoverished people in the developing world.

Recognizing that the pool for the prize has not contained many competitive female candidates, LMIT targeted female innovators. As a result, the number of competitive female candidates increased and we celebrated our first female winner, Dr. Elizabeth Hausler, founder of Build Change, a nonprofit that promotes sustainable, earthquake-resistant housing in the developing world. Build Change's model is based on simplicity. Beginning with a thorough examination of a region's unsafe housing issues, Hausler's team makes slight adjustments to the original building construction plans rather than overhauling an area's traditional architectural structures. Build Change then helps community members work with locally available materials and labor to rebuild. The outcome is a cost-effective, easily modified, and most importantly, culturally accepted construction method the homeowner adopts and understands. Build Change homes cost anywhere from $3,000 to $17,000 less than similar structures built in donor-driven environments.

2011 $30,000 Lemelson-MIT Student Prize

Awarded annually since LMIT's inception, the Lemelson-MIT Student Prize is awarded to an MIT senior or graduate student who has 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.

Dorothy Lemelson announced Alice Chen, from the Harvard-MIT Division of Health Sciences and Technology, as winner of the $30,000 Lemelson-MIT Student Prize at a celebration on March 9. Chen was recognized for her innovative applications of microtechnology to study human health and disease. She is LMIT's second female winner; the first winner was Amy Smith in 2000. Chen's most recent inventive breakthrough—a humanized mouse with a tissue-engineered human liver—is intended to bridge a gap in the drug development pipeline between laboratory animal studies and clinical trials. Chen's hope is that her humanized mouse model will ultimately lead to a safer, less expensive and more efficient path for drug testing. Chen and her colleagues have already begun to screen drug combinations in the mice and study the interactions of the human liver with pathogens such as Hepatitis C and malaria.

Chen has also pioneered inventions that connect new technologies to the process of scientific inquiry, including, with colleague Gregory Underhill, a platform to rapidly analyze engineered tissues under development for therapeutics and discovery; and with Austin Derfus, a method to increase the predictability and accuracy of siRNA as a research tool.

Chen's innovative spirit has also led her down an entrepreneurial path, building connections between existing and emerging technologies to improve the safety and

efficacy of diverse patient treatments. With fellow MIT graduate Todd Harris, Chen cofounded Sienna Labs, a biotechnology company that has developed a breakthrough class of new medical pigments to enhance microsurgeries for skin disease. Chen and her team have conducted pilot human studies and plan to enter clinical trials in the multibillion dollar dermatological laser treatment market within the next year.

Chen has said of winning the Lemelson-MIT Student Prize: "Being named the winner has led to an infinitely increased number of chances to share my work with others, which is opening doors for investment, career, and outreach opportunities that I never anticipated I would have."

The Lemelson–MIT Student Prize received extensive local and national press this year, totaling more than 158 million impressions in national top-tier media outlets, including the *Boston Globe*, MSNBC.com, and ScientificAmerican.com, as well as in-studio broadcast interviews on WBUR (National Public Radio) and NECN, and significant twitter traffic on *Scientific American* and BizWomen2Day.

2011 Lemelson-MIT Collegiate Student Prize

This marked the fifth year of the Lemelson-MIT Collegiate Student Prize Program. It was also our fifth year with Rensselaer Polytechnic Institute and the University of Illinois, Urbana-Champaign. It was the third year with the California Institute of Technology.

$30,000 Lemelson-MIT Rensselaer Student Prize: Benjamin Clough

Benjamin Clough developed a novel method for eavesdropping on terahertz information hidden in invisible plasma acoustic bursts. The doctoral student at Rensselaer Polytechnic Institute has demonstrated a promising technique that employs sound waves to boost the distance from which researchers can use powerful terahertz technology to remotely detect hidden explosives, chemicals, and other dangerous materials.

$30,000 Lemelson-MIT Illinois Student Prize: Scott Daigle

Scott Daigle's company, IntelliWheels, is rapidly developing into a wheelchair innovation house with multiple products. The main product, IntelliWheels, replaces wheelchair wheels and adds automatic gear shifting to reduce the effort required to push the chair and to make it more ergonomically efficient. The company's mission is to create new wheelchair technologies that make everyday life easier.

$30,000 Lemelson-MIT Caltech Student Prize: Guoan Zheng

Guoan Zheng is an innovative electrical engineer who has developed a simple, cost-effective, high-resolution on-chip microscope that is suitable for biological research and enables more affordable clinical and field diagnostics. A prolific inventor, he has also developed a low-cost microscopy imaging system, and a surface-wave-enabled darkfield aperture, which is a nanophotonic structure that boosts the detection sensitivity of image sensors.

As in FY2010, FY2011 media coverage overwhelmingly positioned the news as a national prize, often including references to all four winners. Caltech will not continue the Lemelson-MIT Caltech Student Prize in FY2012.

Invention Education

InvenTeams

InvenTeams™, LMIT's grants initiative supporting high school invention teams, continued as a national program in FY2011, with 13 new grants. The new grantees were a diverse group from 12 states. They developed prototypes of two assistive devices, nine health/safety or environmental inventions, and two affordable technology devices for developing country applications.

Approximately 200 students and more than 50 teachers and mentors were involved in 18 projects. Females made up approximately one-third of all participating InvenTeams students. When given the opportunity to self-identify their ethnicity from multiple selections, students predominately selected Caucasian (78%), Asian American (7%), Mexican American (6%), African American (6%), Other Hispanic Groups (4%), and Other/No Response (9%). One-third of the teams were from schools where a high percentage of students are eligible to receive free and reduced-price meals.

InvenTeams received a significant increase in media coverage this year over FY2010, with more than 100 million impressions received through top-tier print and web outlets, such as the *Boston Globe*, CNN.com, *Newsday*, WashingtonPost.com, and Wired.com, in addition to local news broadcast segments in top markets, including New York City and Phoenix.

Of particular note, two 2010 InvenTeams were invited to the first annual White House Science Fair in October 2010. Three students from Oak Ridge High School InvenTeam (Tennessee) and two students from Cesar Chavez High School (Arizona) presented their projects alongside representatives from other, select national youth science, technology, engineering, and mathematics (STEM) programs. The students met President Barack Obama, as well as John Holdren, director of the Office of Science and Technology Policy and an MIT alum, and Subra Suresh, director of the National Science Foundation and former dean of the School of Engineering. One student from Cesar Chavez High School later received a phone call from John Holdren, inviting him to sit in First Lady Michelle Obama's box during the 2011 State of the Union address.

Invention Education Outreach

FY2011 was spent actively pursuing and developing partnership opportunities and content with organizations that possess extremely large youth channels. We see these interactions as providing significant leverage to InvenTeams' reach of several hundred students.

LMIT conducted a grassroots communications campaign in FY2011 among decision makers in InvenTeams communities. The intent of this targeted communication is to encourage future investment in hands-on STEM learning opportunities, and especially

invention-related experiences. LMIT organized meetings with community leaders and civic groups (including MIT Clubs) to discuss invention education, and invite local youth groups (e.g., Boy Scouts, Girl Scouts, 4-H, and Boys & Girls Clubs) to see their local InvenTeams' project.

EurekaFest at Oregon Museum of Science and Industry (OMSI) was a coordinated one-day event in October with OMSI and Cascade Pacific Council of the Boy Scouts of America. The event drew over 2,000 public visitors and 500 Boy Scouts. Assistance for invention-based activities included local inventors and former InvenTeams from the Portland area. One outcome from the event was that 99 Boy Scouts from the area earned their Inventing merit badge.

Organizations such as the Boy Scouts of America, Girl Scouts of the USA, WGBH, and 4-H—and the youth channels that these organizations own—are important partners to LMIT, as they reach more youth through indirect resource means. LMIT was represented at the multiday National Boy Scout Jamboree in Virginia where the Inventing merit badge was earned by over 600 boys. In addition to LMIT staff, members from the San Juan High School InvenTeam (Utah) volunteered their assistance. By January 2011, 616 Boy Scouts had earned their Inventing merit badge in the six months following its introduction at EurekaFest 2010.

LMIT has continued to be a leader in MIT K-12 outreach activities, including running sessions on invention and ice cream through the Edgerton Center's annual summer camp for Gloucester middle school students, as well as a new program, GE Girls at MIT, which is partially funded by General Electric and aims to interest girls in science and technology. LMIT is a resource nationally and locally for educators who work with youth on invention projects. Staff provided Project ALERTA's summer program at the University of Massachusetts, Boston with resources and guidance in their summer camp for Latino youth who were interested in invention. The staff also organized field trips and activities for subsequent field trips to the MIT Museum.

EurekaFest 2011

LMIT held its fifth annual EurekaFest event June 15–18. EurekaFest is a multiday celebration designed to empower a legacy of inventors through activities that inspire youth, honor role models, and encourage creativity and problem solving.

EurekaFest is comprised of three major components: a series of events held at MIT across three weekdays that serve as a capstone for InvenTeams students; a celebration of the year's award winners; and an all-day design challenge and public engagement event at Boston's Museum of Science over the weekend.

EurekaFest at MIT: Wednesday, June 15–Friday, June 17

We were able to highlight the pipeline of inventive careers and provide opportunities for youth and accomplished inventors to interact and become inspired by one another. Mentoring and inspiration were significant themes. Award winners were asked to invite the person who has most inspired them to the event, Lemelson-MIT Collegiate Student Prize winners and finalists were presenters and mentors, and InvenTeams students

underwent "next steps" training. Excite Award Teachers (finalists for InvenTeams grants) participated in active learning workshops on tools, electronics, and the invention process. They were also able to learn firsthand about the InvenTeams experience from teachers and students.

Building on EurekaFest 2010, when several Chinese educators came to MIT, two InvenTeams from China joined us for EurekaFest 2011. These two teams came from leading Chinese high schools—Shenzhen Middle School and Beijing No. 4—and were coached and supported by members of the MIT Club of Beijing and Tencent, one of China's largest and most used Internet service portals.

Elizabeth Hausler drew a significant crowd the evening of June 16, inspiring youth attendees with her story of how she became so passionate about earthquake-resistant housing.

MIT president Susan Hockfield, and LMIT faculty director, professor Michael Cima, presided over the 17th annual awards ceremony on Friday, June 17. Dean of engineering Ian Waitz presented the $500,000 Lemelson-MIT Prize and Dorothy Lemelson made remarks.

John Rogers's presentation highlighted the impact of mentors and colleagues in his life, and his passion for science and solving big problems.

John Rogers and Elizabeth Hausler each gave a master class during EurekaFest. These lectures are intended to provide each award winner with the opportunity to have a scientific exchange with the MIT community, and help them focus their evening talks on their inspirations rather than the technical details of their innovations. Each master class presentation was attended by approximately 50 people.

This year we introduced "Lunch of Champions," an opportunity for InvenTeam students, award winners, and finalists to have lunch together. More than 20 students participated and spoke with award winners and finalists about their career choices, challenges, studies, and personal stories. This was a wonderful networking event for deeper and more meaningful interaction between award winners and InvenTeam students.

EurekaFest at MIT attracted approximately 175 guests (not including the 200 InvenTeams students, teachers, educators, and mentors) at several events, such as Friday's awards ceremony and Thursday afternoon's InvenTeams and Lemelson-MIT Collegiate Student Prize presentations.

EurekaFest at Museum of Science: Saturday, June 18

This year's EurekaFest at Boston's Museum of Science again featured a large-scale design challenge for InvenTeams students and local youth, and further expanded hands-on invention activities for museum guests.

Continuum, an international design consultancy, was again a partner and supporter of EurekaFest at the Museum of Science. Continuum had a "Meet the Inventor" station, where they showcased many of the products they helped develop, including the Reebok Pump© and Swiffer©. Continuum also provided a keynote speaker for the kickoff: Daniel Braunstein, an MIT alum and principal mechanical engineer for Continuum.

LMIT aggressively marketed EurekaFest, and especially EurekaFest at the Museum of Science, with expanded radio spots on WBUR, announcements in local events calendars, and on-campus promotions for the broader MIT community.

EurekaFest garnered more than 6.5 million media impressions, including coverage in About.com, InventorsDigest.com, Beantown Bloggery, MAKE Magazine Online, and Popular Science Radio.

EurekaFest 2012 will include stronger public components at the Museum of Science, such as the possibility of pre- and post-event activities for guests, and other engagements around invention.

Lemelson-MIT Program Support of MIT Programs and Classes

The Lemelson-MIT Program aims to cultivate a larger community of student inventors at MIT through sponsorship opportunities. By supporting organizations that promote projects at different stages, stories and resources are generated that can be leveraged as inspirational and informative content for youth.

MIT IDEAS Competition

This year, LMIT provided support for the expansion of the MIT IDEAS Competition as it transformed into the MIT IDEAS Global Challenge, providing opportunities to many more students, alumni, and community members.

Product Engineering Processes

For this senior-level mechanical engineering class, 2.009 Product Engineering Processes, teams of 15 to 19 individuals design and build working alpha prototypes of new products, while developing 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's theme was "food." Guided by professor David Wallace, students designed and built prototypes for a variety of projects presented in early December in what is a highly educational, thought-provoking and entertaining evening event for the MIT community and class sponsors.

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.

$100K MIT Entrepreneurship Competition

LMIT did not continue sponsorship of the $100K's Development Track in FY2011.

Thought Leadership

Invention Index

The 2011 Lemelson-MIT Invention Index focused on youth's perceptions of their own inventiveness and the most inventive countries. Media coverage was strong, with 60 million impressions from top national outlets, including FastCompany.com and Boston.com. The Invention Index also continues to be a source of reference for the public and top US brands when citing youth perception about education and invention.

The survey found that while American women ages 16 to 25 possess many of the characteristics that are necessary to become inventors—such as creativity, interest in science and math, desire to develop altruistic inventions, and preference for working in groups or with mentors—they do not see themselves as inventive. Young men in the same age group echoed these characteristics, which highlighted the need to cultivate the interest of young adults in science and math, while educating and inspiring them about the impact they can have on others through invention.

This year's Lemelson-MIT Invention Index also revealed that young women and men do not see the U.S. as leading the way in invention. Sixty-one percent of young women view Japan as the leader, with the U.S. ranking second at 27%. Young men agree, choosing Japan first (54%) and the U.S. second (36%).

To improve the US standing, women cited access to governmental funding (30%) and including invention projects during school (36%) as the best ways to encourage aspiring inventors. Men agreed, noting that providing places to develop inventions (24%) is another way to encourage hopeful inventors.

Finances and Funding

Fiscal year 2011 is the fourth year of our current, five-year funding cycle with the Lemelson Foundation. The FY2011 grant was approximately $2.95 million. Additional sources of funding were obtained through small sponsorships and gifts—up to $10,000—to InvenTeams, specifically from Tencent in support of InvenTeams in China, from Time Warner Cable for Joshua Schuler's service on the board for Connect a Million Minds, and from the MIT Club of Ohio.

Future Plans

In the future, the Lemelson–MIT Program plans to:

- develop an FY2013 to FY2017 proposal to the Lemelson Foundation;
- explore invention education activities that reach more youth, especially underserved populations;
- further refine the annual awards program, including continued emphasis on recruiting nominations from the private sector and women;

- identify other universities with which to partner for the Lemelson-MIT Collegiate Student Prize Program;
- cultivate additional sources of funding; and
- redesign LMIT the website.

Personnel Changes and Recognition

At the end of FY2011, three members of the LMIT staff left to pursue job and educational opportunities:

- Maura Hume accepted a position at her alma mater, Holy Cross;
- Ellen Dickenson made plans to enter an MBA program in fall 2011; and
- Stacy Pyron accepted a position with the MIT Office of the Arts.

We have initiated searches for the three open positions and plan to have them all filled by September 1, 2011.

Additionally, Leigh Estabrooks received a School of Engineering Infinite Mile Award in recognition of her work with Invention Education and across MIT.

Joshua Schuler
Executive Director