

Transforming Healthcare through Technology

Connected Health Symposium
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Symposium Participants: Our Challenge

1. Construct the vision

by understanding present & future intersection of:

- clinical needs
- technological solutions

2. Sell, enlist, recruit many sectors

- many disciplines
- some slow to listen

3. Convene right:

- People
- Interaction
- Engagement
- Role of an honest broker
- Informational Intensity
 - right amount
 - right synthesis

Goal

To develop strategic and operational programs that use *communications technologies* to bring care out of the medical setting and to the patient.

“bringing technology in” frames the magnitude of impact

How Do We Bring the Technology in?

Technology in → push it out

- **Precondition (obligatory first step)**
bring technology in
- **Identification of right technology**
 1. Clarify need (opportunity)
 - Discard myths
 - Patient centric view
 - Enough detail
 2. Increase awareness (beyond usual club)
 3. Best guess (can do much better)

How Do We Capture the Appropriate Technologies for Healthcare and Keep the Costs and Adoption Hurdles to a Minimum?

Translate

(adopt, modify, customize)

or

Innovate

(develop new technologies)

Technology already exists

Committee: find all options

Futurist: predict intersection

Leader: choose and go

Through needs pull not technology push

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Transforming Healthcare Through Technology

Which technologies?

communications: “fixed” and mobile
remote sensors
integrated monitoring
data processing
user interface science

From which “industry”?

communications
entertainment
weapons & defense
tagging & shipping
other (potentially our best source)

CIMIT is a *collaboration*

A clinically-based non-profit consortium of teaching hospitals, engineering research centers & academic institutions, working collaboratively with industry & government to develop & implement advanced technologies to impact healthcare

- **Academic Medical Centers:**
 - ❖ Massachusetts General Hospital
 - ❖ Brigham and Women's Hospital
 - Beth Israel Deaconess Medical Center
 - Children's Hospital Boston
 - Newton-Wellesley Hospital
 - Boston Medical Center
- **Universities**
 - ❖ Massachusetts Institute of Technology
 - Boston University
 - Harvard Medical School
- **Engineering/Research Laboratory**
 - ❖ Charles Stark Draper Laboratory
- **Private Sector Companies**
- **Major Supporters & Collaborators**
 - Partners Healthcare System
 - Department of Defense

❖ Founding Members

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Transforming Healthcare Through Technology

. . . and a catalyst for *technology innovation*

Our Mission: To improve patient care by facilitating collaboration of engineers and clinicians to catalyze development of innovative technologies, emphasizing minimally invasive diagnosis and therapy.

Domains of Activity

Medical Devices

Procedures

Technology Systems

CIMIT – Key Ingredients

- **Convening → mix and match**

 - education

 - meetings

 - “site miners”

 - profile, playground

 - finding collaborators

- **Facilitating**

 - seed money → “second round” funding

 - expertise:

 - research management

 - IP portfolio building and reimbursement

 - regulatory issues

 - industry liaison

CIMIT Impact:

Now in Patient Care or in Clinical Trials

- **Process**

- Operating Room of the Future: Living Laboratory
 - Plug and Play (interoperability)
 - Ambulatory Practice of the Future
 - TeleLinkage

- **Technology**

- Optical Coherence Tomography (GI, cardiovascular)
 - Epileptic Seizure Detection and Intervention
 - Jaw Reconstruction Surgery
 - Image-Guided Focused Ultrasound (breast, fibroids)
 - Image-Guided Brachytherapy (prostate)
 - Intraoperative Near-InfraRed Fluorescence Imaging
 - Pre-Hospital Detection & Characterization of Circulatory Dysfunction
 - Breath Analysis to Detect Disease (TB, Diabetes)

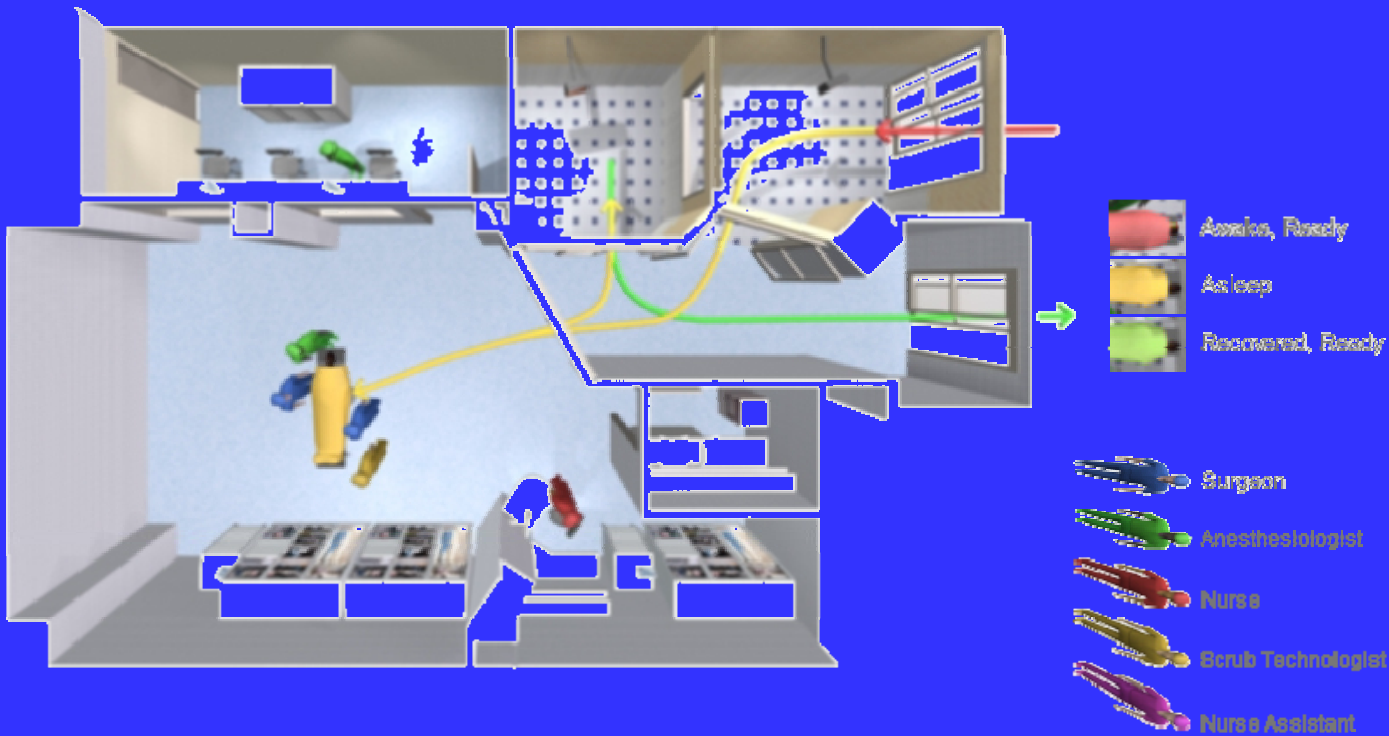
- **Education**

- Simulation for Medical Training Systems
 - Chest Tube Insertion
 - Interventional Cardiology and Endovascular
 - Laparoscopy
 - Smallpox Inoculation
 - Medic Training System (virtual human)

CIMIT Works!

- **Operating Room of the Future**
- **Computer Based Seizure Detection Technology**
- **Plug n Play**

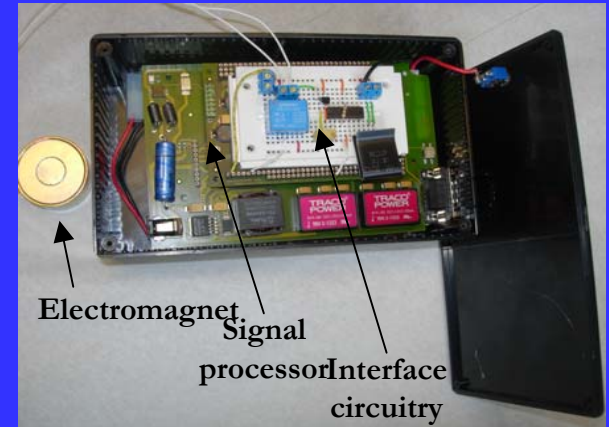
Operating Room of the Future



Industry Participants: Karl Storz Endoscopy, LiveData, BK Medical, Draeger Medical, GE Healthcare, Getinge USA, Pentax Precision Instruments, Radianse

Epileptic Seizure Detection and Intervention to Eliminate Seizure Symptoms

- Vagus nerve stimulation can abort seizures
- Sophisticated, patient-specific signal processing & machine learning can predict seizures
- Symptoms of seizures in selected patients may be eliminated



Prototype Vagus Nerve Stimulator



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CIMIT – Lessons Learned

Lesson 1 – “Translation” of technology into healthcare is very difficult

Barriers include:

- “idea to product” (bench to bedside)
- “business as usual”
- misaligned incentives

Lesson 2 – Can be done by enormous investment in first translational step

- seed money
- committed expertise
(special people whose mission=facilitation)

CIMIT Joins Connected Health: Point of Care Technologies

- **Managing surge capacity**

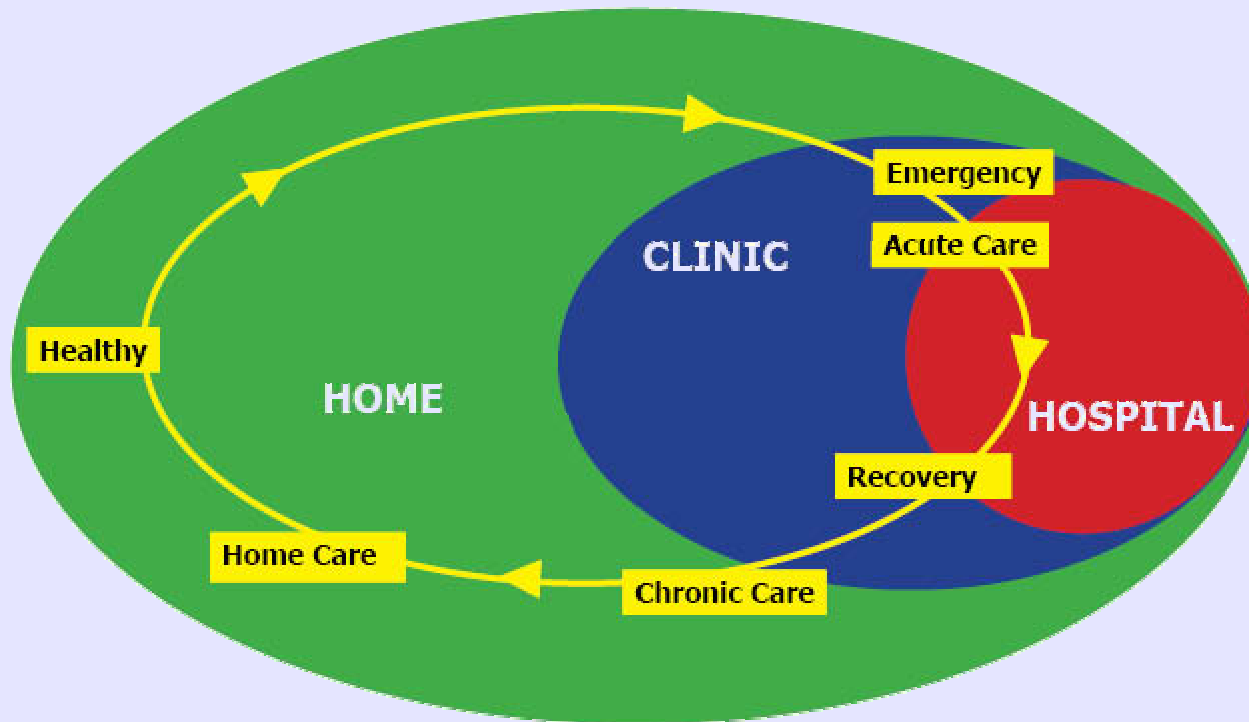
 - Remote untethered monitoring

 - On the battlefield – casualties
 - In the home – freedom of movement
 - For mass casualties of natural catastrophes

- **Virtual practice of the future**

- **Robotics in home care**

Delivering Care – Right Time, Right Place for Patient Benefit



Creating “Learning Laboratories” for Technology and Process Innovation: *Practices of the Future*

Current care paradigm

- Focus on sickness
- Event-based healthcare
- Static experiences
- Directive communication
- Individual experiences
- Patient goes to treatment
- One size fits all
- Obscurity

New paradigm

- Focus on health and life balance
- Continuous healthcare
- Iterative experiences
- Collaboration
- Team-based experiences
- Treatment goes to patient
- Mass customization
- Transparency

If . . .

Every element of “new paradigm” must be present –
absence of any becomes a barrier for all

“Connected health” community should lead not follow

Then . . .

How can we frame the opportunity to attract the right
solution people?

There are two types of technology companies

- currently in healthcare
- should be in healthcare

Should we put more resources into networking and nurturing?

By *connecting* the clinician and the technologist

Today's meeting and similar symposia

Find the *missionaries*

Attract *bilingual* people (technology & healthcare)

By *nurturing* good ideas & committed champions

Devoting resources (\$ and people)

@ right time

Are incremental approaches sufficient for success? NO!

- **Slight enhancement of present (broken) system is frustrating**
- **The most clever clinical champions are overburdened – small “add-ons” cripple them**
- **Technologists with best solutions (technology) may not play**

Our Challenge

Time is right. **Perfect opportunity for maximum collaboration by academia, government, industry, and philanthropy.**

Invest \$ and people in the translational step – ***bring technology IN*** before we bring it out to the patient.

Be bold! Go for it! **Our patient (healthcare) is sick. It does not need 2 aspirin – it needs intervention.**

Be optimistic! **We are on the edge of a major *disruption, a transformational change with global impact.***

Thank you

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