PITAC

The President's Information Technology Advisory Committee

Jonathan C. Javitt, M.D., M.P.H.

Why a planning process?

- As the information technology advances, large institutions such as government agencies and multi-national corporations are increasingly tuning to computer networks to design and deliver effective services and to improve efficiency of governance.
- While the information technology in general and computer networking in particular, have made significant contributions to the economy, society and the process of governance.
- However, there are many great possibilities still to be explored.
- Implementing “BIG” IT ideas must start from the top and requires systematic planning.

About PITAC

- PITAC members are appointed by the President to provide independent expert advice on maintaining America's preeminence in advanced information technology.
- PITAC's studies help guide the Administration's efforts to accelerate the development and adoption of information technologies vital for American prosperity in the 21st century.
- PITAC members are IT leaders in industry and academia with expertise relevant to critical elements of information technology research and development.

About PITAC (continued)

- Chartered by Congress under the High-Performance Computing Act of 1991 (P. L. 102-194) and the Next Generation Internet Act of 1998 (P. L. 105-305). It is formally renewed through Presidential Executive Orders.
- Federally chartered advisory committee operating under the Federal Advisory Committee Act (FACA) (Public Law 92-463) and other Federal laws governing such activities
- Reports to the President through the Office of Science and Technology Policy
- Supported by the National Coordination Office for Information Technology Research and Development

Current PITAC Membership

Current PITAC Subcommittees

- Health
- Cyber Security
- Computational Science

Report to the President from the
President's Information Technology Advisory Committee

Revolutionizing Health Care Through Information Technology

Jonathan C. Javitt, M.D., M.P.H.

CSTB Meeting—October 4, 2004

June 2004

Health Care Delivery is the last paper-based industry in the United States

- 300,000 Americans die each year from medical errors.
- Medical error is the fifth leading cause of death in the U.S.
- Americans spend an estimated $70 billion per year on incorrectly prescribed drugs
- Between 17% and 49% of laboratory tests are performed simply because physicians don't have access to existing records
- 1 in 7 hospital admissions results from failure to transmit critical information from one caregiver to another

Health Care Delivery is the last paper-based industry in the United States

- *The most remarkable feature of this twenty-first century medicine is that we hold it together with 19th century paperwork…* Secretary Tommy Thompson
- *By computerizing health records we can avoid dangerous medical mistakes, reduce costs, and improve care.* 2004 State of the Union
- *If 40% of my passengers check in on the internet before coming to the airport, why do I have to fill out another clipboard everytime I visit the doctor?* Major Airline CEO

The Sign on the Hospital Door

Please be advised that this hospital uses manual, paper-based methods for tracking the process of your care and for implementing the orders of your care providers. Therefore, many orders that your doctors initiate will not be carried out as written. As a result, you may regrettably receive the wrong medicine, the wrong dose of the right medicine, via the wrong route of administration, or at the wrong time.

Healthcare vs. other industries

- In most industries, eliminating the paper merely saves the cost of handling the paper (which may still be 25%)
- In healthcare, eliminating the paper has the potential to transform the entire process of care and its cost to the nation

IT has Proven Itself in the VA

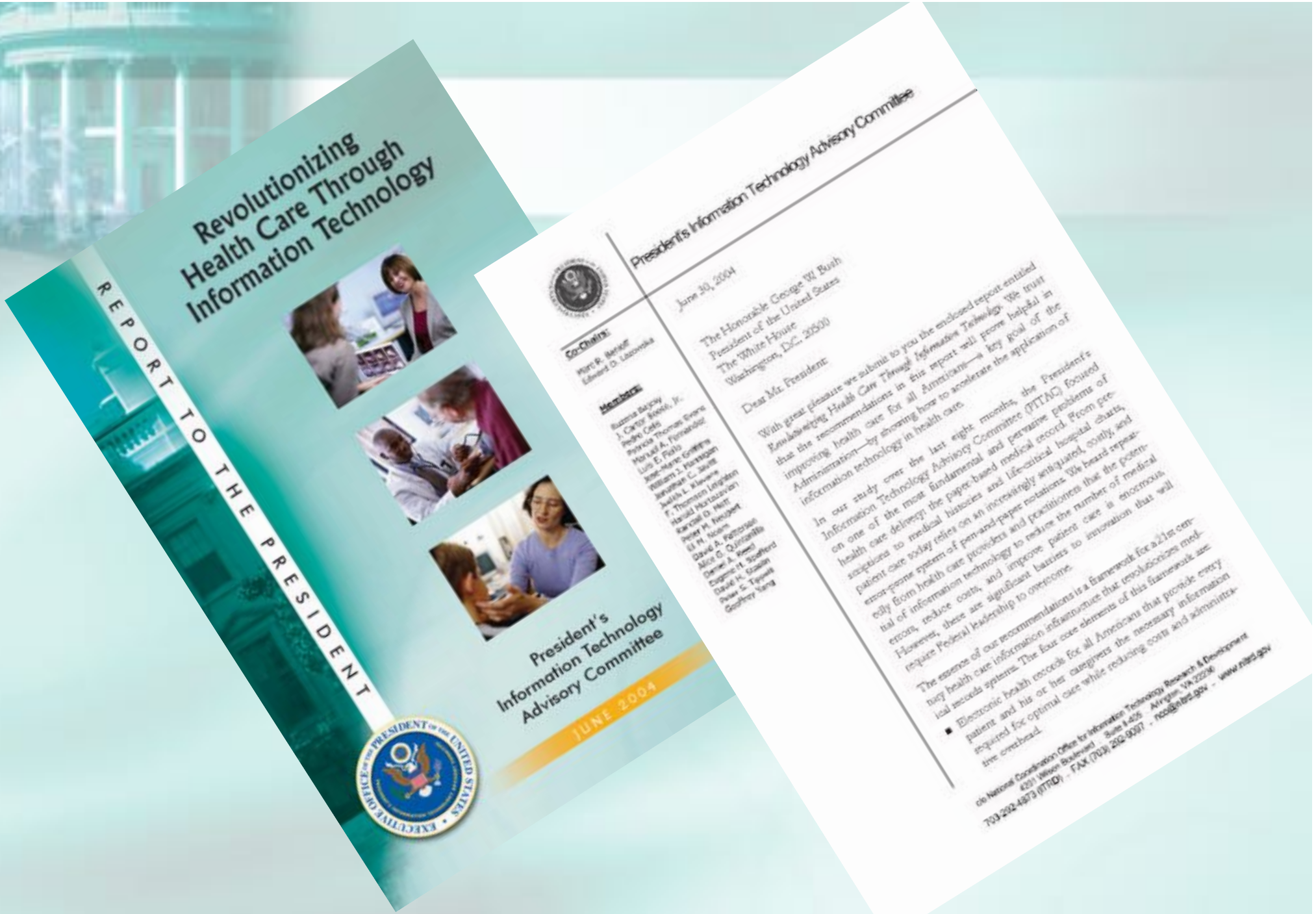
- The Veterans Health Administration has eliminated paper records at 1,600 sites of care across the U.S.
- The medication error rate has dropped to less than 1 in 100,000
- The cost of care per eligible patient has dropped by 50%
- One example of many: Veterans are 50% more likely to be vaccinated against pneumonia and substantially less likely to be hospitalized for pneumonia

IT has Proven Itself in the Army

- The Army has pioneered a web-based solution for ambulatory care.
- In two years, national awards have been won for the management of diabetes, asthma, elevated cholesterol, and congestive heart failure.
- Substantial increases have been seen in hitting targets for blood sugar, cholesterol reduction, and similar indices
- Substantial reductions in emergency department visits and hospital admissions have resulted.

It is rapidly proving itself abroad

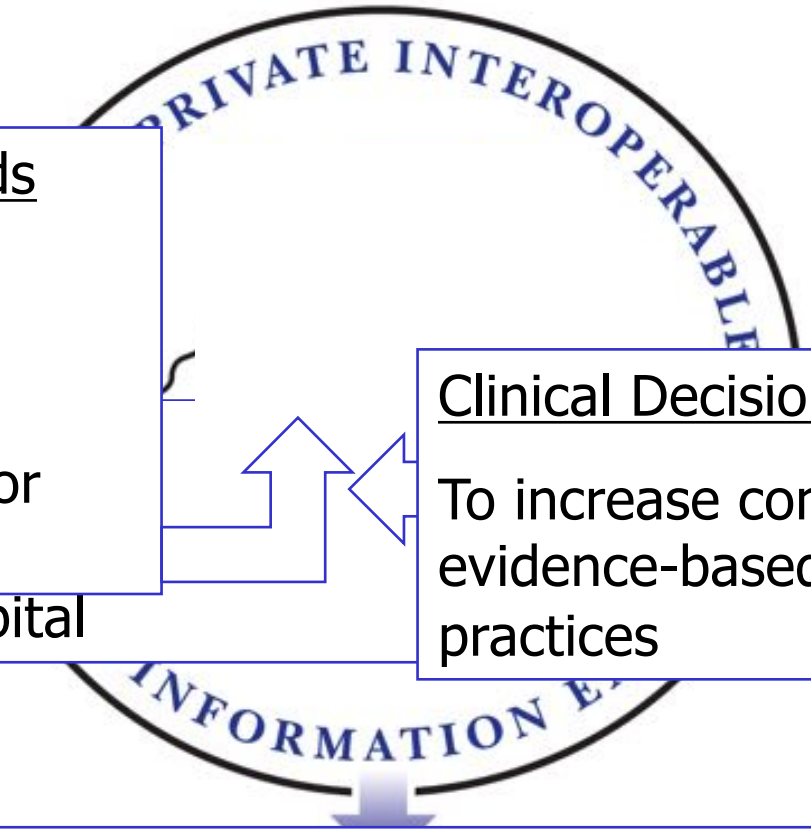
- The English National Health System is spending $10 billion over two years to computerize the entire system


Revolutionizing Health Care Through Information Technology
REPORT TO THE PRESIDENT
President's Information Technology Advisory Committee
JUNE 2004
President's Information Technology Advisory Committee
June 30, 2004
The Honorable George W. Bush
President of the United States
The White House
Washington, DC, 20500
Dear Mr. President

Key Goals

- Accelerate the adoption of information technology in the private health care sector.
- Achieve substantial economic and social benefits:
  - Reduce medical errors.
  - Reduce unproductive healthcare expenditures.
  - Improve quality and consistency of care.

Four Essential Elements for Health IT



Electronic Health Records

Maximize information available to caregivers without creating new workflow requirements or cost burdens

hospital

Clinical Decision Support

To increase compliance with evidence-based medical practices

Secure, Private, Interoperable Health Information Exchange

- Highly specific standards for capture of new data
- Tools for capturing non-standards compliant legacy data

Essential Elements: Electronic Health Records

- No shortage of competent solutions from multiple vendors
- Outside of a single medical enterprise, the value of EHR rapidly diminishes because of the silo effect
- Until care givers get more return from an EHR than the investment in time and money, adoption will continue to be slow
- The medical record system is really just the data viewer. Without decision support, order entry, and data interchange, its value is limited

Essential Elements: Electronic Order Entry

- Simple, tested applications are available
- The VA has been doing it for years
- Again, the principal barrier is availability of source data from multiple sites

Bar Coding Technologies

- Replace traditional data entry
- Quick & accurate linkages between component parts (i.e patient ID bracelet and medication dispensing unit)
- Allow for faster entry of information

Bar Coding Technologies

- Impact on Quality
  - Study at a Veteran's Hospital noted reduction in medication error rates
    - 62% reduction in errors resulting in giving the wrong medication dosage
    - 87% reduction in errors resulting in giving the right medication at the wrong time.
    - 93% reduction in errors resulting in giving the wrong medication to the wrong patient

Essential Elements: Decision Support

- Tools begin to add value even before EHR and order entry are available because of ability to derive knowledge from claims data

President's Information Technology Advisory Committee

Subcommittee on Cyber Security
Presentation of Draft Findings and Recommendations
F. Thomson Leighton, Chair

November 19, 2004
Grand Hyatt Washington at Washington Center
Washington, D.C.

Societal Consequences of Information Technology Vulnerabilities (1)

- IT is at the heart of society; IT runs critical infrastructures: electric power grid, financial systems, air traffic control, food distribution, defense networks, etc.
- The use of IT (and the faith in it) has had enormous positive impact on productivity, with tremendous remaining potential (e.g., see PITAC Health Care report).

Societal Consequences of Information Technology Vulnerabilities (2)

- Ubiquitous interconnection is central to what makes IT important to society.
- BUT ubiquitous interconnection is also a primary source of widespread vulnerability.

The Problems are Growing at a Dramatic Rate (1)

- The number of new vulnerabilities discovered in software is growing at 140% per year, and is now in excess of 4000 per year (CERT).
- The average time between disclosure of a vulnerability and release of an associated exploit has dropped to 5.8 days (Symantec).
- The percent of PCs infected per month has grown from 1% in 1996 to over 10% in 2003 (ICSA Labs).
- The rate at which new hosts are "zombied" rose from 2,000 per day to 30,000 per day during the first 6 months of 2004 (Symantec).

The Problems are Growing at a Dramatic Rate (2)

- 92% of organizations experienced “virus disasters” in 2003 (ICSA Labs).
- 83% of financial institutions experienced compromised systems in 2003, more than double the rate in 2002 (Deloitte).
- Hostile (worm) traffic originated from 40% of networks controlled by Fortune 100 companies in 1H04, despite the fact that these companies have taken a variety of protective measures (Symantec).

The Problems are Growing at a Dramatic Rate (3)

- 17% of 100 companies surveyed reported being the target of cyber extortion (CMU-Information Week)
- The number of unique phishing attacks is doubling every month with 2000 different attacks perpetrated against millions of users in July alone (Anti-Phishing Working Group).
- 1% of US households fell victim to phishing attacks in early 2004, at a cost of over $400M in direct monetary losses (Consumers Union).

The Problems are Growing at a Dramatic Rate (4)

- Cybersecurity is not just about email being slow or your favorite E-commerce site being down.
- Viruses, worms, Trojan horses, spoofing attacks, extortion, and the like are a rapidly spreading cancer in the IT and networking world.
  - They are largely invisible to the lay person but alarming to those who know how to diagnose a dangerous condition.
  - The threat they pose is rapidly growing.
  - To combat the problem, we must establish a foundation of knowledge and skill that will assist the cyber security professionals of tomorrow.

What Must be Done to Improve Cyber Security (1)

- Funding of Basic Research
  - Basic research is needed to move us from a model of "plugging holes in the dike" in response to each new vulnerability to a model where the system as a whole is secure against large classes of current and future threats.
  - Basic research is the responsibility of the Federal Government.

What Must be Done to Improve Cyber Security (2)

- Development and Technology Transfer
  - Effective development needs supporting mechanisms such as testbeds and metrics.
  - The Federal Government has a critical role to play in the development of metrics, testbeds, and best practices.
- Market Adoption of Products and Best Practices by Government and Industry
  - Very important but not the primary focus of this report.

Computational Science Subcommittee: Preliminary Observations

President's Information Technology Advisory Committee
Subcommittee on Computational Science
Daniel A. Reed, Chair
Dan_Reed@unc.edu

PITAC Meeting, Arlington, Virginia
November 4, 2004

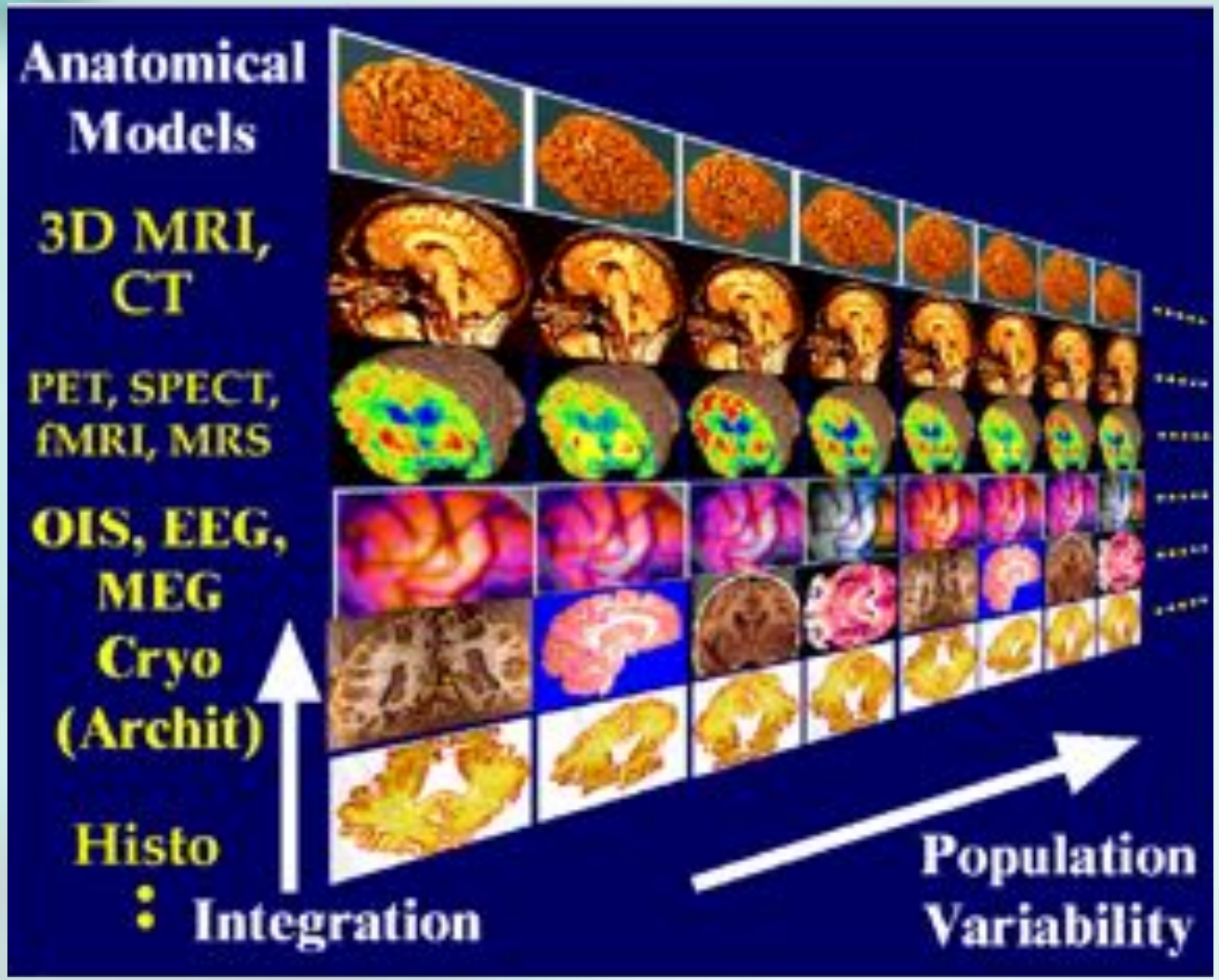
Outline of Disciplines Explored

- Overarching and cross-cutting issues
- Disciplinary studies
  - biomedical and biological sciences
  - engineering
  - climate, weather, and environmental science
  - more to come
- Technology and human resource assessment
  - software and algorithms
  - architecture and infrastructure

Biomedical and Biological Sciences

- **NIH roadmap observations**
  - Computation is integral and critical to biomedical research.
  - Computation's deficiencies and insufficient personnel and education limit progress.
- Clinical decision making requires computational science (including access to long-term archives of clinical records) to select tests, determine therapies, choose dosages and schedules, and identify combination. Examples include surgical and radiation treatment planning, which also requires computation- and data-intensive imaging.

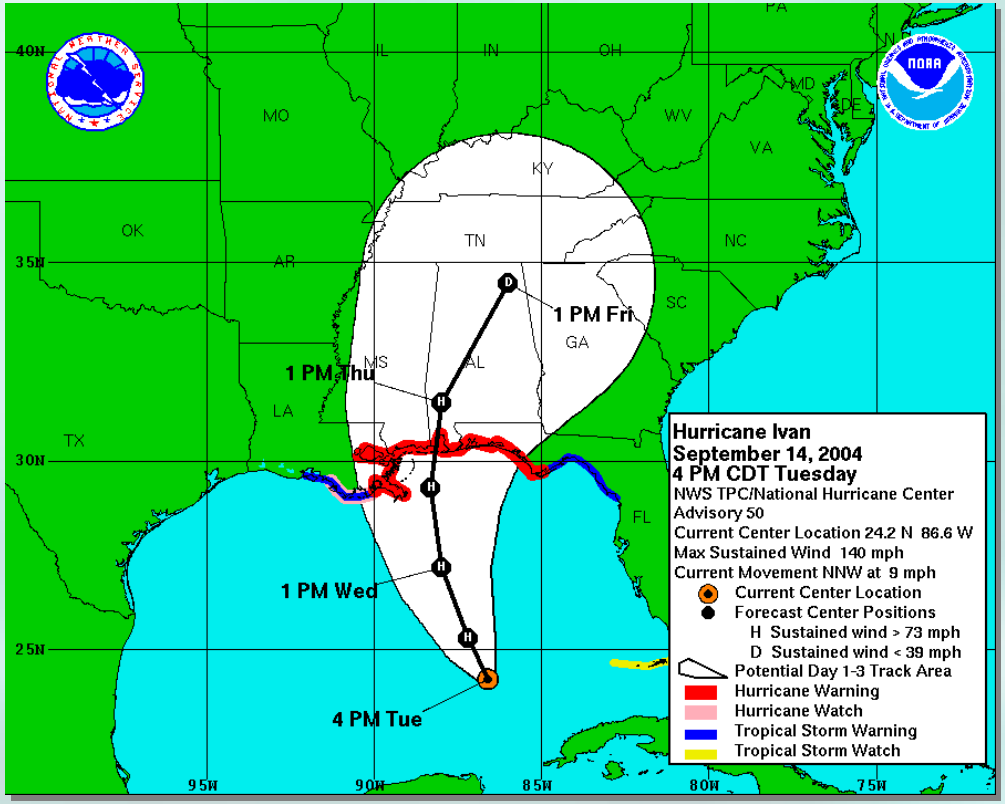
Biomedical Imaging Challenges



Source: Chris Johnson, Utah and Art Toga, UCLA

Weather and Economic Loss

- 40% of the $10T U. S. economy is impacted by weather and climate
- $1M in economic loss to evacuate each 1 mile of coastline



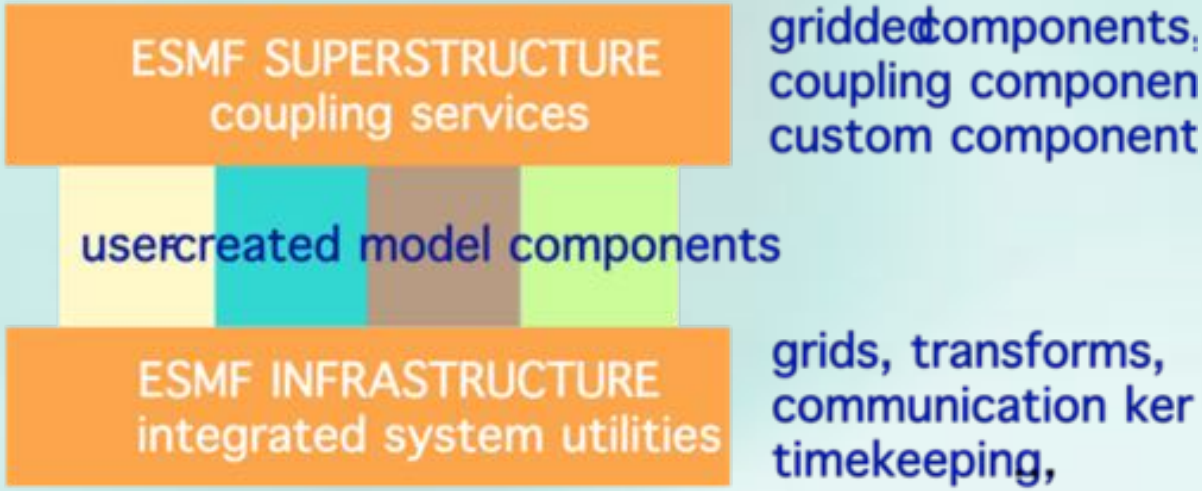
- We now over-warn by a factor of 3
- Average over-warning is 200 miles, or $200M per event
- Improved forecasts
  - saving lives and resources

Source: Kelvin Droegemeier, Oklahoma

ESMF

The Earth System Modeling Framework: A High-Performance Framework for Earth Science Modeling and Data Assimilation

ESMF Architecture



NCAR NASA Los Alamos NATIONAL LABORATORY NOAA MIT mcs

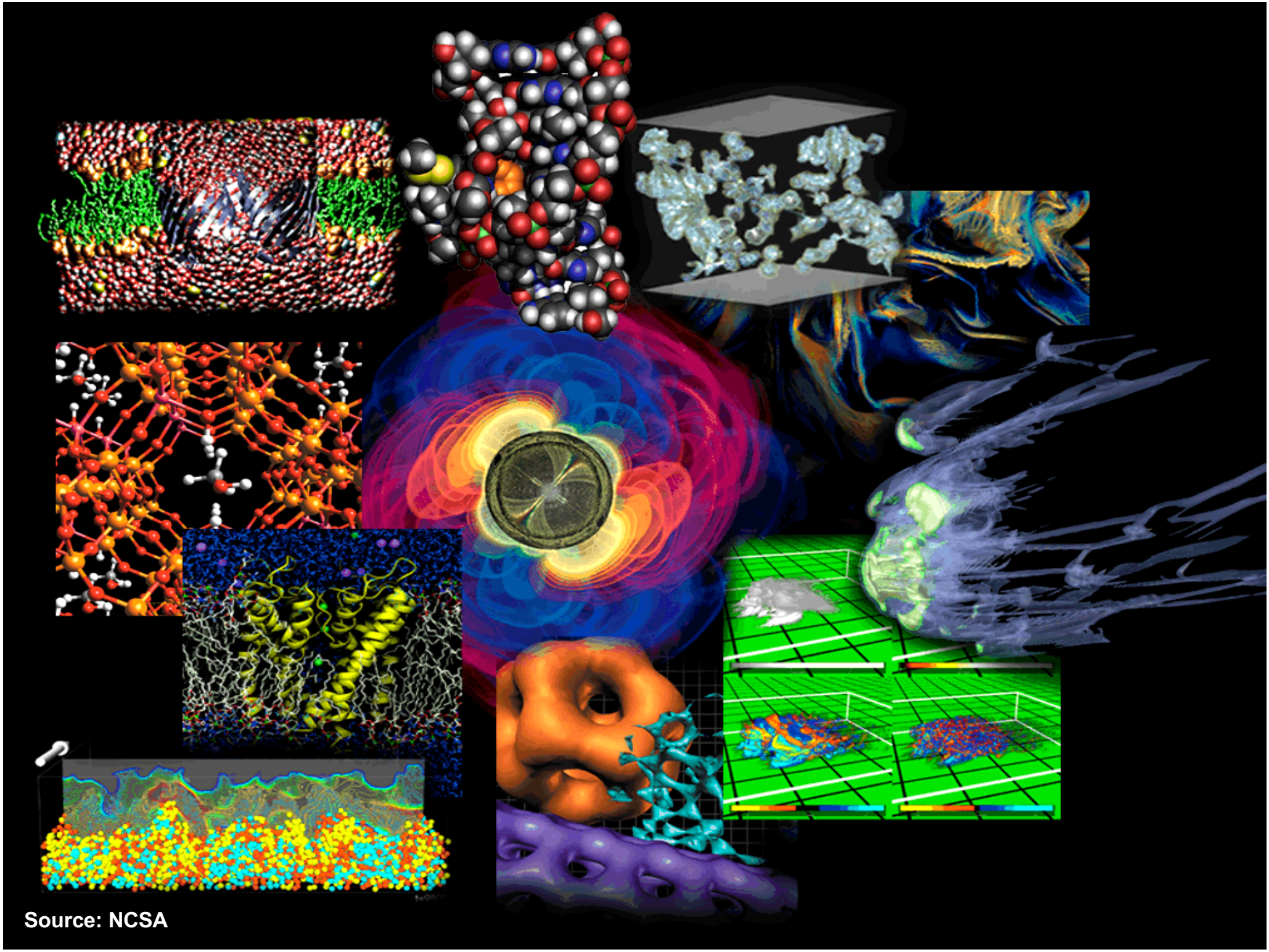
Source: Tim Killeen, NCAR

PITAC: Summary

- The Purpose of PITAC is to systematically plan for the future of computing, networking, and information technology research and development
- Our meetings are open, our deliberations are public, and our findings are there for all to use
- Please feel free to participate with us as we explore new domains of computing
- All of our meetings can be viewed live on Webex
- You can find all of our materials at www.nitrd.gov/pitac

PITAC and the Conference

- By virtue of the fact that you are here, looking for the next challenges in IT, you are colleagues in our process.
- We look forward to hearing from you and to seeing you at our meetings.



Source: NCSA