



Converging Technologies: Physical and Biological Science

Dr. Arden L. Bement, Jr.

Director

National Institute of Standards and Technology

Information Science Standards to Enable Biomedical Research

November 4, 2003

Biosciences will Drive the 21st Century Economy



"We are now starting the century of biology"

J. Craig Venter

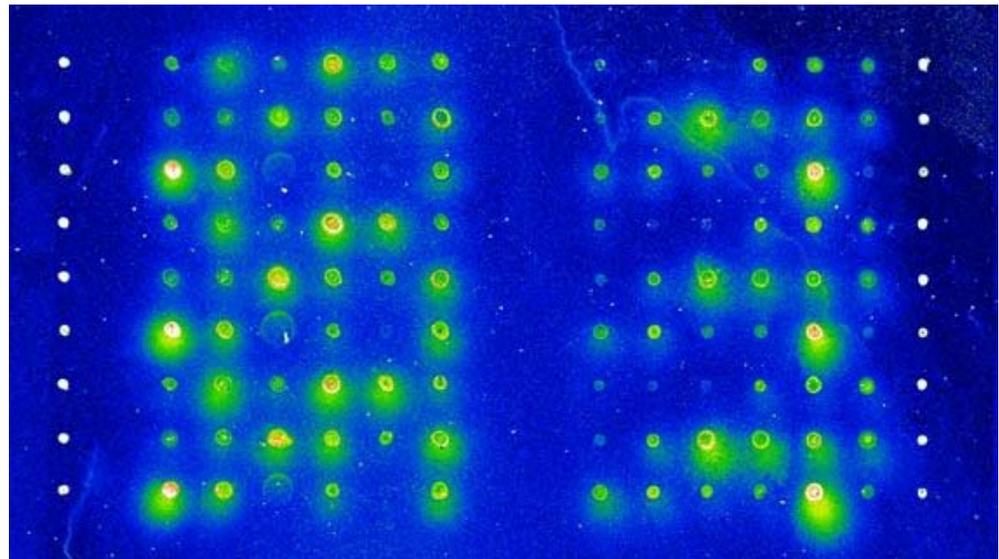
President of the Center for the Advancement of Genomics, former President and Founder of Celera Genomics

New Tools Are Driving the Biosciences



**Human Genome
GeneChip® – Affymetrix**

**Nucleic Acid-Programmable
Protein Array (NAPPA) –
Harvard Institute of Proteomics**

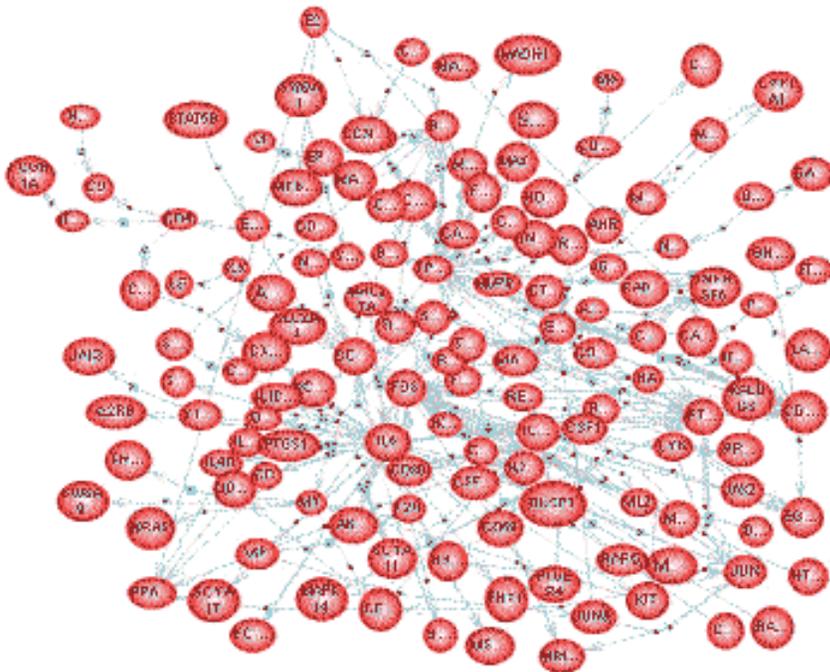


“Biology is awash in data,”

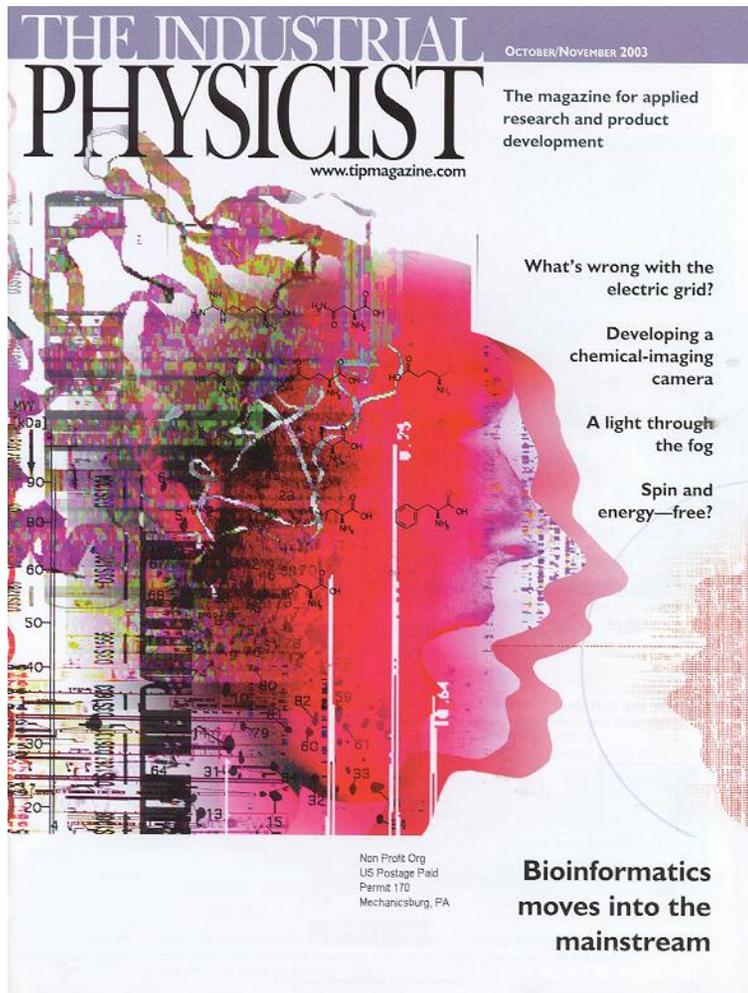
Eric Jakobsson

Director, National Institutes of Health
Center for Bioinformatics and

Computational Biology.



[NIH Alliance for Cell Signaling (UCSD)]



“The biggest challenge right now in bioinformatics is the integration of disparate data.”

– Scott Kahn
Chief science officer
Accelrys, Inc.

National Institute of Standards and Technology

NIST's mission is to develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life.

NIST Assets Include:

- **3,000 employees**
- **1,600 guest researchers**
- **Unique research facilities**
- **\$825 million annual budget**

NIST Intramural Program

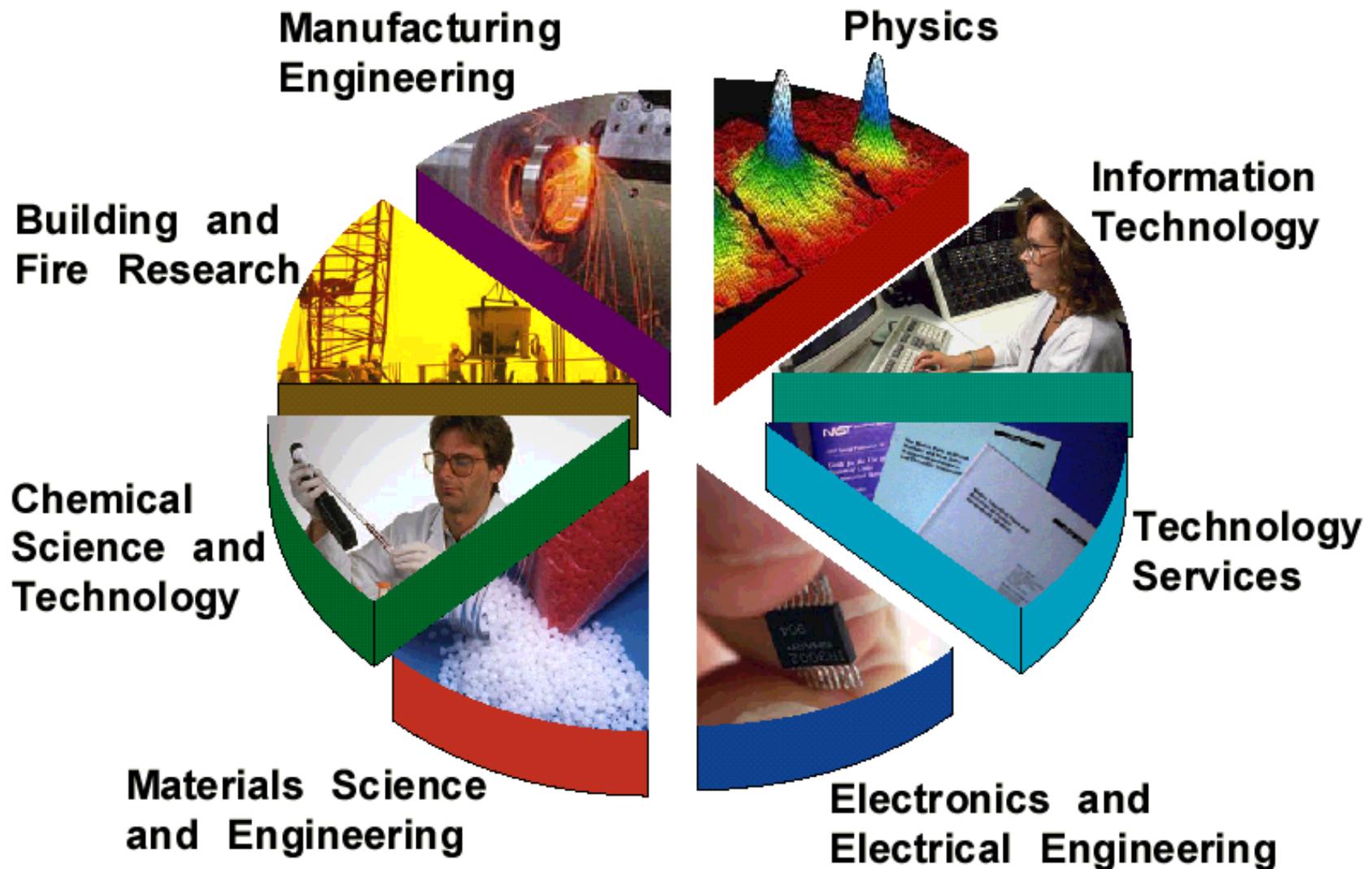
- **NIST Laboratories – Mission driven research in seven scientific disciplines**



NIST Extramural Programs

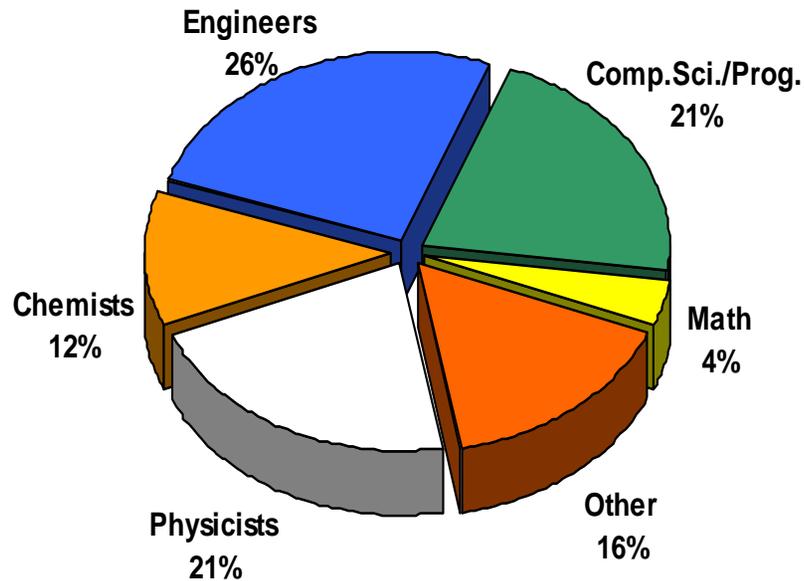
- **Advanced Technology Program – \$640 million current R&D partnerships with industry**
- **Manufacturing Extension Partnership – 400 centers nationwide to help small manufacturers**
- **Baldrige National Quality Award**

NIST's Intramural Laboratories

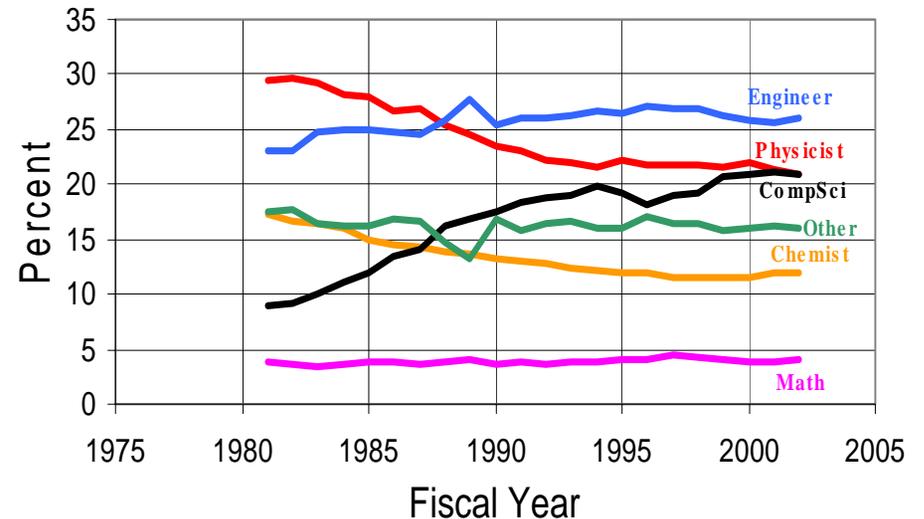


NIST Technical Staff

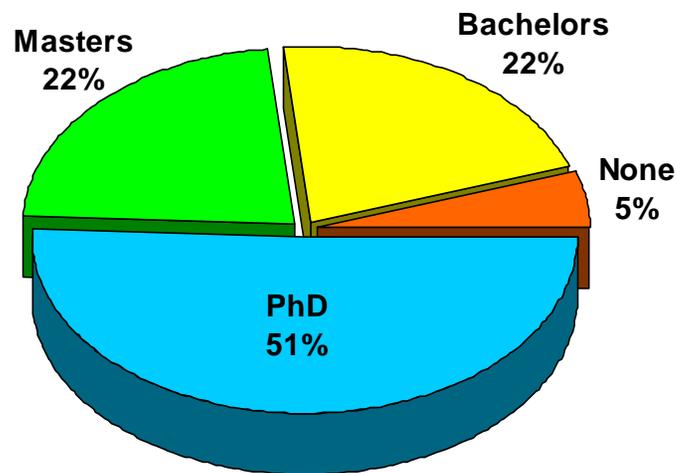
By Technical Discipline:



Trends by Technical Discipline: (% of total technical FTP)



By Degree:

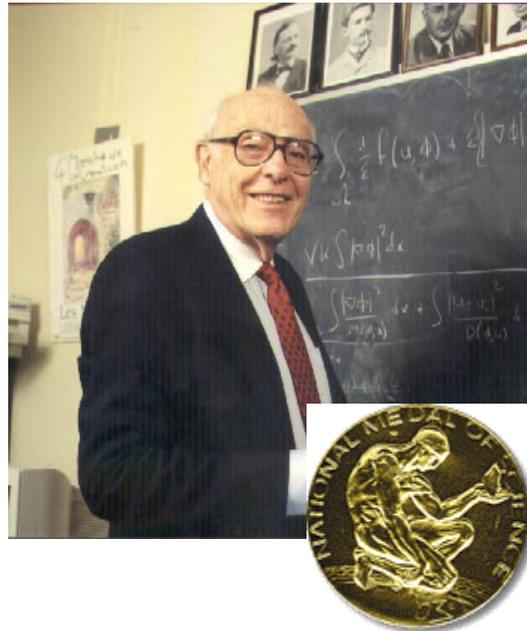


- 1481 total full-time permanent technical staff in FY2002
- Approximately 1600 guest researchers per year.

World Renowned Scientists and Engineers



Bill Phillips
Eric Cornell
Nobel Prizes in Physics
1997 and 2001



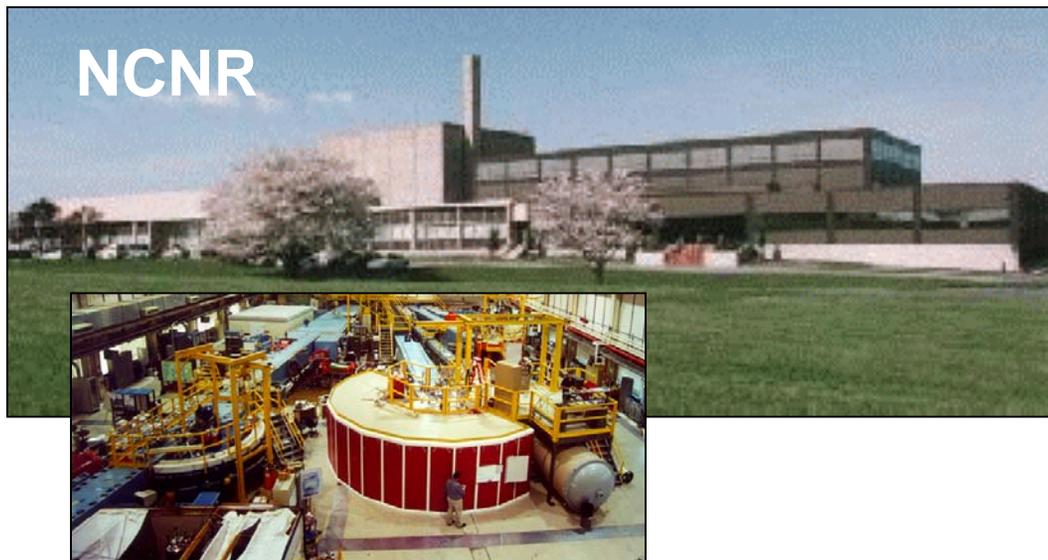
John Cahn
1998 National Medal
of Science
and the 2002 Bower
Award and Prize for
Achievement in
Science from the
Franklin Institute



Johanna Levelt Sengers
Selected as the North
American recipient of the
2003 Women in Science
Awards to be presented by
L'Oreal and UNESCO.

Unique NIST Measurement and Research Facilities

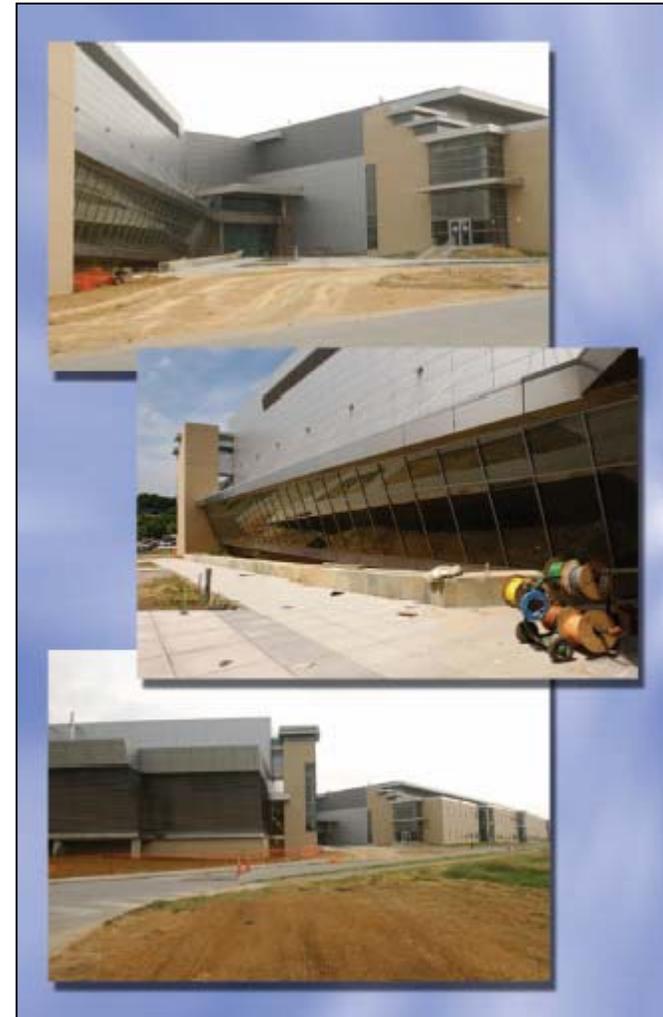
- **Advanced Chemical Sciences Laboratory**
- **Cold rooms for biotechnology research**
- **Clean rooms and non-metallic modules**
- **Excellent ventilation system and capabilities to handle corrosive chemicals**



- **NIST Center for Neutron Research**
- **Most versatile facility in the U.S. with more than 1750 annual users.**

Advanced Measurement Laboratory (AML)

- **Will be the world's best measurements laboratory.**
- **Stringent control of temperature, vibration, humidity, cleanliness.**
- **Establishes nano and micro-fabrication capabilities, primarily in the Cleanroom Building.**
- **Opportunity for enhanced external collaborations.**
 - **511,000 gross square feet**
 - **210,000 net assignable square feet.**
 - **92,000 gross square feet Cleanroom/Nanofabrication wing.**



Strategic Focus Areas

To develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life.

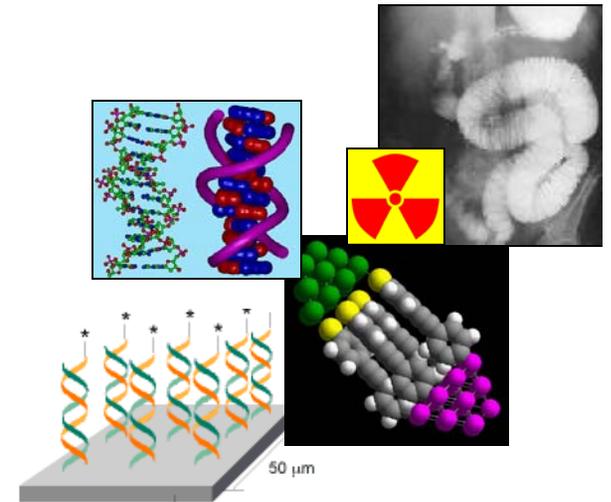
NIST Strategic Focus Areas

⇒ **Healthcare/Bio-metrology**

⇒ **Nanotechnology**

⇒ **Homeland Security**

⇒ **Information/Knowledge Management**



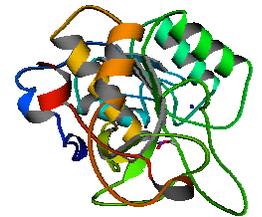
What NIST Brings to a Partnership

- **Unique mission**
- **World renowned scientists and engineers**
- **Unique capabilities and facilities**
- **Strong relationship with industry**
- **Strong history of partnership with other government agencies**

Center for Advanced Research in Biotechnology



- Cooperative effort between NIST, University of Maryland Biotechnology Institute (UMBI), and Montgomery County.
- Experimental and theoretical programs in biomolecular structure-function relationships.
 - **Structural Biology**
 - **Structural Genomics**
 - **Protein Engineering**
 - **Protein Folding**
 - **Membrane Receptors**
 - **Molecular Recognition**
 - **Biothermodynamics**
 - **Computational Genomics**
- 18 permanent Fellows from NIST and UMBI.
- 116 total staff: Post-docs, grad students, technical staff, visiting fellows...
- Approximately \$10 million annual budget
 - About 1/3 from each of NIST, UMBI, grants (NIH, NSF, others).



Growing Ties to NIH...

- Met with NIH Director, Elias Zerhouni
- Established a Joint Postdoc Program
- Site visit by NIBIB Director and Executive Team
 - Draft MOU with NIBIB for Intramural Co-Location
- Mini Symposium at 2003 NIH Research Festival
- Jointly Sponsored Workshops

Information Science Standards to Enable Biomedical Research

GOAL:

To identify opportunities for information science standards and standards development to facilitate bioscience and biomedical research.