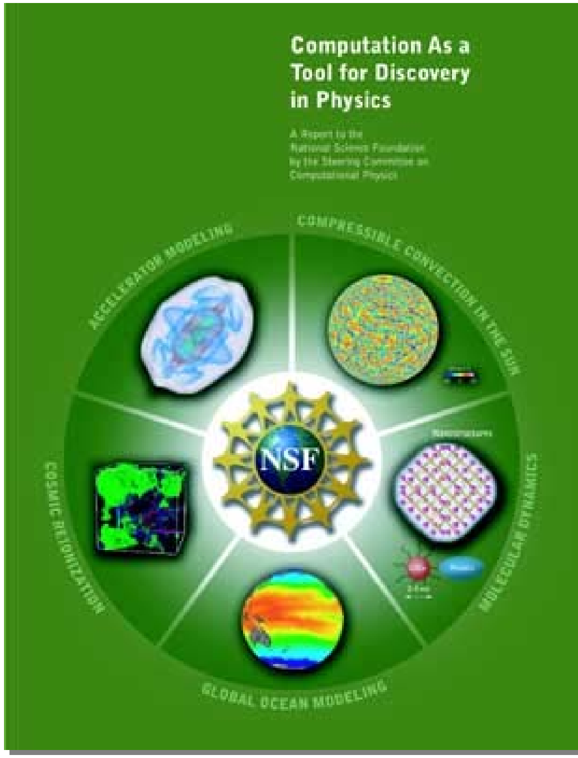
Overview of NSF MPS Workshop on CI/CS (CyberInfrastructure &CyberScience)

- o Breakout Group on Networks
- o Breakout Group on *Models*, Algorithms, and Software
    - o Personal views and examples

Mark A. Novotny
Mississippi State University

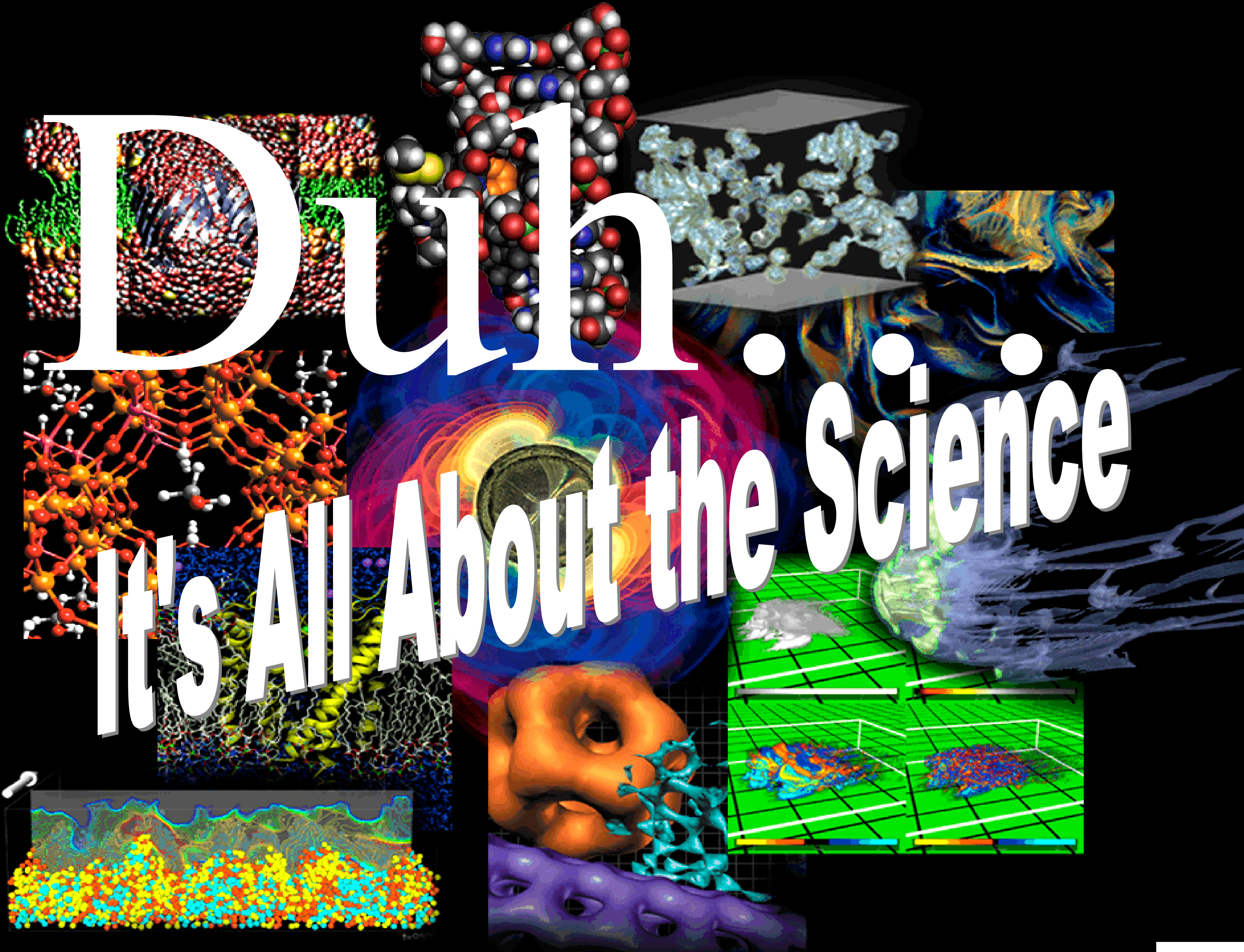
Cyberinfrastructure Reports

- Computation as a Tool for Discovery in Physics, September 2001
  - www.nsf.gov/pubs/2002/nsf02176/start.htm
- Blueprint for Future Science Middleware and Grid Research and Infrastructure, August 2002
  - www.nsf-middleware.org/MAGIC/default.htm
- NSF Cyberinfrastructure Report, January 2003
  - www.cise.nsf.gov/evnt/reports/toc.htm
- DOE Science Network Meeting, June 2003
  - gate.hep.anl.gov/may/ScienceNetworkingWorkshop/
- DOE Science Computing Conference, June 2003
  - www.doe-sci-comp.info
- DOE Science Case for Large Scale Simulation, June 2003
  - www.pnl.gov/scales
- Roadmap for the Revitalization of High End Computing, June 2003
  - www.cra.org/Activities/workshops/nitrd/
- DOE ASCR Strategic Planning Workshop, July 2003
  - http://www.fp-mcs.anl.gov/ascr-july03spw
- *PITAC Computational Science, 2004-2005*
  - *stay tuned*



Duh….

It's All About the Science



D. Reed

Network Infrastructure Breakout Group

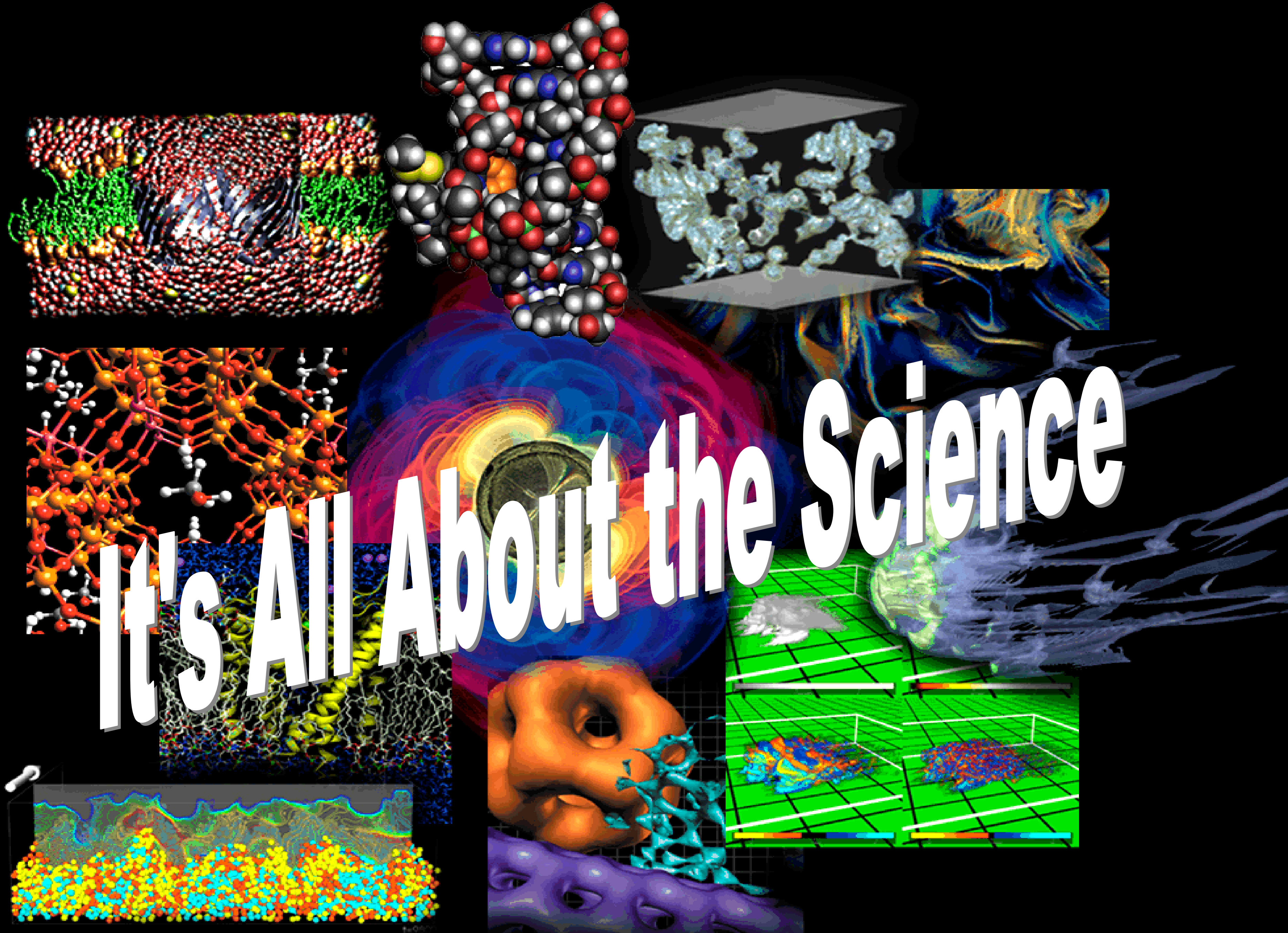
- Kenny Lipkowitz -- N. Dakota State
- Glenn Martyna -- IBM
- Nigel Sharp -- NSF
- Sandip Tiwari -- Cornell
- Vicky White -- Fermi Lab
- Alan Whitney -- MIT Haystack

Computing and simulation (… data …) provides the critical link between theory and experiment

Network is the enabler

What should Network infrastructure do?

- Networks are the glue in any infrastructure involving data
  - Should be a coherent reliable network backbone for science
  - 10 Gbps pipes important for large data delivery
  - Needs to have a reliable flow rate
  - Capable systems locally to exploit the data
- Provides a mechanism to effectively utilize resources
  - Software, e.g. documented and supported across disciplines
  - Concentrated resources for large-scale problems and distributed for multiply-connected small-scale problems
- Smart network infrastructure that takes a problem we pose and goes and searches and finds answers/directions and provides connections
- Provides an important way to connect – national labs to universities to K-12 to commercial enterprises


It's All About the Science

CI/CS Models, Algorithms, Software

- T. Dunning, Jr and R. Larter (co-chairs)

  G. Allen, A. Chan, M. Ciment, R. Fedkiw, A. Frank, M. Gunzberger, G. Hummer, L. Lehner, H. Levine, D. Lockhart, M. Norman, M. Novotny, V. Pande, T. Russell, W. Symes, and W. Tang

Added ‘Models’ to original charge

Different areas at different levels of model maturity

CI/CS Models, Algorithms, Software

- Cyberscience is at different levels of maturity in various MPS fields, these differences must drive the MPS cyberscience investment stategies
- Investments should be made in the entire knowledge chain in cyberscience; theory and computational models, algorithms, computational frameworks, and scientific applications software as well as in applied mathematics and statistics.
- Funding for computational models, algorithms, and applications software should be at a level commensurate with the strategic role that it plays in cyberscience

CI/CS Models, Algorithms, Software

- Panel urges MPS to show leadership in fostering and supporting the development of computational models, algorithms, and applications software

- It is essential that investments in computational methods, algorithms, and software be a ***sustained*** effort with continuous support.

  -- From single-PIs to large centers

  -- Foster interdisciplinary approaches

CI/CS Models, Algorithms, Software

- MPS invest in sustained development, deployment, and support of computational modeling software of high value to the broader scientific community
- MPS develop program that fosters collaborations between applied mathematicians/statisticians and physical sciences (interdisciplinary cyberscience)

CI/CS Models, Algorithms, Software

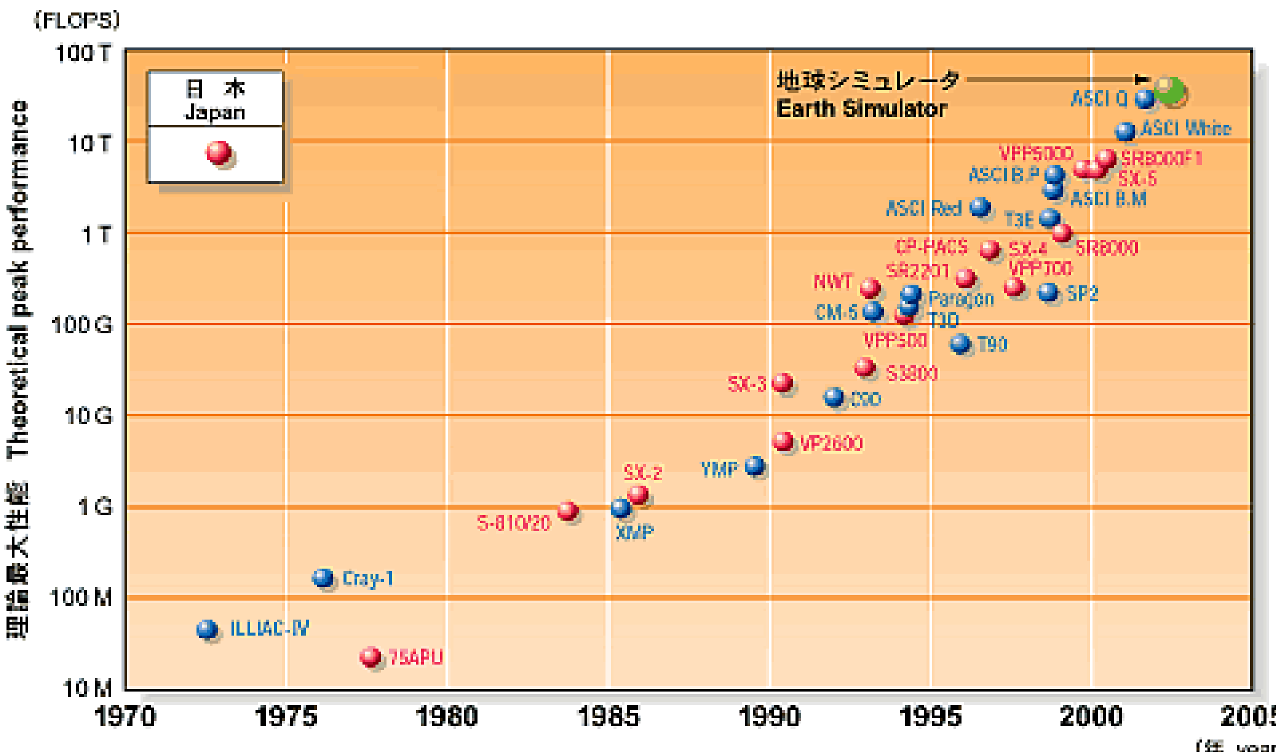
- MPS ensure that cyberscience is properly represented in the Science & Technology Centers solicitication
- MPS fund an Institute for Cyberscience with the mission to advance cyberscience within the areas supported by MPS and provide a bridge within MPS and to CISE

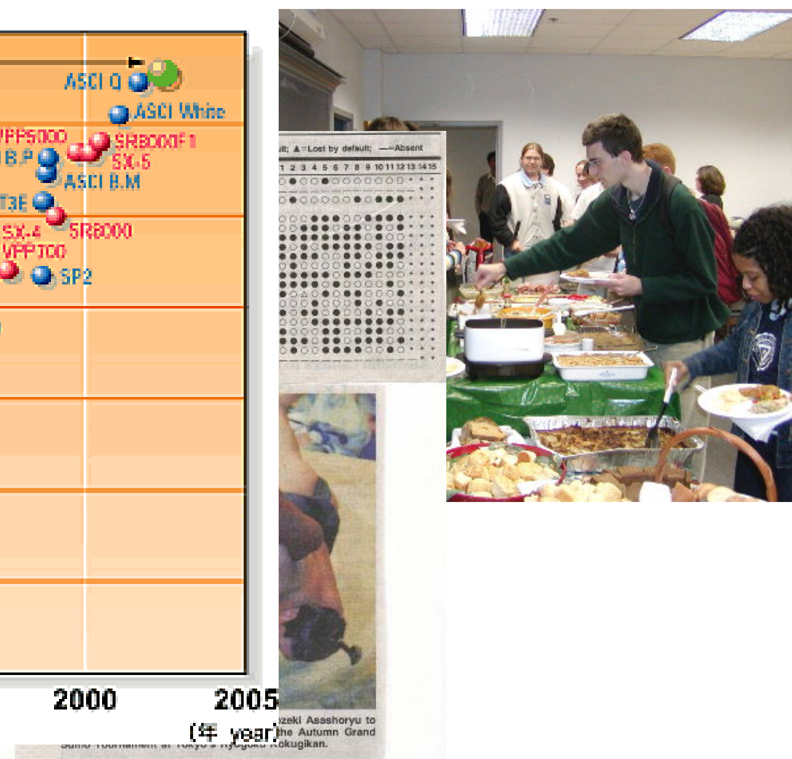
CI/CS Models, Algorithms, Software

- In determining the level of support for the cyberscience, MPS should consider that costs in the Models, Algorithms, Software area are dominated by funding for personnel rather than funding for equipment.

personal view

Ratio of science productivity

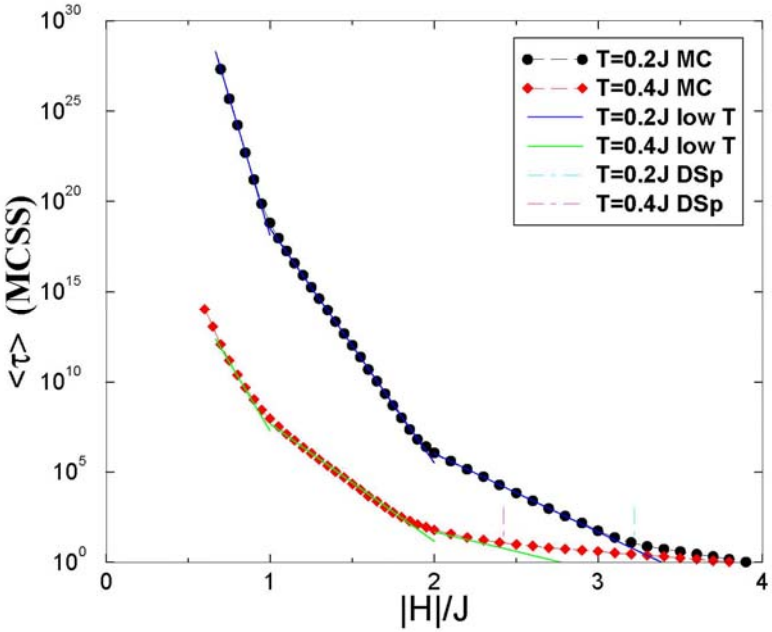




personal view

Ratio between funding hardware and personnel

Ratio of science productivity



personal view

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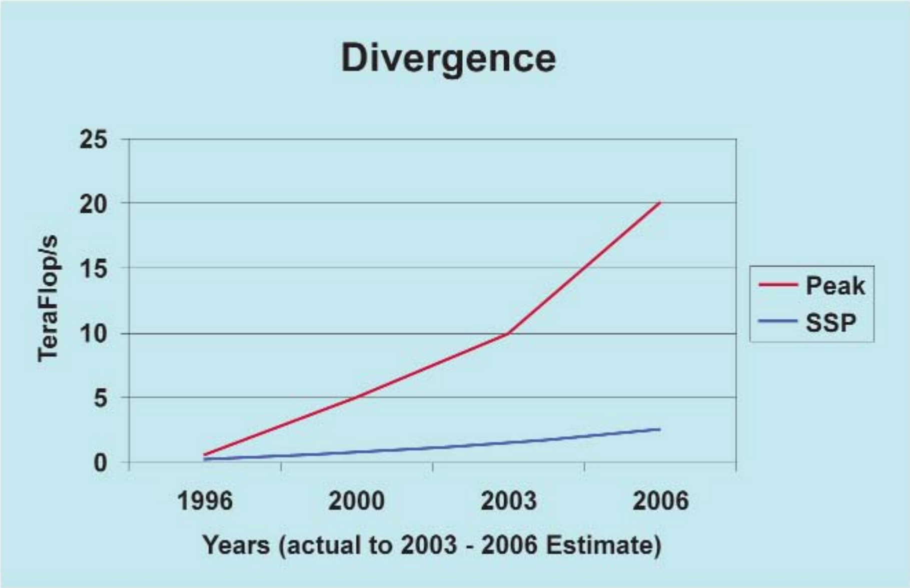
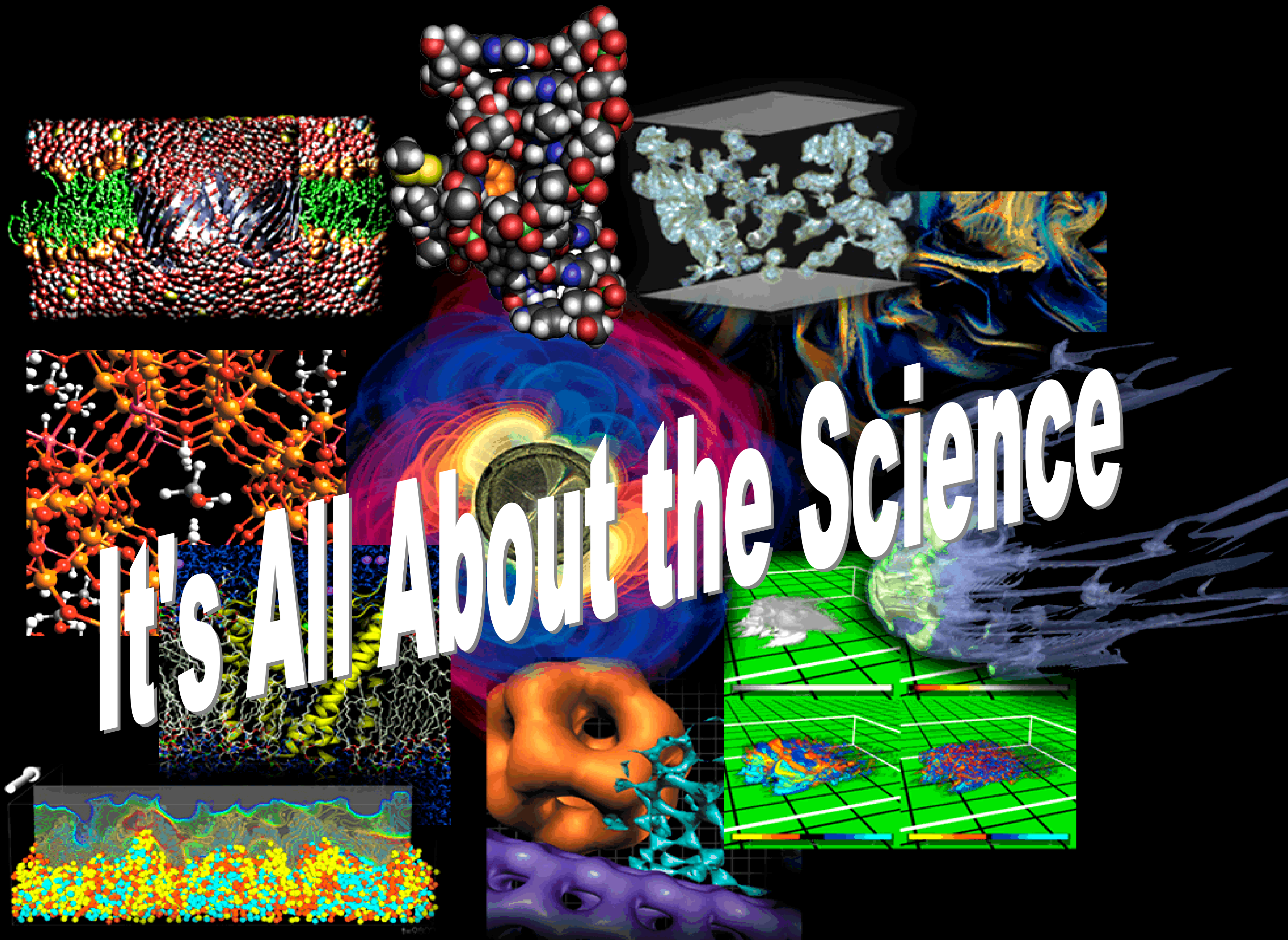


Figure 1: Divergence Problem for HEC Centers (SSP = Sustained System Performance)

www.NITRD.gov


It's All About the Science