U.S. ARMY MEDICAL RESEARCH & MATERIEL COMMAND

HealthGRID: Broadband Medical Networks

Dia CUDI de Institutos Nacionales de Salud
6 Septiembre 2005

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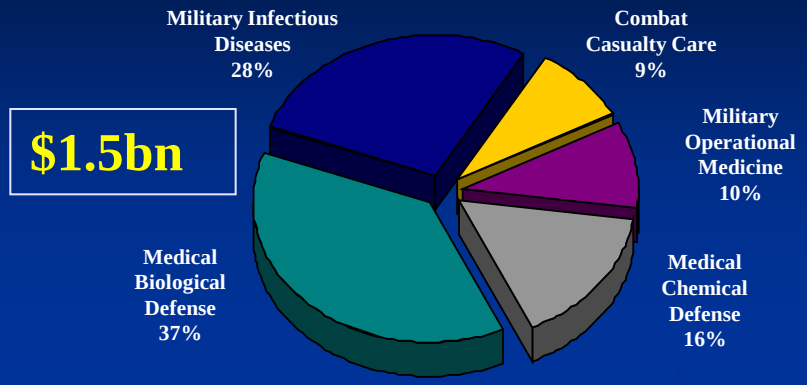
Agenda

- TATRC Overview
- World Health Organization (WHO)
  - Resolution
  - Priorities
- Framework for Opportunities
- Wrap Up

U.S. Army Medical Research and Materiel Command
Core Medical S&T Program Areas

Military Infectious Diseases

- Medical readiness
- Vaccines
- Biotechnology
- Prophylaxis/treatment drugs
- Diagnostics/prognostics
- Vector control



Combat Casualty Care

- Lightweight medical equipment
- Medical C4ISR
- Trauma care
- Health monitoring and diagnostic technology

Medical Biological Defense

- Vaccines/therapies
- Field-portable diagnostic systems
- Medical readiness
- Biotechnology

Military Operational Medicine

- Soldier selection and sustainment
- Soldier performance
- Warrior system modeling
- Health hazards protection
- Diagnostics/prognostics
- Health monitoring

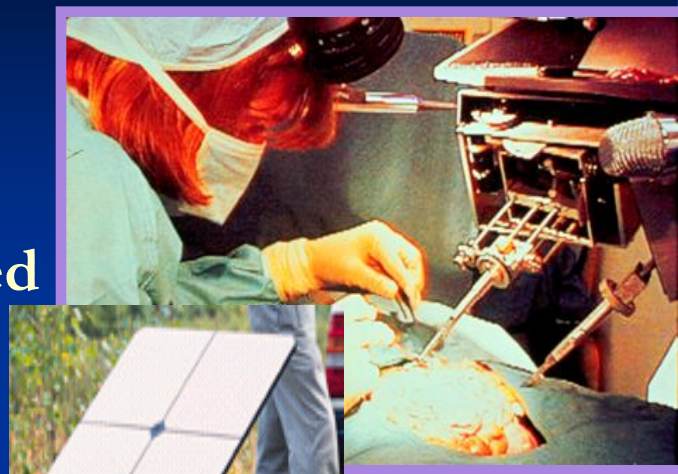
Medical Chemical Defense

- Medical management of chemical warfare casualties
- Medical readiness
- Drug prophylaxes/ pretreatments
- Diagnostics/therapeutics

Mission

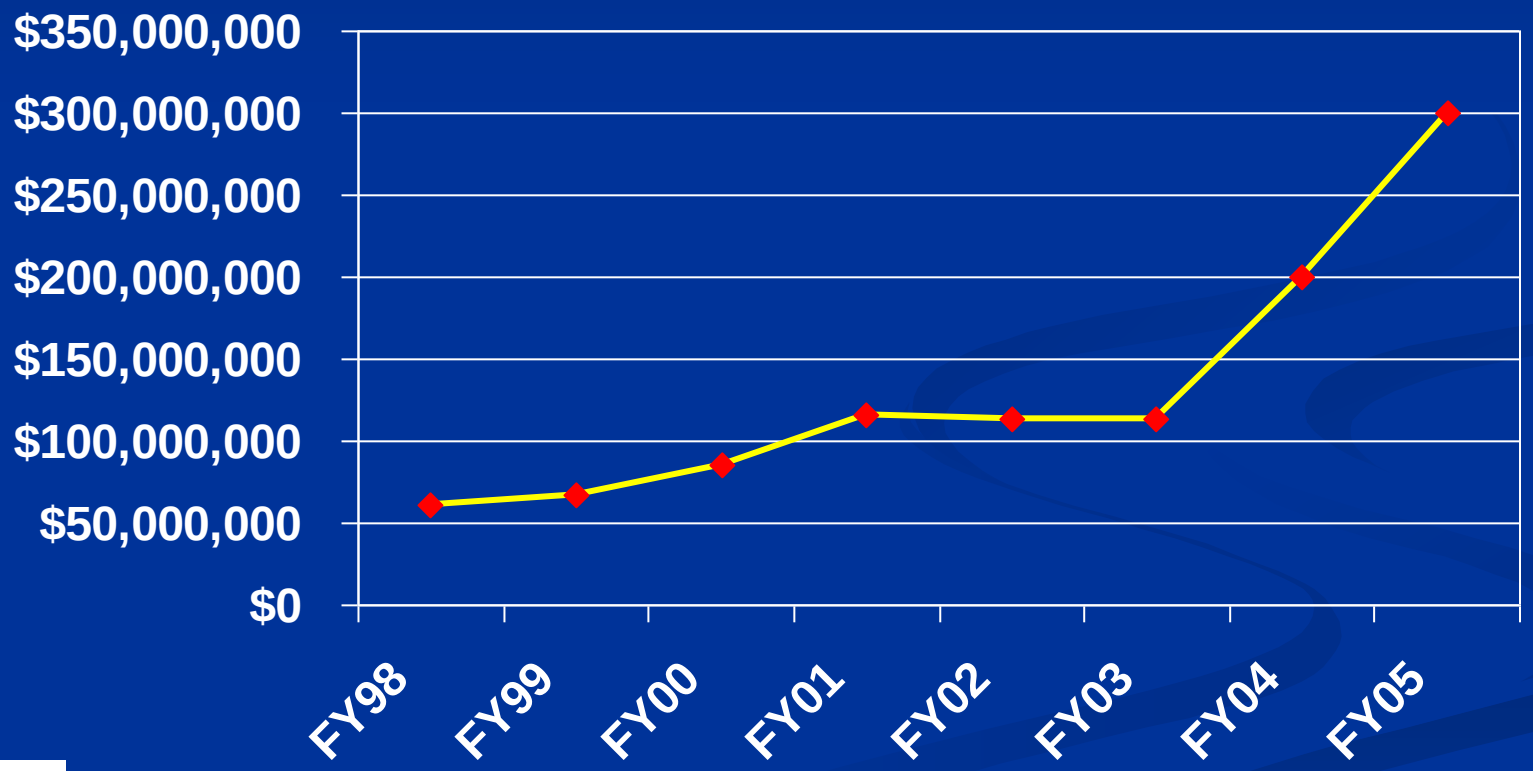
Apply physiological and medical knowledge, advanced diagnostics, simulations, and effector systems integrated with information and telecommunications for the purposes of enhancing operational and medical decision-making, improving medical training, and delivering medical treatment across all barriers.

The program scope is to identify, explore, and demonstrate key technologies and biomedical principles required to overcome technology barriers that are both medically and militarily unique.



Department of Defense,
Joint Warfighting Science and Technology Plan, Chapter IX, Joint Readiness and Logistics, 1999

Total Funding



TATRC

TATRC Funding Programs

- Congressional Special Interest
- Dual Use Science & Technology
- Small Business Innovative Research
- Defense Health
- Small Business Technology Transfer
- Federal Partnerships

Leverages Academic Partnerships
…For Basic and Applied Research

Georgetown University	(CA-Medical Vangaurd)
Howard University	(CRDA-Urban Telemed)
Harvard University	(CA-CIMIT)
Mass Institute of Technology	(CA-CIMIT)
University of Maryland	(IPA/CA – ORF)
University of Utah	(Contract-Teleopth)
Rutgers University	(CA-CEMBR)
Saint Francis University	(CRDA-CERMUSA)
Drexel University	(CA-CIMERC)
Loma Linda University	(CA-NMTB/Proton Beam)
University of Tex - Houston HSC	(CA-DREAMS)
University South Florida	(CA-Telerad/Adv Cancer Detect)
University of Hawaii	(CA-Telemed Curric'lm)
University of Pittsburgh	(Contract-GGTS)
Stanford University	(Contract-Affiliates Prog)
Yale University	(IPA-Adv Tech Watch)
Texas A & M	(CA-DREAMS)
Johns Hopkins University	(CA-Periscopic MIS)
University of Southern Calfornia	(CA-NGI)
University of Oregon	(CA-BBM)

Uses DoD & Federal Partnerships

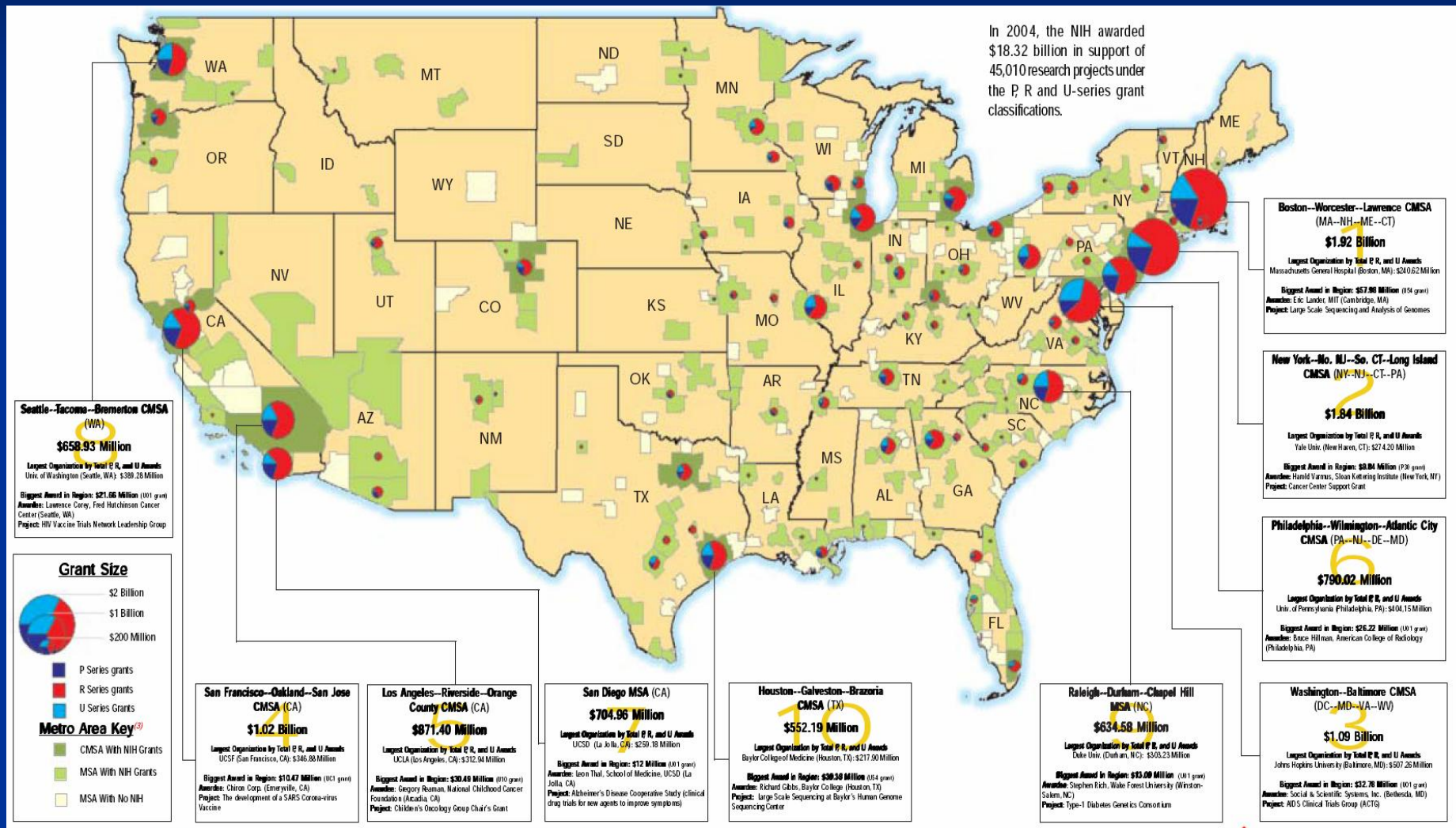
…for Non-Medical and Supporting Technologies

- U.S. Army Research Laboratory
- Los Alamos National Laboratory
- Sandia National Laboratory
- U.S. Army, Signal Battle Laboratory
- Commo & Electronic Command
- Oak Ridge National Laboratory
- Veterans Administration
- NASA
- DARPA
- National Library of Medicine (NIH)
- Agency for Health Research & Quality
- Food & Drug Administration
- Centers for Disease Control & Prevention

* Distributed, Synchronized Databases
* Advanced, Adaptive Multilevel Security
* Data Mining of Disparate Databases
* Secure Global Positioning System
* Network Management Tools
* Info Warfare Surveillance & Defense Tools
* Artificial Intelligence - Expert Systems
* Fault Avoidance and Recovery Systems
* Hands Free, Wireless Telecom
* Wireless Networking
* Data Compression
* High Bandwidth Datalinks
* Low Power Electronics
* Multi-platform, Interoperable Software
* Complex Modeling and Simulation

2004 NIH Funding of Biomedical Research[1]

Aggregated by Metro Areas[2]



(1) Based on NIH extramural support of research projects and centers (P-series), research project grants (R-series), cooperative research agreements (U-series).
(2) Awards were geocoded by the five-digit zip-code location of award recipients. Metro area shares were then aggregated by zip-code to metro-area correspondence.
(3) Metro areas are based on the 2000 US Census Bureau's definition of both Metropolitan Statistical Areas (MSAs) and Consolidated Metropolitan Statistical Areas (CMSAs).

SoCalBio SYNERGIES Winter 2004/05
Author: Ahmed A. Enany
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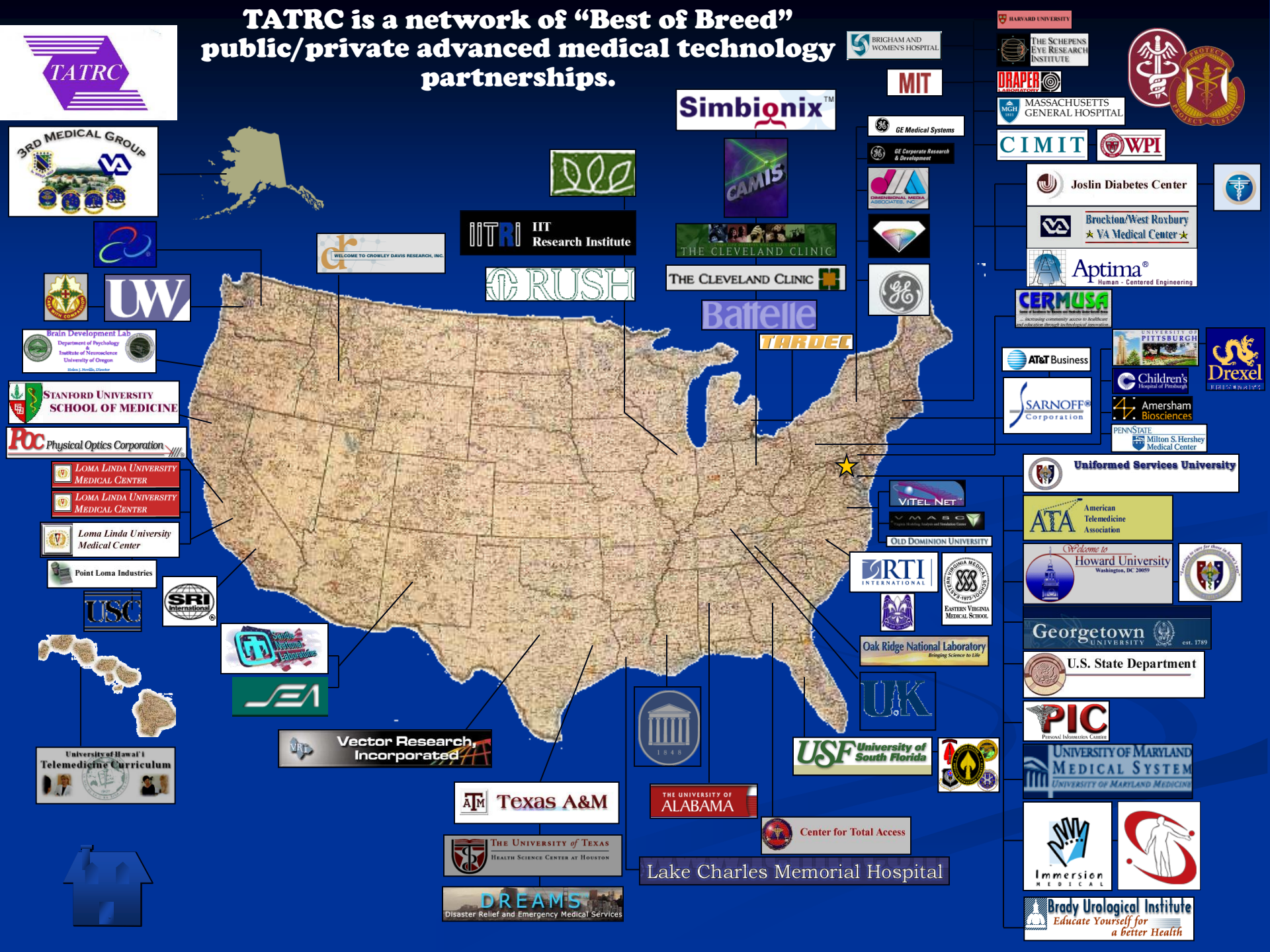
TATRC is a network of "Best of Breed" public/private advanced medical technology partnerships.



Leverages International Partnerships

...to Accelerate Development

- US/Norway Telemedicine (Wireless, Handheld)
- European Union Collaboration
- NATO – Telemedicine Standardization Committee
- Canada: International Space Station (Telesurgery)
- South African Military Health Service (Peacekeeping)
- International Global Satellite System: Poland (CME)
- Landmine Victim Assistance: Central America > Bosnia > Afghanistan
- Partnership for Peace – Romanian Needs Assessment
- Fellowship Programs: Pakistani, Polish
- Yuma Proving Ground - Panama Telepathology – Hyperspectral Imaging
- Argentina – Civilian Medical Emergency Response
- Israeli Trauma Simulator
- South Korean Exchange Program
- ATA Symposiums
  - EU (2001) – Africa (2002) - Latin America (2003) - E.Europe (2004) – Asia (2005) – W. Europe (2006)

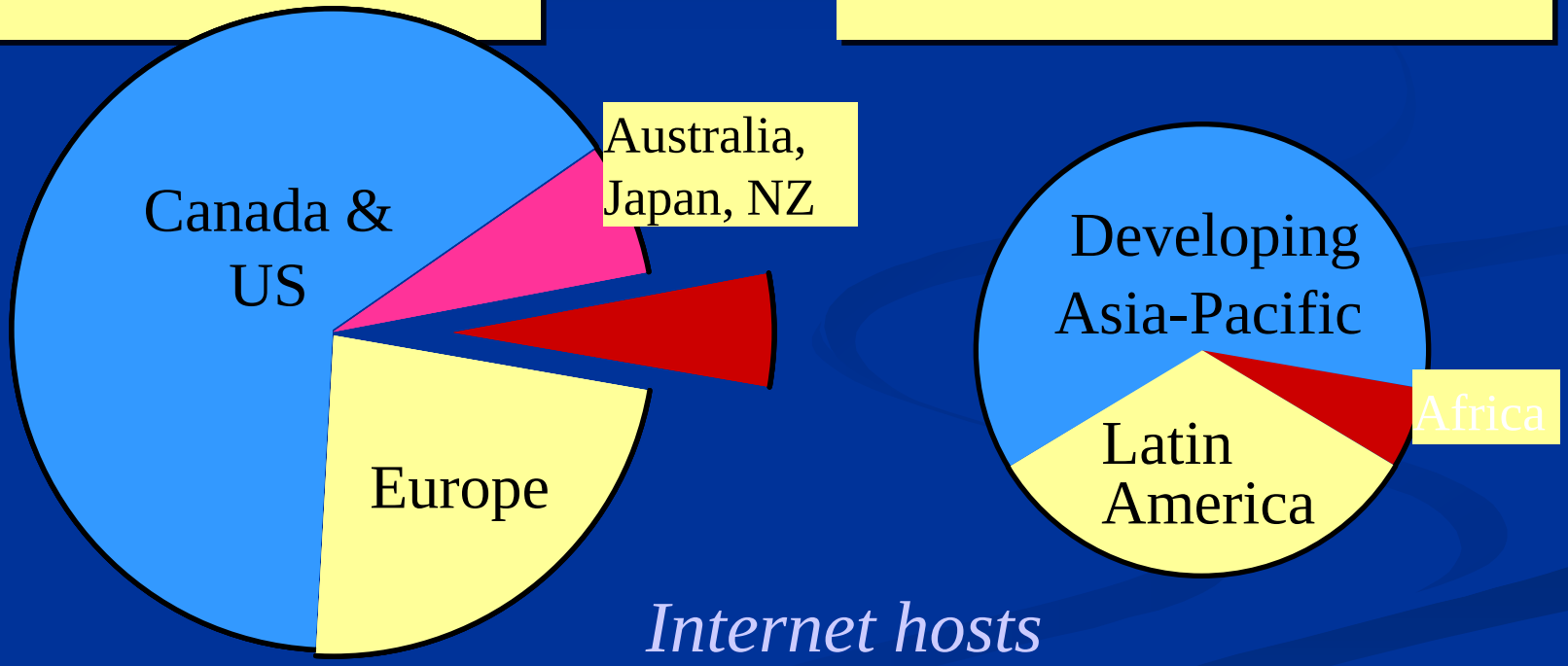
Equity Our Biggest Challenge

High-income countries

16% population
7% burden of disease
89% health spending
94% Internet hosts

Low-income countries

84% population
93% burden of disease
11% health spending
6% Internet hosts



Internet hosts

Source: ITU 2000

HABEMUS….

WHO eHealth Strategy
Stratégie de l'OMS pour la cybersanté
Estrategia de cibersalud de la OMS
Стратегия ВОЗ в области электронного здравоохранения
世界卫生组织的电子卫生保健
إستراتيجية الصحة الإلكتروني لمنظمة الصحة العالمية

World Health Assembly, May 2005

eHealth Resolution WHA.58.28 Approved

http://www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_28-en.pdf

- **Develop a national eHealth strategy, including legal and infrastructure frameworks, and public-private partnerships**
- **Mobilize multi-sectoral collaboration**
- **Establish national eHealth centres and networks of excellence**

Target 18:

In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.

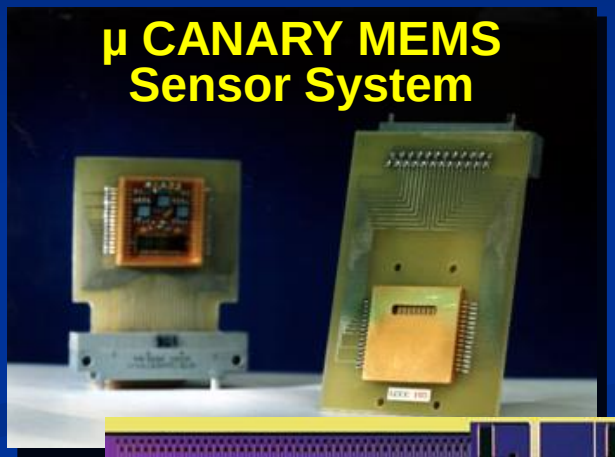
WHA.58 Resolution 28 (continued)

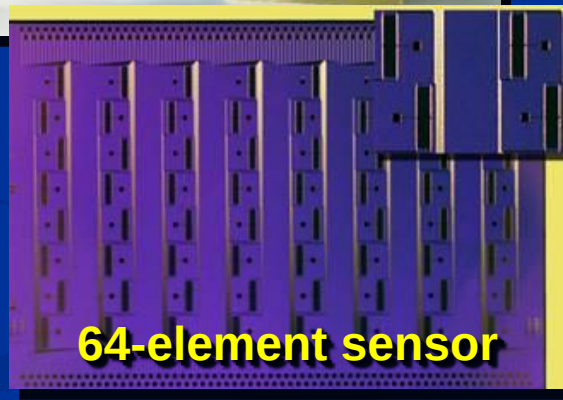
- Promote international collaboration
- Provide technical support
- Facilitate integration of eHealth
- Continue to promote health awareness and healthy lifestyle through eLearning services
- Support inter-regional initiatives among groups of countries that speak a common language
- Document best practices and report on them

TATRC Homeland Defense

Chemical/Biological/Nuclear Threat Detection

- MEMS Sensor System
  - High Sensitivity
  - Nanoliter Samples
  - Short Analysis Time
  - High-density Information
  - Low Cost





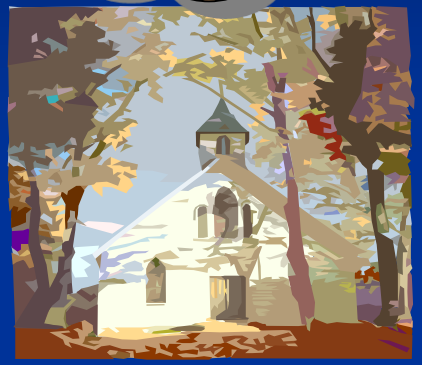
Typical of TATRC programs for threat detection is the MicroElectroMechanical sensor for detection of anthrax, developed through the Harvard Medical School Center for Integrating Medicine and Innovative Technology, the Draper Research Laboratory and MIT.

WHA.58 Resolution 28: next steps

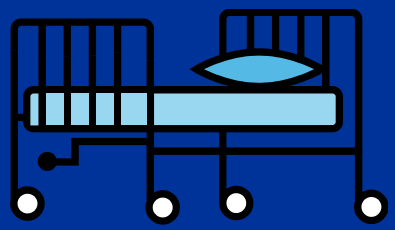
- 2nd World Summit on Information Society (WSIS), November 2005, Tunis
  - eHealth Report
  - Memorandum of Understanding with ITU
  - Memoranda of Understanding with satellite Telco companies
- World Bank commitment
- European Union and WHO partnerships

Eschatological Approach of Health Paradigms

GOD



FAULT/PUNISHMENT



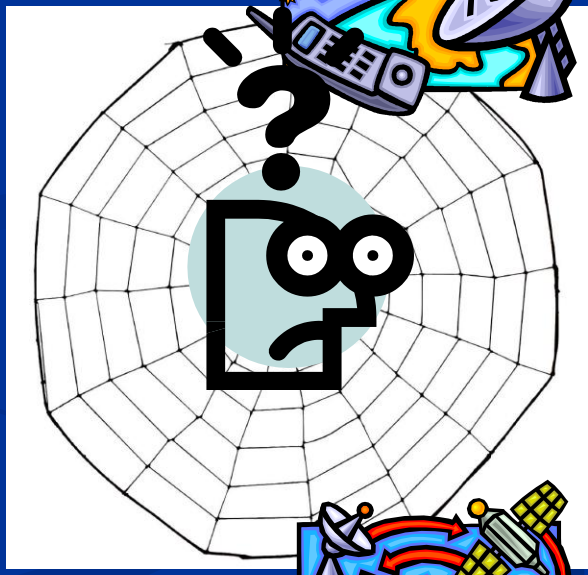
RECONCILIATION

T R U T H
Genes, molecules, virus

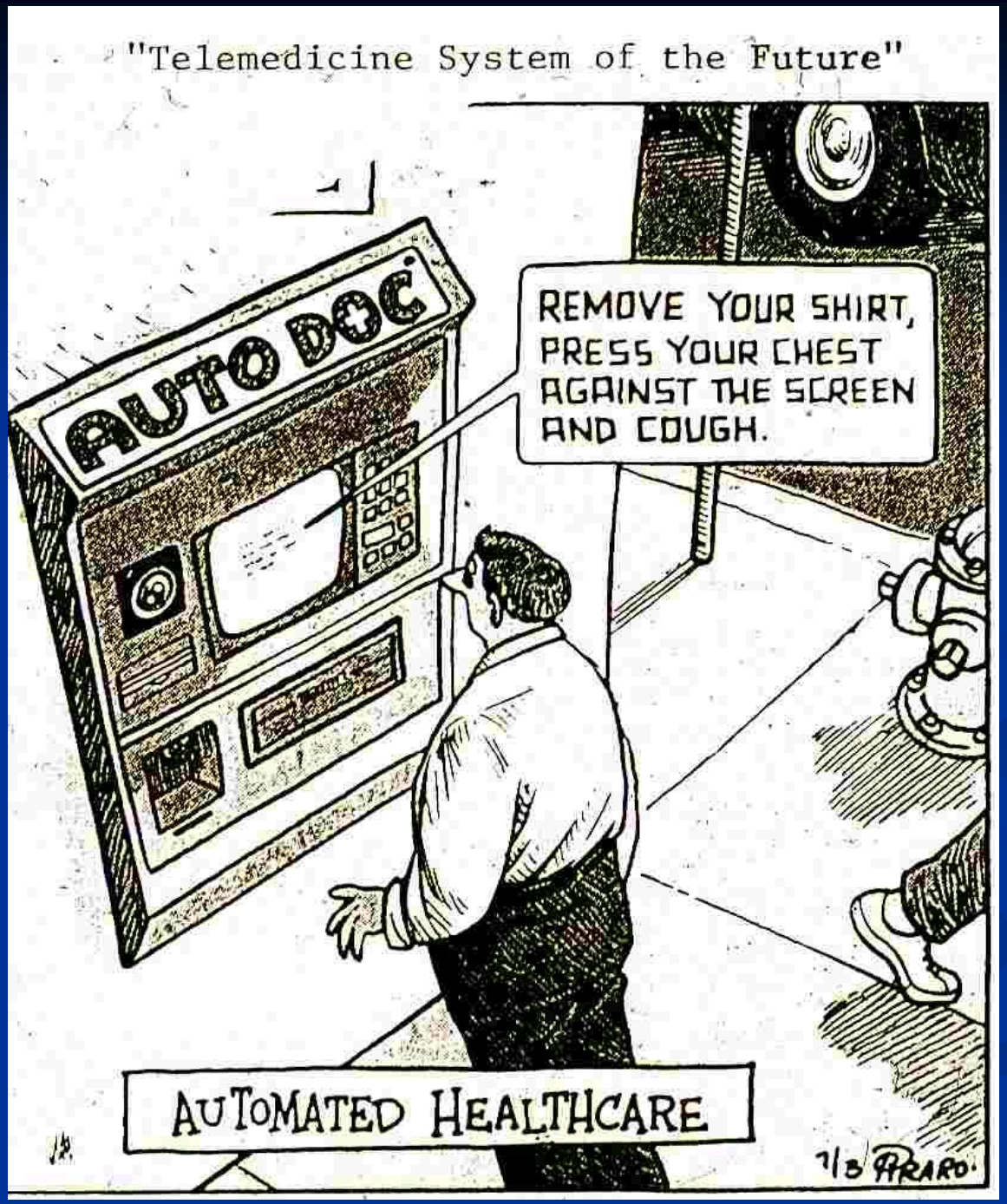
ERRORS

RECOVERY

GLOBAL INFORMATIO N SOCIETY



Slide Courtesy Jean-Claude Healy, WHO


"Telemedicine System of the Future"
AUTO DOC
REMOVE YOUR SHIRT, PRESS YOUR CHEST AGAINST THE SCREEN AND COUGH.
AUTOMATED HEALTHCARE
7/8 PRADO

Key Question

"Are there unique, regional opportunities for technology development and/or avenues of collaboration?"

TATRC Life Cycle Health Care Management

5 P's of Precision Healthcare

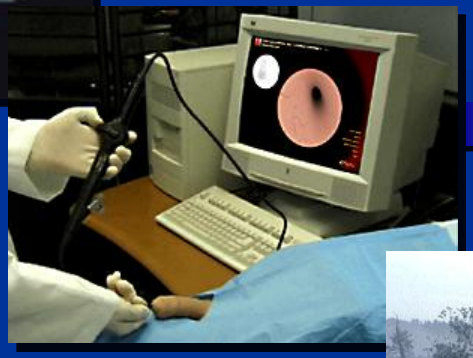
Predictive	Genetics, Bio-Informatics & Multi-Modality Imaging
Preventive	Disease Prevention
Point of Care	Mobile Communications, Ubiquitous Computing and Local Intelligence
Parametric	Multi-Parametric Information Reference to Patient Baseline and Standard Model
Personalized	Individualized Therapeutics to Each Patient

To care for the chronic diseases of middle age such as diabetes, hypertension and heart disease, TATRC focuses on the "5 Ps" to improve the delivery of health care service.

TATRC Advanced Distributed Learning

PC-based Interactive VR/Multimedia

Digitally Enhanced Mannequins



Virtual Workbenches

Total Immersion Virtual Reality

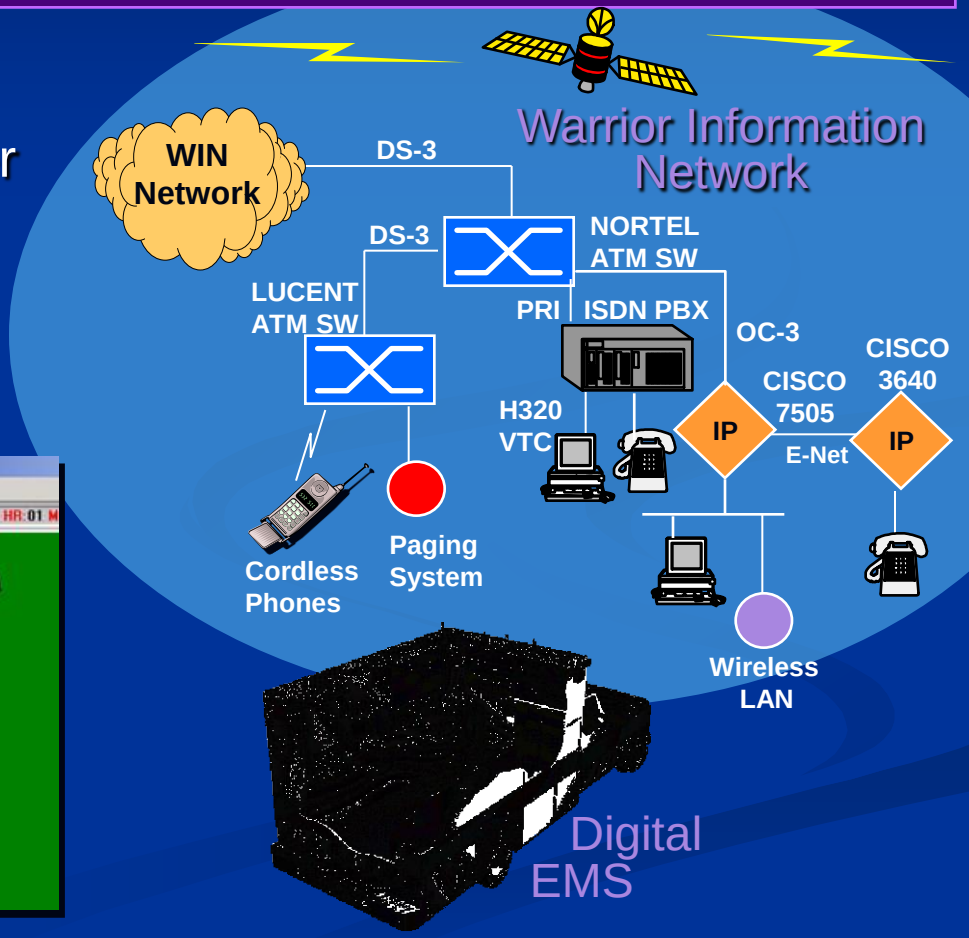
To meet multiple training needs, TATRC is actively developing computer imaging technologies and telecommunications to achieve the most effective training possible.

TATRC Homeland Defense

Disaster Relief and Emergency Medical Services

TATRC has developed a variety of programs and prototypes for disaster response planning, damage assessment, on-site treatment, communications and transport.

Med Model Simulation



TATRC Life Cycle Health Care Management

Telemedicine is the cornerstone of TATRC geriatric care, such as the home monitoring equipment being developed in collaboration with the Mercy Health System to improve the management of congestive heart failure.

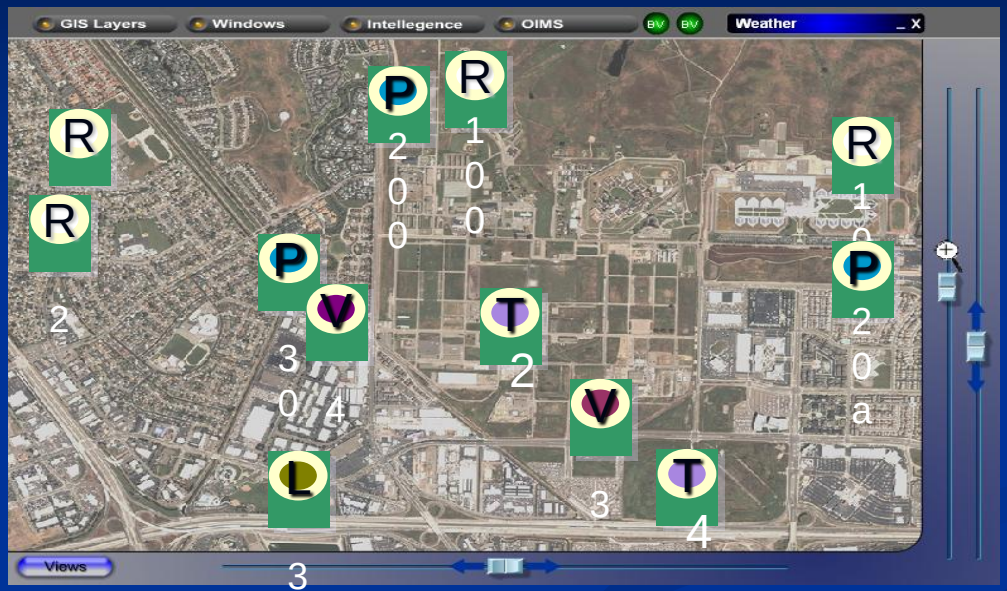
Home Health Congestive Heart Failure Protocol base data collection.

Parameters:

- Blood Pressure
- Heart Rate
- Respirations
- Oral Temperature
- Heart and Lung Assessment with Stethoscope
- ECG
- Oxygen Saturation

Assessment of general appearance, pedal edema and mental status will be obtained through the video camera, as well as questions presented by the telemed nurse.

Wireless Sensor System for Water Supply Security



- Intelesense Technologies, Inc.
- Water quality management with real- time data
  - System of small, inexpensive sensors
  - Water & air quality measurements
  - Data transmitted to central server; live data stream anytime (e.g. GIS); system of alerts
- System deployed & evaluated Hawaii watershed

Doing Business with TATRC

- MRMC Broad Agency Announcement (BAA 05-1)
  - http://www.usamraa.army.mil/pages/index.cfm
- General process
  - Submit pre- proposal to MRMC/TATRC
  - Review for scientific and programmatic merit
  - Award funding
  - Project monitoring and accountability
- Broadband Medical Networking activities
  - Integrated Research Team BMN
  - iGRID 26-30 September, San Diego, CA
  - HealthGRID

Questions? More information?

- http://www.tatrc.org
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