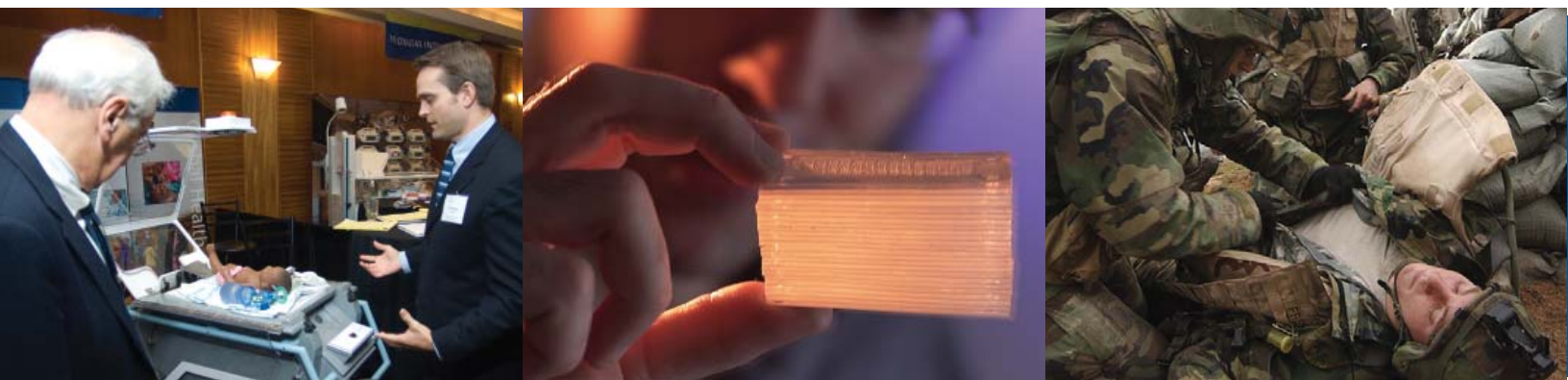


# CIMIT<sup>®</sup>

Center for Integration of Medicine  
& Innovative Technology

## Transforming Healthcare through Technology



2007 Annual Report

“CIMIT has made significant strides in transforming healthcare through technology. In 10 years we have supported over 270 Principal Investigators and their collaborators, more than 14 new devices or procedures are already in clinical practice, 16 more are currently in clinical trials and many more are in the pipeline. Over 7000 patients have been treated in the operating rooms of the future, 10 companies have been formed or redirected into healthcare, over 40 companies are actively involved in our industry liaison program and 150 million dollars in additional research funding from other sources has been enabled because of the 50 million dollars awarded in grants by CIMIT.

The CIMIT community is a vibrant and powerful network connecting many of the most brilliant scientists, engineers and clinicians in Boston. Our mission is based on the core belief that better health care for people worldwide is within our reach, and that technology can and should be part of the solution.”



John A. Parrish, MD  
CIMIT Executive Director

CIMIT is a proven and successful model for initiating and accelerating translational medical research in the domain of devices, procedures, and clinical systems engineering. Our approach is based upon four assumptions:

- ▶▶ With active effort, sophisticated technology from other industries can be applied in healthcare to improve the quality and safety of patient care.
- ▶▶ Early-stage, high-risk, high-reward ideas have little access to funding.
- ▶▶ Solving many of the problems in healthcare today is best achieved through active collaboration between the clinical and engineering research communities.
- ▶▶ Facilitation and coaching at every stage of the innovation cycle adds value, produces better outcomes and yields better researchers.

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# CIMIT Overview

## Mission & Vision

*To improve patient care by facilitating collaboration among scientists, engineers and clinicians to catalyze the discovery, development and implementation of innovative technologies, emphasizing minimally invasive approaches.*

A non-profit consortium of the Boston teaching hospitals and engineering schools, CIMIT fosters interdisciplinary collaboration among world-class experts in medicine, science and engineering, in concert with industry and government, to rapidly improve patient care.

Seeking out and identifying those entrepreneurial clinicians and engineers from among the over forty thousand doctors and twenty thousand technologists who work at the CIMIT consortium institutions is what makes CIMIT unique. Finding the women and men who have the potential to innovate through multidisciplinary collaborations is one way the CIMIT community is able to rapidly move ideas from bench to bedside.

CIMIT provides innovators with resources to explore, develop and implement novel technological solutions for today's most urgent healthcare problems. CIMIT is dedicated to helping develop medical technology that will help both military and civilian patients.

## Transforming Healthcare through Technology

Today's challenges in healthcare cannot be met by researchers working alone in their specialties. Dramatic change in diagnostics and treatments for complex diseases and medical conditions requires technological readiness and imaginative leaps – transformative improvements not incremental advances.

CIMIT founders created a new paradigm in translational research, a model for innovation connecting the clinical and academic research communities: a network of scientists in medicine, biology, chemistry, mathematics, engineering, physics and industry, each with a passion to reach beyond traditional research and deliver revolutionary outcomes.

Nearly ten years ago, a few highly motivated Boston-area physicians became convinced that the breakthroughs in modern technology could, and should, deliver more effective solutions for unmet needs in patient care. New tools and technologies for healthcare were taking too long to be developed and integrated into medical practice. And, with the guidance of forward-looking clinical champions, technologies in entertainment, communications and defense systems could be put to work in medicine. With the support of the four founding institutions, these visionaries created CIMIT, a new kind of consortium designed to accelerate the pace of research and

### Consortium Institutions

Brigham and Women's Hospital\*

Massachusetts General Hospital\*

Massachusetts Institute of Technology\*

The Charles Stark Draper Laboratory\*

Beth Israel Deaconess Medical Center

Boston Medical Center

Boston University

Children's Hospital Boston

Harvard Medical School

Newton-Wellesley Hospital

Partners HealthCare

### International Alliances

University of Manchester, UK

\*Founding Members

development by leveraging technological expertise – from industry or academia – for targeted medical applications.

## CIMIT Values

CIMIT is a vibrant community of highly motivated collaborating entrepreneurs who learn from each other and identify gaps in healthcare where known and emerging technologies can solve clinical problems.

### **Innovation**

Use the most advanced scientific technologies from academia and industry to develop new diagnostics and treatments that will have a positive impact on patients' lives.

### **Collaboration**

Access a broad spectrum of individuals' talents by convening and supporting diverse and productive teams.

### **Integrity**

Seek the highest ethical standards in what we say, in responsibility for what we do, and in responsiveness to people around us.

### **Entrepreneurialism**

Encourage initiative and risk-taking. We understand that having a major impact on health care requires appropriate partnerships with business and industry.

### **Excellence**

Strive for superior results. It is a promise we make to each other, a spirit that unites our individual skills and talents into a single supportive and dynamic culture.

### **Compassion**

Dedicate ourselves to serving the needs of patients by always seeking solutions that improve patient safety and reduce suffering.

### **Respect**

Value the individual skills and perspectives of our diverse collaborators in academia, industry and clinical care, and of the patients we serve.

## CIMIT Priorities

**Seek solutions to unsolved clinical problems** by integrating the solution-rich environment of engineering and science centers and the problem-rich environment of our clinical stakeholders.

**Build a strong and vibrant CIMIT community** by actively working to improve patient care through early stage devices, procedures and clinical systems.

**Contribute to improved patient care** through innovative leadership practices that reward performance through teamwork.

**Achieve financial sustainability** by diversifying funding sources, and employing financial and operational best practices.

**Support CIMIT investigators** by creating and sustaining an efficient operational and management system to advance the CIMIT mission.

## Founding CIMIT

**The Four Horsemen.** At the earliest days of what would evolve into CIMIT was an idea. Four innovative clinicians shared a desire to advance the use of technology for minimally invasive surgery in their respective disciplines of radiology, obstetrics, gastroenterology and general surgery. These visionaries became known as The Four Horsemen – Steve Dawson, MD, Keith Isaacson, MD, Norm Nishioka, MD and David Rattner, MD.

All were deeply embedded in clinical practice, each confronting a similar challenge: how to develop more advanced endoscopic tools, imaging devices and other novel technologies that each could utilize in their individual specialties. Innovators by nature, these future leaders were revolutionaries for their time. They wanted to explore a non-traditional approach to research – building teams of clinicians and engineers to solve complex medical challenges.

“Medicine must look beyond its traditional borders, take the good from other disciplines and apply those ideas to healthcare,” is how Steve Dawson described their shared beliefs.

Word spread and before long, these Four Horsemen attracted others who believed in the power of a multidisciplinary approach to solving complex medical challenges. Soon, their weekly meetings became the Forum, a place where like-minded entrepreneurial clinicians could explore novel approaches to engineering-based solutions.

“We had ideas on how to use technology better and how to cross disciplines, as everything in medicine was very silo-oriented. Through this group we began to reach outside our own traditional boundaries and cross-train each other,” is how David Rattner described the early days leading to the founding of CIMIT.

Together these four crafted the initial roadmap – a proposal for a multidisciplinary consortium designed to transform healthcare through technology. It would become the framework for the CIMIT model.

**Establishing the Consortium.** Emerging out of a MGH-sponsored taskforce on the Future of Medicine led by John Parrish, MD and Ronald Newbower, PhD was a similar concept for a “place where ideas and people could meet, form teams and receive financial support to achieve their goals.”

Their concept envisioned an organization to provide seed funding for early-stage, high-risk ideas leveraged by the experience of commercialization experts to facilitate the progress of these newly formed multidisciplinary teams. Dr. Parrish’s reputation as a successful creator of multidisciplinary, technology-based research consortia and his track record for attracting industry and government support, enabled the creation of a new organization focused on translational research — CIMIT. The joining of these two efforts by experienced clinical champions and innovative visionaries gave CIMIT its start.

# Organizational Structure

The technology-rich, Boston-area community of medical device companies and industrial laboratories offers a unique competitive advantage. By integrating talented and inquiring minds from academia, healthcare, engineering labs, scientific research facilities and industry, together with superb medical and graduate students, CIMIT creates a culture of innovation.

CIMIT's methodology involves convening experts from relevant disciplines, facilitating interaction between clinicians, engineers and others throughout the cycle of innovation, and funding research initiatives to revolutionize patient care. CIMIT embraces all technology-based approaches (new or adapted technology) and actively facilitates the efforts of each multidisciplinary team to ensure barriers are not insurmountable. Through CIMIT the pace from bench to bedside is accelerated.

CIMIT encourages entrepreneurial innovation through its Programs. Focused in the areas of greatest opportunity for technology to make transformational change in the current paradigm of patient care, CIMIT Programs offer an insider's view of the future of medicine – where and how technology has the potential to transform healthcare in the not-too-distant future.

The CIMIT Program structure supports, organizes and enables the facilitation of interdisciplinary translational research. By harnessing the novel technologies of electronics, material sciences, optics, computational mathematics, and systems engineering, CIMIT teams of scientists, physicians and engineers accelerate the development and adoption of new tools and techniques for specific areas of medical research.

## Boston Medical Device Industry

Massachusetts leads the nation in venture capital investment in life sciences companies, particularly for medical device companies. Manufacture of medical devices also contributes to the economic health and vitality of the Commonwealth.

Massachusetts is headquarters for over 300 biotechnology firms and more than 200 medical device companies. This growing sector attracts world-class scientists, engineers, and technology workers. Through its economic links with electronics, metal and plastics manufacturers, hospitals and financial institutions, the medical device sector contributes \$5.5 billion to the economic health and vitality of the Commonwealth.

Boston has the highest concentration of top-ranked teaching hospitals, research laboratories, universities and researchers from private industry.

Each year these academic medical centers and universities attract \$1.4 billion in federal research funds that help drive the \$24.3 billion in economic activity generated by the academic-based research community.

At the center of these two vibrant sectors is CIMIT, a consortium of the teaching hospitals, engineering schools and science laboratories of greater Boston.

CIMIT is the only network connecting the over 40,000 physicians and 20,000 engineers of these world-class institutions. By finding and funding the most innovative entrepreneurs from this vibrant community, CIMIT accelerates the cycle of discovery, development and implementation of innovative technologies that can and will benefit patients.

# Innovation Leadership

**Program Leaders** form the clinical nucleus of the CIMIT community. Program Leaders are visionaries, subject matter experts, accomplished innovators, mentors and compassionate clinicians. An authority on a given medical specialty, a Program Leader serves as head coach for the teams of investigators within each program area, imparting advice and offering encouragement as the researchers explore the science for which they have received a CIMIT grant.

Program Leaders also recruit new researchers into the CIMIT community. Years of personal experience make it easy for these talented physicians to spot the potential of a young clinician who has what it takes to become a successful innovator. Each actively cultivates the next generation by helping form multidisciplinary collaborations, providing expert guidance on overcoming the barriers to innovation and when necessary, offering access to a national network.

As key participants in the Innovation Leadership team, Program Leaders challenge CIMIT to pursue emerging areas of clinical need, where devices and other technologies could make a powerful difference in the standard of care.

**Site Miners** are unique to the CIMIT network. They seek out, encourage and engage emerging innovators who show a passion for transforming patient care through technology. Boston's teaching hospitals are a mecca for creative, passionate doctors, technologists and clinical researchers. So how does CIMIT find and fund those clinicians with the most promising ideas? Through its network of Site Miners.

Appointed as faculty within each consortium institution, Site Miners understand the unique complexities and cultures of their organization. They help innovators successfully navigate through any organizational challenge that might arise. A Site Miner is a scout, mentor, project manager, dealmaker, visionary and reality tester. These individuals are quiet leaders, who network with other Site Miners to connect clinicians and engineers who might not otherwise meet. Knowing the best and brightest scientists and technologists who have a passion for healthcare, or finding those up and coming engineers whose novel technologies could match the needs of a clinical researcher, is how these technology-oriented Site Miners help CIMIT form and fund multidisciplinary collaborations.

The CIMIT community relies on the skills and expertise of many. Supporting this novel approach to translational research is a team of commercialization and business experts who are the full-time **CIMIT Facilitators**.

Entrepreneurial by nature, CIMIT Facilitators are cross-trained in multiple disciplines. All are experienced in crossing organizational boundaries. Each has achieved significant career success before joining CIMIT. Facilitation services help researchers overcome many of the barriers to successful innovation, including managing regulatory issues, developing prototypes, securing second and third round funding through grant writing (SBIR, STTR and foundations), seeking out potential collaborators, making connections with industry, addressing intellectual property issues, and more.

# 2007 Year in Review

## Strategic Goals & Accomplishments

**Clinical Programs – Enhance the clinical environment and contribute to the ongoing missions of our academic medical centers by developing innovative research programs that integrate the solution-rich environment of engineering and science centers and the problem-rich environment of our clinical stakeholders.**

- Support consortium institutions by funding projects in key program areas that will advance the standard of patient care
- Nurture and mentor clinical and scientific investigators in collaborative, multidisciplinary research
- Actively seek out career-development opportunities for young clinicians

### Accomplishments

- ▶ Awarded \$5 million in grants. Solicited over 200 proposals; funded 67 projects and fellowships
- ▶ Created Young Clinicians Award program designed to support early-career clinicians. Awarded five grants of \$50,000 each
- ▶ Created CIMIT/MIT Medical Engineering Fellowship
- ▶ Established two new CIMIT Programs: Neurotechnology and Global Health
- ▶ Reinvigorated Clinical Systems Innovation Program, identifying paradigm altering approaches to delivering care in the right place and at the right time
- ▶ Advanced several new CIMIT Learning Laboratories – Neonatal Intensive Care Unit, Medical Device Plug-and-Play and Ambulatory Practice of the Future initiatives

Seed funding is only one of the benefits of a CIMIT grant.

Equally important is the expertise of our facilitators who help researchers move projects forward. Facilitators coach, make connections, help write and obtain second round funding, think through novel approaches to intellectual property protection or introduce the research scientist to the right industrial partner at the right time along the innovation pathway.

### Convening, Facilitating, Collaborating – Build a strong and vibrant CIMIT community.

- Advance CIMIT mission through active collaboration and facilitation of multidisciplinary project teams
- Engage industry partners through a robust and growing Industry Liaison Program
- Support Principal Investigators and project teams by facilitating their efforts to transcend traditional barriers to innovation; including legal, regulatory, intellectual property, and technology-transfer challenges
- Mentor innovative investigators in their pursuit of funding from non-traditional (non-NIH) sources

### Accomplishments

- ▶ Hosted several VC Summits, specialized convening forums designed to facilitate a new network of commercialization specialists and clinical innovators
- ▶ Facilitated the ongoing work of over 151 collaborations, guiding and coaching progress along the pathway to commercialization

- ▶ Convened over 45 CIMIT Forums, experimenting with innovative programming and outreach to new audiences using webcasts
- ▶ Welcomed five new companies into the Industry Liaison Program
- ▶ Supported three applications for SBIR grants
- ▶ Hosted two delegations from Australia to explore potential collaborations

### **Leadership – Contribute to improved patient care through innovative leadership practices and actively developing leadership skills of emerging clinical leaders.**

- Convene high-profile events that attract healthcare, technology, academic and other opinion leaders
- Advise on and publish best practices in translational research innovation
- Develop clinical champions and CIMIT evangelists through the CIMIT Program Leader and Site Miner teams
- Create and sustain ways to engage stakeholder participation

#### **Accomplishments**

- ▶ Convened over 80 international leaders of innovation for a 2-day symposium, *Models of Collaborative Medical Innovation*; cohosted with Wellcome Trust
- ▶ Attracted over 650 attendees to CIMIT Innovation Congress 2007; a 2-day conference and exploratorium showcasing leading-edge technology innovations in simulated care settings
- ▶ Hosted a symposium on Traumatic Brain Injury, convening national and regional experts to explore potential research collaborations to address this important national issue
- ▶ Joined a national collaboration, spearheaded by the Veterans Administration and the Department of Defense, to design the Hospital of the Future
- ▶ Continued leadership role in the Innovation Learning Network, a national network of healthcare innovators
- ▶ Collaborated with Harvard Business School in developing a case study on the CIMIT Model

### **Financial Sustainability – Increase fundraising and strengthen performance through teamwork, using financial and operational best practices to achieve long-term viability of the consortium.**

- Retain and expand current stakeholder support
- Seek and secure financial support for CIMIT Programs through philanthropic unrestricted giving and non-profit grants (foundations)
- Diversify sources of revenue to maximize the pool of funds available for research grants

#### **Accomplishments**

- ▶ Secured annual funding from key stakeholders—federal agencies and consortium institutions
- ▶ Exceeded philanthropy fundraising goals

- ▶▶ Established relationships with foundations supportive of innovation and experimental convening
- ▶▶ Generated over \$130,000 in unrestricted sponsorship of the CIMIT Innovation Congress 2007

**Infrastructure – Build, support and sustain an efficient operational and management system to support and advance the CIMIT mission.**

- Strengthen CIMIT's organizational structure through best practices in leadership and teamwork
- Realign the CIMIT Facilitation core team to complement strategic and programmatic priorities
- Increase awareness and visibility of CIMIT to advance mission and strategic priorities

**Accomplishments**

- ▶▶ Revitalized the Science Review Process to strengthen the quality of proposals and improve operational efficiency
- ▶▶ Conducted bi-annual Investigator Survey; collecting data and feedback
- ▶▶ Implemented new project management processes
- ▶▶ Achieved 2% overall cost-savings in core budgets through efficiency and teamwork