

The NSF CI Vision and the Office of CyberInfrastructure Software Engineering for High Performance Computing Applications

José L. Muñoz, Ph.D.

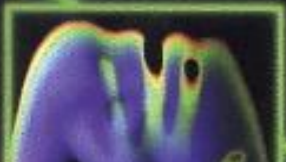
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Office of CyberInfrastructure/Muñoz

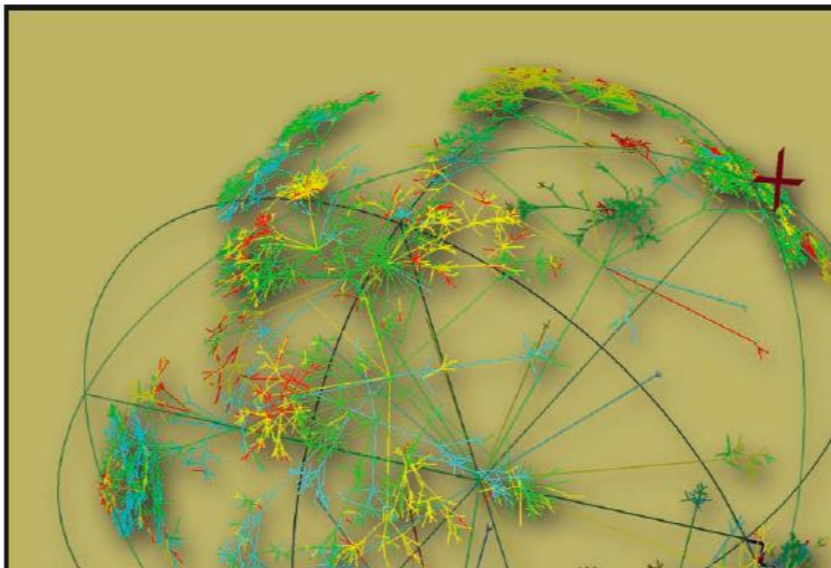


Revolution in Science Engineering through Cyberinfrastructure



Report
National Science Foundation
Advisory Panel
Cyberinfrastructure

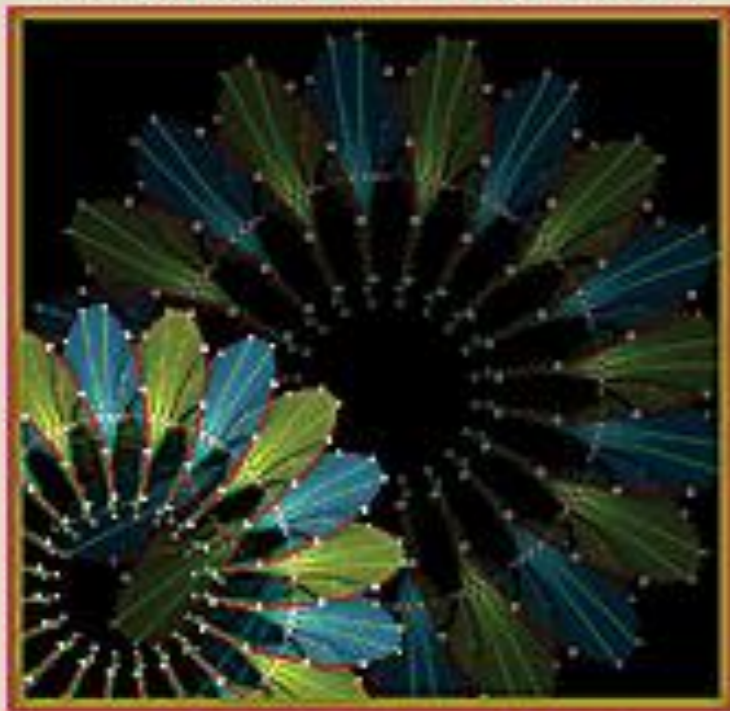
CYBERINFRASTRUCTURE VISION FOR 21ST CENTURY DISCOVERY



RISING ABOVE THE GATHERING STORM

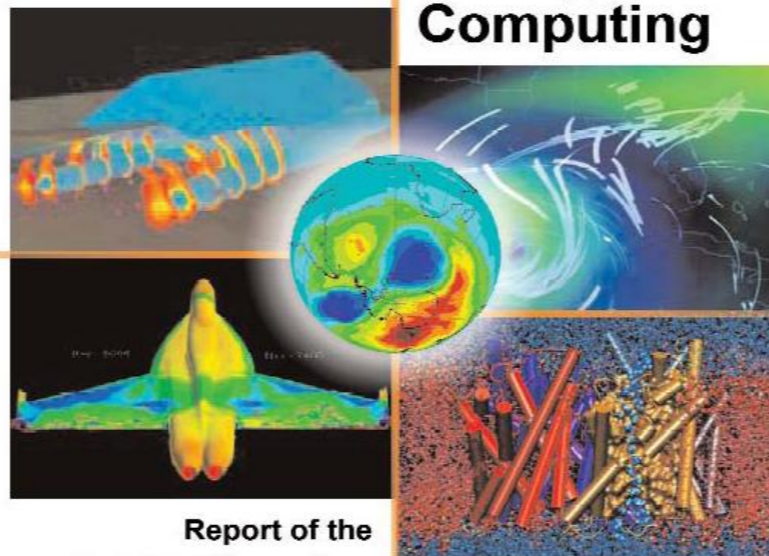
Emerging and
Employing America
for a Brighter
Economic Future

National Science Foundation INVESTING IN AMERICA'S FUTURE



STRATEGIC PLAN
FY 2006-2011

Federal Plan for High-End Computing



Report of the
High-End Computing
Revitalization Task Force
(HECRTF)



MAY 10, 2004
SECOND PRINTING—JULY 2004

A SCIENCE-BASED CASE FOR LARGE-SCALE SIMULATION

VOLUME 1

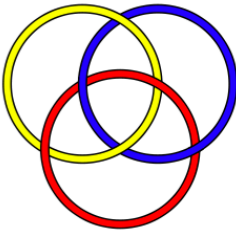
OFFICE OF SCIENCE
U.S. DEPARTMENT OF ENERGY

JULY 30, 2003





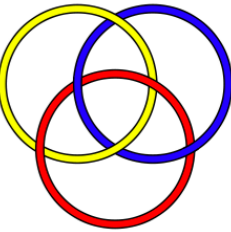
Some Science Drivers



- ❖ **Inherent complexity and multi-scale nature of today's frontier science challenges.**
- ❖ **Requirement for multi-disciplinary, multi-investigator, multi-institutional approach (often multi-national).**
- ❖ **High data intensity from simulations, digital instruments, sensor nets, observatories.**
- ❖ **Increased value of data and demand for data curation & preservation of access.**
- ❖ **Exploiting infrastructure sharing to achieve better stewardship of research funding.**
- ❖ **Strategic need for engaging more students in high quality, authentic science and engineering education.**



Vision and Activities Based on Broad and Diverse Community Engagement



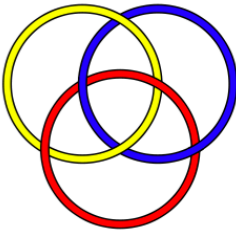
Vision Framework



- ❖ *All directorates and offices support cyberinfrastructure.*
- ❖ *Science-driven partnerships between creation, provisioning and use of CI*
- ❖ *Supports integrated research and education and broadened access and participation.*



Mission of OCI

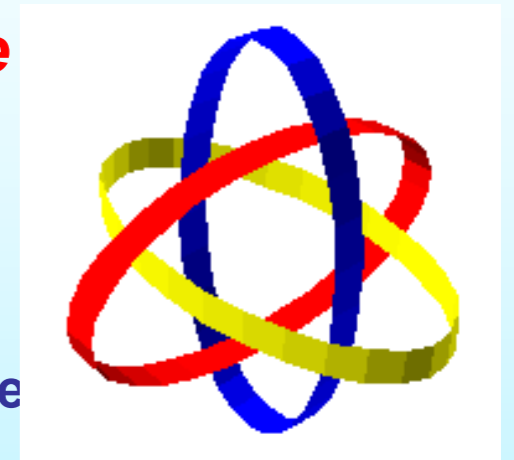


The mission of the OCI is to **greatly enhance the ability of the NSF community to create, provision, and use the comprehensive cyberinfrastructure essential to 21st century advances in science and engineering.** This goal is implicit in many areas of the new NSF Strategic Plan and is being pursued within the context of the evolving *Cyberinfrastructure Vision for 21st Century Discovery.*

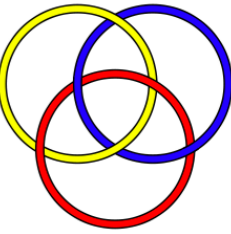
OCI will serve the Foundation and the NSF community in its mission through three types of activity:

1. **provisioning of cyberinfrastructure** resources together with mechanisms for flexible, secure, coordinated sharing of these resources among collections of individuals, organizations, and institutions;
2. **partnerships** with others in science and engineering-driven, transformative use of CI in research and education; and
3. **identification** and transfer of the results of relevant R&D into the next generation of CI.

OCI is a cross-cutting enterprise that builds mutually beneficial partnerships will all parts of the NSF, with other Federal agencies, and with the large and growing CI/e-science initiatives in other countries.



Borromean Ring:
Symbol of peer-to-peer synergy. The three rings taken together are inseparable, but remove any one ring and the other two fall apart. See www.liv.ac.uk/~smpmr02/rings/

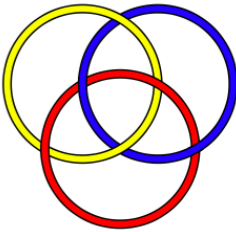


OCI is about *Connectedness* between

- ❖ **Systems**
- ❖ **People**
- ❖ **Organizations**



Dualities



cyberinfrastructure

enables

research &
development

CI is both an object and means for R&D

collaboration

enables

CI
environments

Multi-stakeholder collaboration required to create, provision, and apply CI; CI supports collaborations across time and distance (geographic, disciplinary, institutional)

learning | education

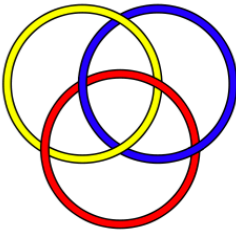
enables

CI
environments

Learning and workforce development initiatives required to create and use CI; CI enables/enhances learning/education



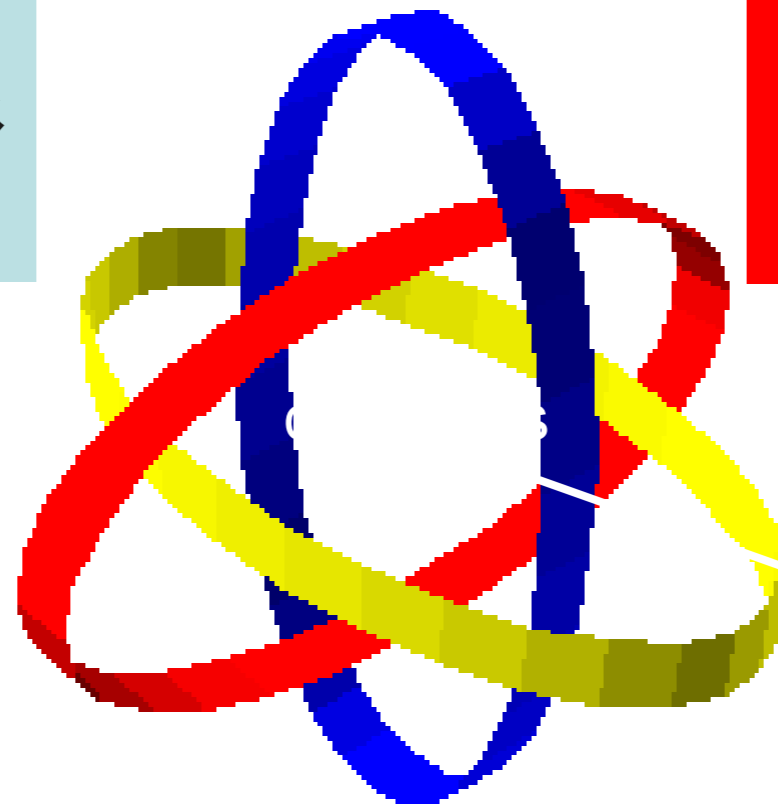
Achieving the NSF CI Vision



requires synergy between 3 types of activities

Transformative Application - to enhance discovery & learning

Provisioning - Creation, deployment and operation of advanced CI



Borromean Ring: The three rings taken together are inseparable, but remove any one ring and the other two fall apart. See www.liv.ac.uk/~spmr02/rings/

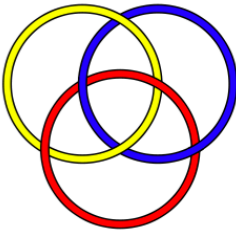
provides shared and connecting CI

Office of Cyberinfrastructure

R&D to enhance technical and *social* effectiveness of future CI environments



Strategic Technologies for Cyberinfrastructure



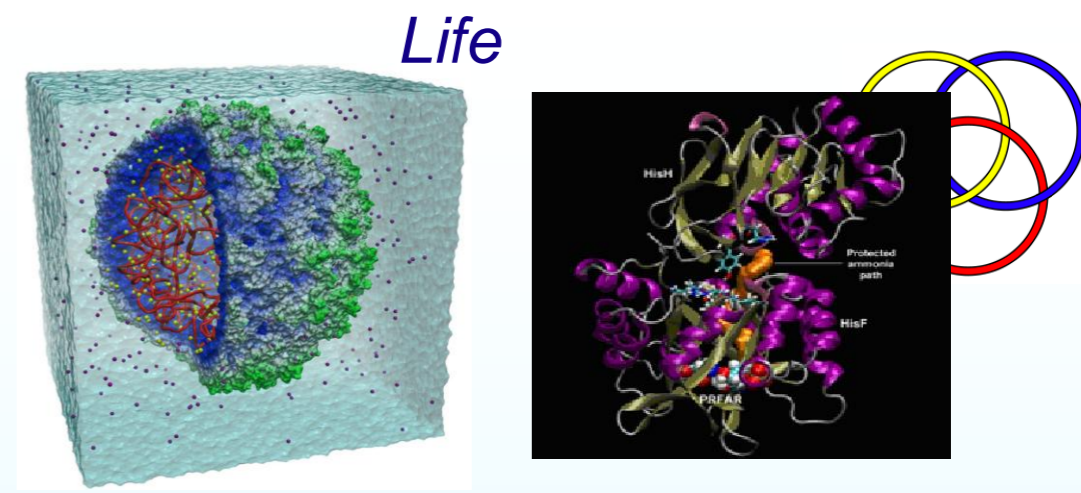
- ❖ **PD 06-7231 Standing program Strategic Technologies for CI – Core OCI program**
 - support work leading to the development and/or demonstration of *innovative* cyberinfrastructure services for science and engineering research and education that fill gaps left by more targeted funding opportunities
 - consider highly innovative cyberinfrastructure education, outreach and training proposals that lie outside the scope of targeted solicitations.

 - ❖ **Two dates each year**
 - August 2007
 - February 2008

 - ❖ **\$2M**
- “The number and caliber of proposals submitted demonstrate the need for this program.” – panelist for STCI.*

High Performance Computing

increasingly important tool for understanding

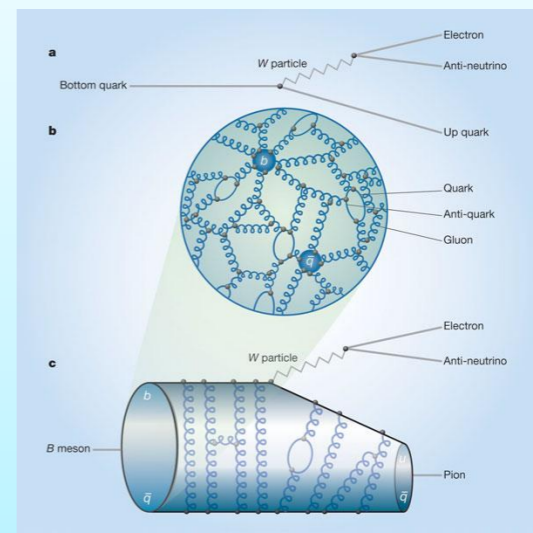
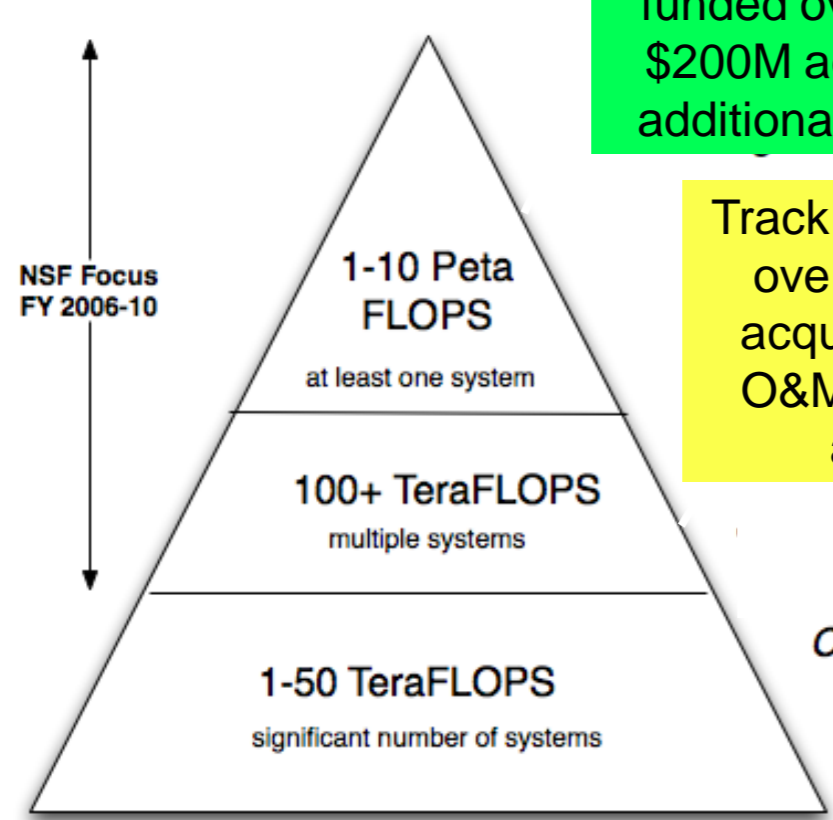


Satellite tobacco mosaic virus, P. Freddolino et al.

Aldehyde dehydrogenase, T. Wymore and S. Brown

Track 1: One solicitation funded over 4 years: \$200M acquisition + additional O&M cost.

Track 2: Four solicitations over 4 years: \$30M/yr acquisition + additional O&M cost. First track 1 approved 8-07

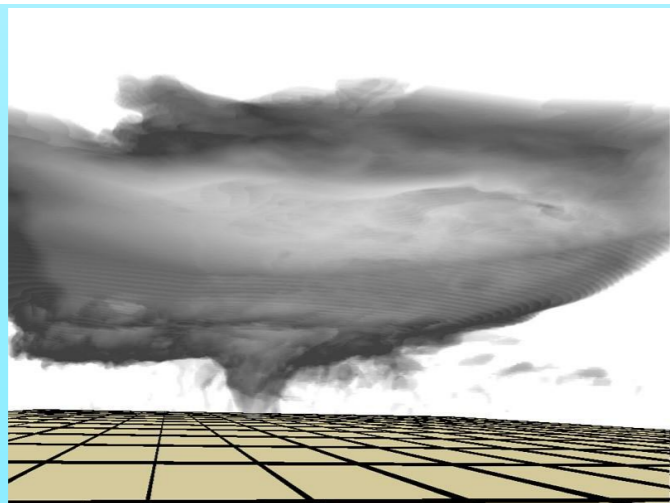


I. Shipsey

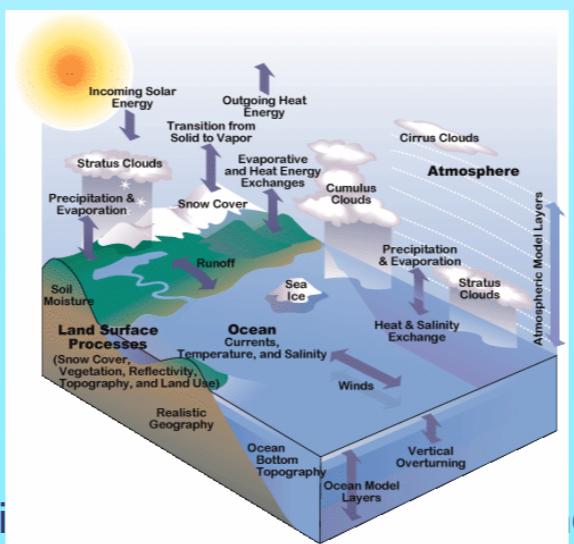
Matter

Society

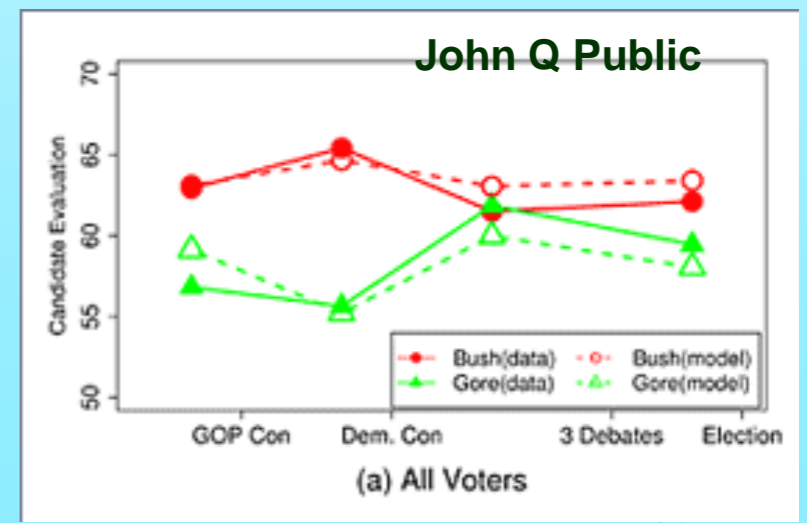
The Environment



May 2007



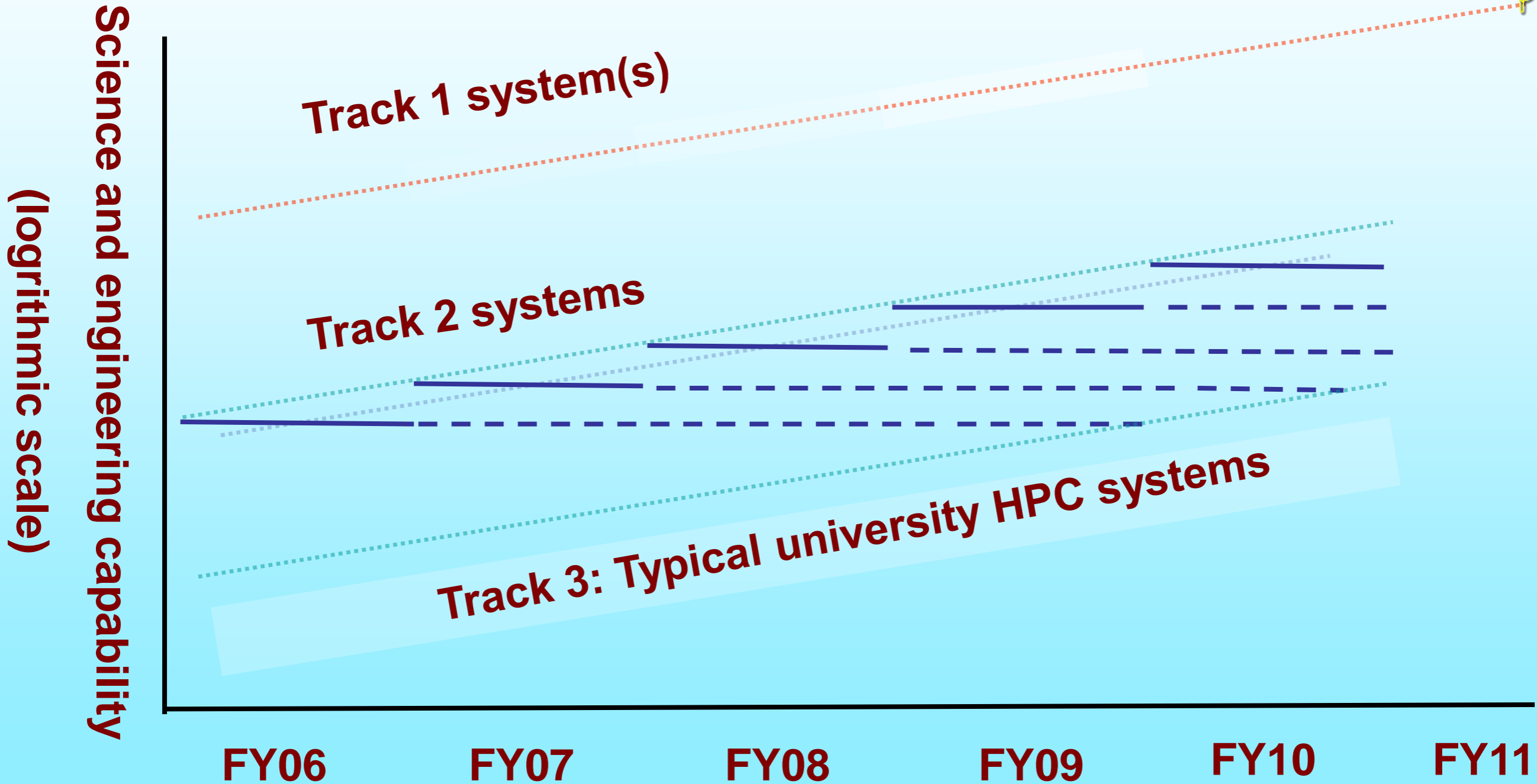
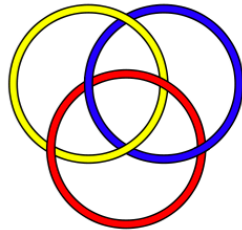
Office of Science



S.-Y. Kim, M. Lodge, C. Taber

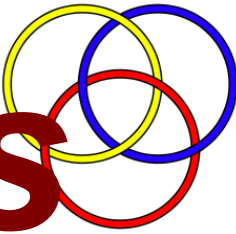


NSF HPC Acquisition Strategy





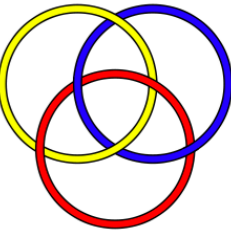
Track 2 Acquisitions



- ❖ **Individual systems - provide capabilities beyond those typically obtainable with university or state funds**
- ❖ **Collectively, as part of TeraGrid - provide a diverse HPC portfolio to meet the HPC needs of the academic research community**
- ❖ **Annual competition: roughly \$30M/year for acquisition costs**
- ❖ **O&M costs via a TeraGrid RP award**
- ❖ **Primary selection criterion: Impact on science and engineering research**



Track 2 Benchmarks



❖ **HPCC CHALLENGE**

❖ **SPIOBENCH**

❖ **WRF (weather framework)**

❖ **OOCORE (Out of core solver)**

❖ **GAMES (ab initio chemistry package)**

❖ **MILC (particle physics lattice QCD code)**

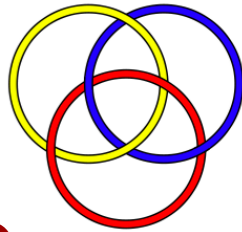
❖ **PARATEC (Parallel total energy code)**

❖ **HOMME (tools to create a high-performance scalable global atmospheric model)**

Thanks to HPCMOD and DOE Office of Science



TACC Track-2



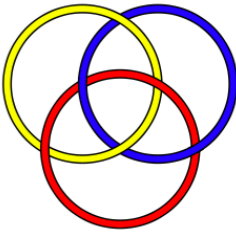
Ranger System Configuration

- ❖ **Compute power - 529 Teraflops aggregate peak**
 - 3,936 Sun four-socket, quad-core nodes
 - 15,744 AMD Opteron “Barcelona” processors
 - Quad-core, four flops/cycle (dual pipelines)
- ❖ **Memory**
 - 2 GB/core, 32 GB/node, 125 TB total
 - 132 GB/s aggregate bandwidth
- ❖ **Disk subsystem**
 - 72 Sun x4500 “Thumper” I/O servers, 24TB each
 - 1.7 Petabyte total storage
- ❖ **Infiniband interconnect**
 - Full non-blocking 7-stage Clos fabric
 - Low latency (~2 μ sec), high-bandwidth (~950 MB/s)
- ❖ **System Power: 3 MW**
 - 90 racks, 4,000 sq. ft.

Courtesy of TACC



TACC Track-2

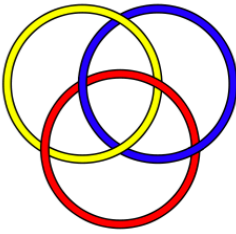


Impact in NSF TeraGrid

- ❖ **470M CPU hours to TeraGrid per year**
 - more than double current total capacity of all TG HPC systems
 - 1.8 Billion CPU hours over operational life
- ❖ **529 Teraflops peak**
 - 2x total performance of all TeraGrid HPC systems
 - 8x top TeraGrid HPC system in performance, memory, disk
- ❖ **Balanced, general-purpose capability system**
 - More than 60,000 cores available
 - Unprecedented scaling opportunities for computational science and research
- ❖ **Production for early capability users Dec 1, 2007**



Track 1 Acquisition (FY07-10)

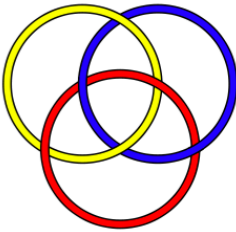


Examples of research problems:

- ❖ **The origin and nature of intermittency in turbulence**
- ❖ **The interaction of radiative, dynamic and nuclear physics in stars**
- ❖ **The dynamics of the Earth's coupled carbon, nitrogen and hydrologic cycles**
- ❖ **Heterogeneous catalysis on semiconductor and metal surfaces**
- ❖ **The properties and instabilities of burning plasmas and investigation of magnetic confinement techniques**
- ❖ **The formation of planetary nebulae**
- ❖ **The interaction of attosecond laser pulse trains with polyatomic molecules**
- ❖ **The mechanisms of reactions involving large bio-molecules and bio-molecular assemblages**
- ❖ **The structure of large viruses**
- ❖ **The interactions between clouds, weather and the Earth's climate**



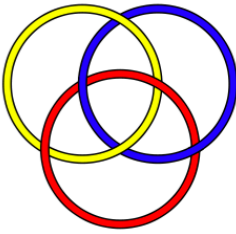
Track 1 Acquisition (FY07-10)



- ❖ A system that will permit revolutionary science and engineering research
- ❖ Capable of delivering large numbers of cycles and large amounts of memory to individual problems
- ❖ Capable of **sustaining** at least 10^{15} arithmetic ops/second on a range of interesting problems
- ❖ Have a very large amount of memory and a very capable I/O system
- ❖ An architecture that facilitates scaling of codes
- ❖ Robust system software with fault tolerance and fault prediction features
- ❖ Robust program development tools that simplify code development
- ❖ **A single physical system in a single location**



Other Federal Government HPC Activities in (near) Petascale



- ❖ **DARPA High Productivity Computing Systems**
 - Sustainable petascale systems
 - PRODUCTIVITY
 - In Phase 3: IBM, Cray

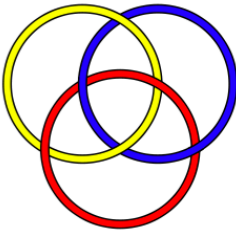
- ❖ **DOD HPC Modernization Office**

- ❖ **DOE Office of Science**
 - ORNL, NERSC, ANL

- ❖ **DOE National Nuclear Administration Agency**
 - Capacity/capability computing systems
 - LLNL, LANL, Sandia



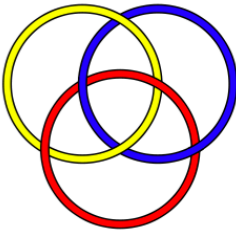
ACCELERATING DISCOVERY IN SCIENCE AND ENGINEERING THROUGH PETASCALE SIMULATIONS AND ANALYSIS



- ❖ **NSF 07-559: PetaApps**
 - Several NSF Directorates participating
- ❖ **develop the future simulation, optimization and analysis tools that can use petascale computing to advance the frontiers of scientific and engineering research**
- ❖ **beyond the current state-of-the-art.**
 - emphasis is on implementation and exploitation of forefront techniques.
- ❖ **research problem that *requires* or can exploit petascale computing capabilities**
- ❖ **\$21.5M (11 – 22 awards)**
- ❖ **July 2007**



High-End Computing University Research Activity



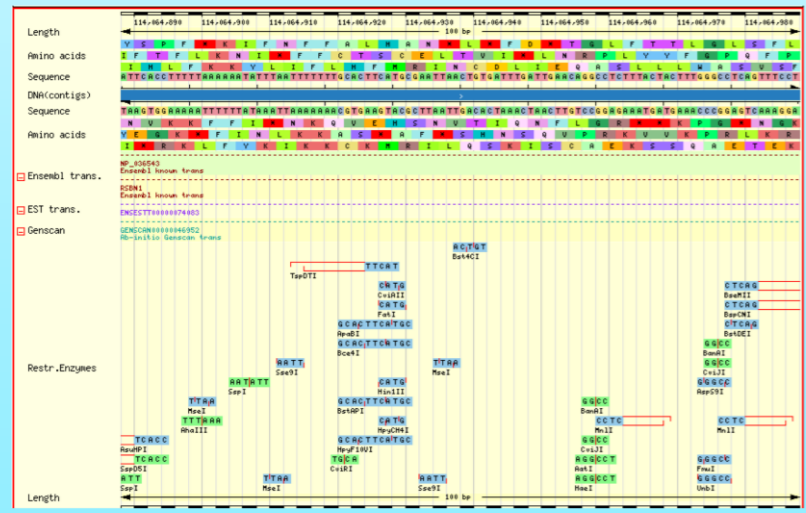
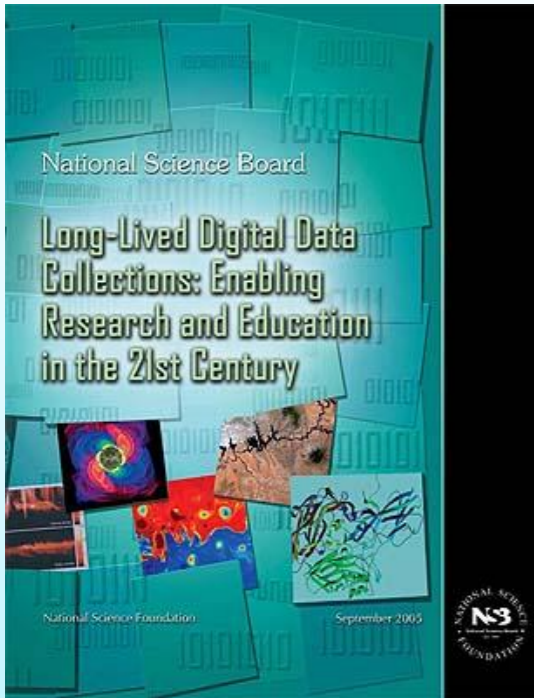
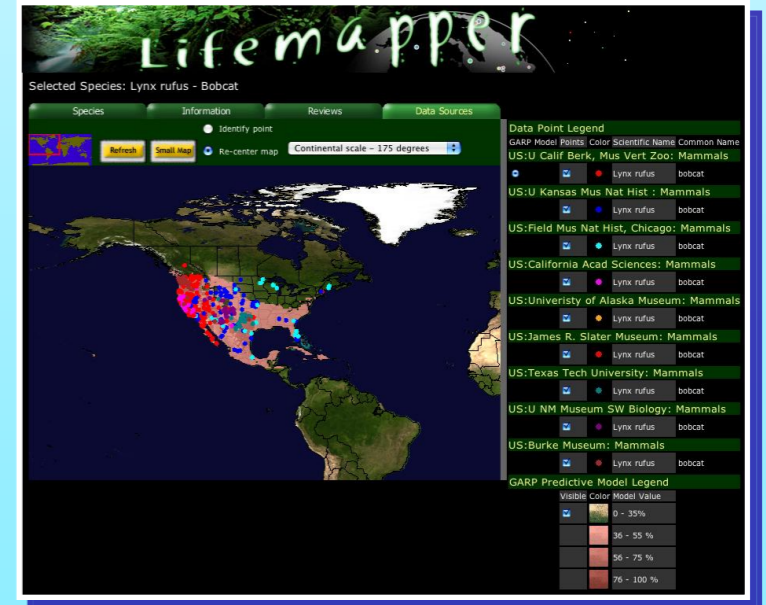
- ❖ HECURA FY 2006 Budget 14.5M
- ❖ **NSF/DARPA/DOE/EPSCoR activity**
 - Input/Output capabilities
 - File Systems
 - Storage Systems
- ❖ **62 proposals submitted in February 2006**
- ❖ **Nineteen projects were awarded.**

- ❖ FY 2008 Budget 8M (Planned)
- ❖ **NSF activity will be focused on**
 - HEC Programming Models
 - HEC Languages
 - HEC Compilers

Data, Data Analysis & Visualization

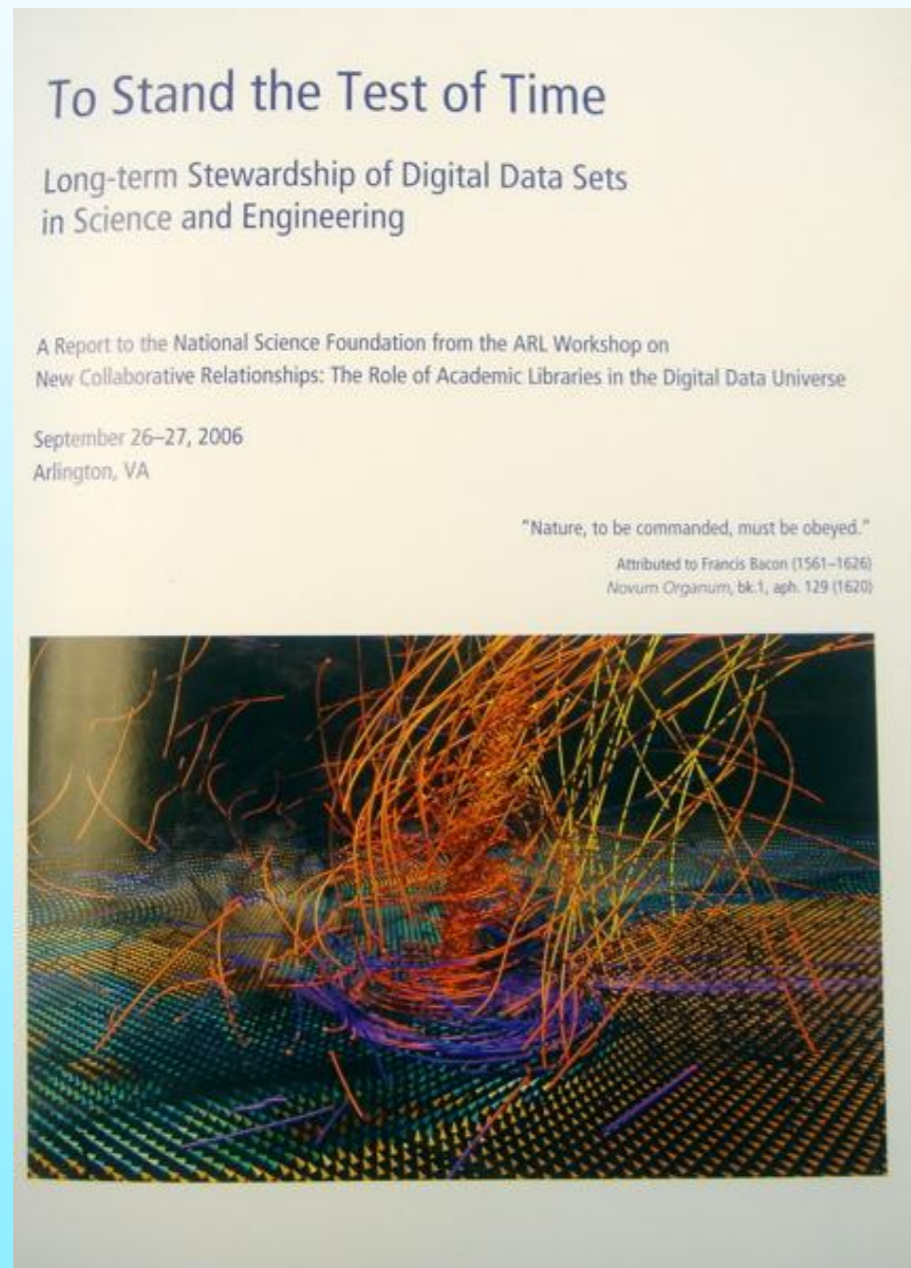
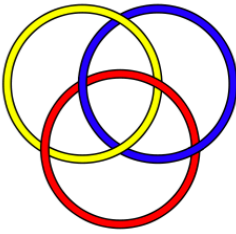


- **Challenges: increased scale, heterogeneity, and re-use value** of digital scientific information and data. Inadequate digital preservation strategy of long-lived data.
- Taking initial steps to **catalyze the development** of a federated, global system of science and engineering data collections that is open, extensible, evolvable, (and appropriately curated and long-lived.)
- Complemented by a **new generation of tools** and services to facilitate data mining, integration, analysis, visualization essential to transforming data into knowledge.
- **NSF Leadership for OSTP/Interagency Working Group on Digital Data**



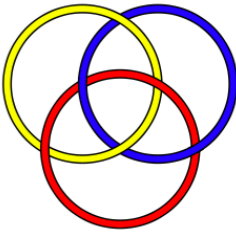
New Report: *To Stand the Test of Time*



Available online at
<http://www.arl.org/info/events/digdatarpt.pdf>

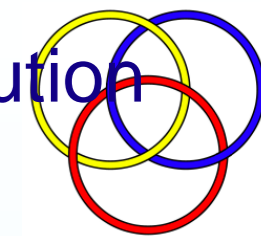


Community Based Data Interoperability Networks



- ❖ **NSF 07-565 “INTEROP”**
 - Several NSF Directorates participating
- ❖ **Support community efforts to provide for broad interoperability through the development of mechanisms such as robust data and metadata conventions, ontologies, and taxonomies**
- ❖ **Each project shall have two goals:**
 - Develop community consensus (e.g. workshops, task groups, community websites, etc.)
 - Turn consensus into technical standards with implementation tools (e.g. ontologies, taxonomies, software tools, web resources, etc.)
- ❖ **Approximately 10 \$250K/yr. awards (3-5 yrs.)**
- ❖ **August 2007**

Virtual Organizations



- To catalyze the development, implementation and evolution of a national cyberinfrastructure that integrates both physical and cyberinfrastructure assets and services.
- To promote and support the establishment of world-class VOs that are secure, efficient, reliable, accessible, usable, pervasive, persistent and interoperable, and that are able to exploit the full range of research and education tools available at any given time
- To support the development of common cyberinfrastructure resources, services, and tools that enable the effective, efficient creation and operation of end-to-end cyberinfrastructure systems for and across all science and engineering fields, nationally and internationally.



NVO



LEAD



iVDgL



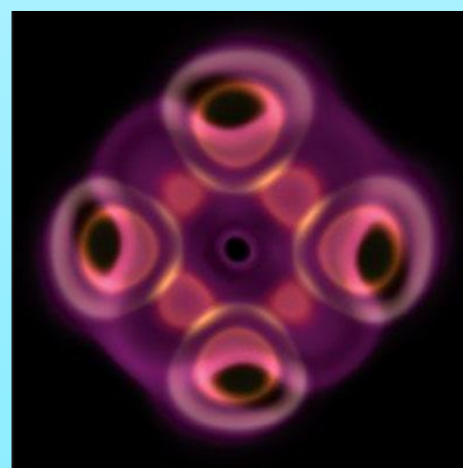
TeraGrid



Open Science Grid



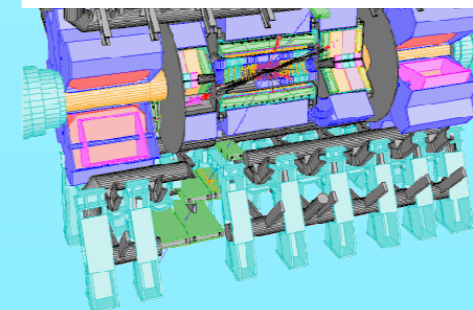
NEES



NanoHub



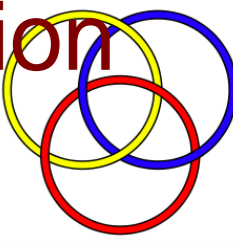
CMS



ATLAS



Virtual Organizations offer additional modes of interaction between People, Information, and Facilities



Geographic Place

Same
Different

Time

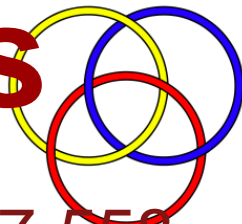
Same (synchronous) **Different** (asynchronous)

Same	ST-SP P: Physical mtgs I: Print-on-paper books, journals F: Physical labs, studios, shops	DT-SP P: Shared notebook I: Library reserves F: Time-shared physical labs, ...
	ST-DP P: AV conference I: Web search F: Online instruments	DT-DP P: Email I: Knowbots F: Autonomous observatories

P: people, **I:** information, **F:** facilities, instruments

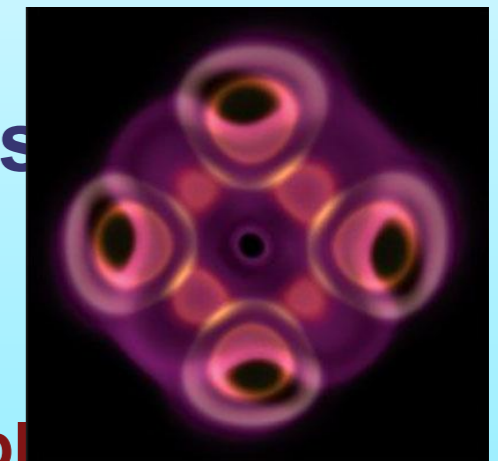


Engineering Virtual Organizations (EVO)



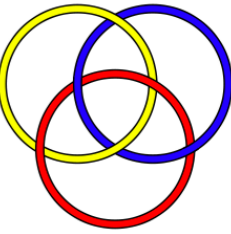
NSF 07-558

- ❖ Primary purpose of this solicitation is to promote the use of Virtual Organizations (VOs) in ENG communities
 - flexible, secure, coordinated resource sharing among dynamic collections of individuals, institutions, and resources
- ❖ Early ENG experience with gateways has been very positive
 - nanoHUB.org for nanotechnology researchers
 - NEES for earthquake engineering researchers
- ❖ EVO will provide seed grants to ENG communities
 - Defining **user needs** for **shared community resources**
 - Formulating **organizing principles** and VO structure
 - Building a prototype and developing a **plan for full-scale implementation**
- ❖ Program size: 10-15 awards, \$100-200K
- ❖ Letter of Intent: May 31, 2007; Full Proposal: July 3, 2007



NanoHub

ENG, OISE

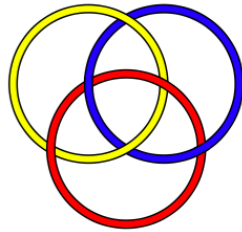


Let's look at a few real example Grid Science Gateways

These example slides courtesy of D. Gannon



NEESGrid



Real-time access to earthquake
shake table experiments at remote sites.

CHEF (dev-local): Worksite - Microsoft Internet Explorer

Address: http://neespop.ce.unr.edu:9271/chef/portal/group/NEESgridUNR/page/default.psm/js_pane/P-f16ab04bfe-10006

NEESgrid WorkTools

My Workspace | NEESgrid UNR | NEESgrid Support | NEESgrid All

Nov 14, 2002 05:43 pm

Video Cameras

Home | Schedule | Announcements | Resources | Discussion | Telepresence Server | Video Cameras | ENotebook | Data Browser/Viewer | NEESgrid Repository | Chat | Browse Testbed

TeleRobotic Video Camera 1

UNRCamera1 Thu Nov 14 17:43:19 2002

Select Camera: [1](#) [2](#) [3](#) [4](#) [5](#)

(1 item remaining) <http://134.197.37.119/axis-cgi/mjpg/video.cgi?resolution=fullsize&camera=1>

NEESgrid WorkTools

My Workspace | NEESgrid UNR | NEESgrid Support | NEESgrid All

Nov 14, 2002 05:42 pm

NEES Data Browser

NEES Repository @ UNR

Symbol key:

- The folder is open (click to close).
- The folder is closed (click to open).
- Download this file using GridFTP.
- Upload a file to this folder using GridFTP.
- Configure data streaming and recording for this event.
- Make this event viewable with the NEES data viewer.
- Follow a link between objects.

New Object | Delete Object | Move Object | Copy Object | Edit Object

[Server Root]

- UNR Demo
 - Bridge Shake Table Experiment
 - Data Acquisition
 - White Noise System Identification
 - White Noise System Identification Channel Configuration
 - sensor data
 - white noise
 - sensor data
 - white noise
 - sensor data
 - sensor data
 - 1940 Imperial Valley-EI Centro 100%
 - 1940 Imperial Valley-EI Centro 100% Channel Configuration

Folder "Data Acquisition"

name (string)
Data_Acquisition

lastAccessedTimestamp (timestamp)
2002-11-12 13:15:06.055

lastModifiedTimestamp (timestamp)
2002-11-12 13:15:06.055

originalVersionID (object)
Data Acquisition

versionNumber (integer)
0

creationTimestamp (timestamp)
2002-11-12 13:15:06.055

lockTimestamp (timestamp)
1969-12-31 18:00:00.0

Users Present
Charles Saveras
Lars Shumann

NEESgrid WorkTools

My Workspace | NEESgrid UNR | NEESgrid Support | NEESgrid All

Nov 14, 2002 05:40 pm

DataViewer

Event: "core: ex2 sine1-4"

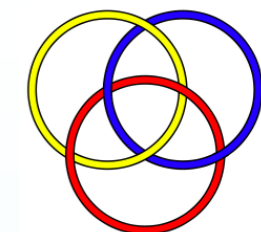
sine1	-0.062791	
sine2	-0.24869	
sine3	-0.187381	
sine4	-0.125333	

Home | Schedule | Announcements | Resources | Discussion | Telepresence Server | Video Cameras | ENotebook | Data Browser/Viewer | NEESgrid Repository





BIRN – Biomedical Information



The screenshot shows the BIRN Portal website. At the top left is the BIRN logo with the text "BIOMEDICAL INFORMATICS RESEARCH NETWORK". To the right is a login form with fields for "Username:" and "Password:" and a "login" button. Below the logo is a navigation bar with links: "Portal Home", "BIRN Website", "Account Request", "Style", and "Help".

Login Information

BIRN Portal Login

Enter your username/password

Username:

Password:

- [Request](#) a BIRN account (must be a BIRN participant)
- [Email](#) BIRN Portal admins

Portal Requirements

You must have cookies enabled to login to the BIRN Portal, in addition, Javascript is highly recommended but not required.

The latest version of Java will be required to access *some* of the applications.

For optimal browsing please use a [Mozilla](#) based browser.

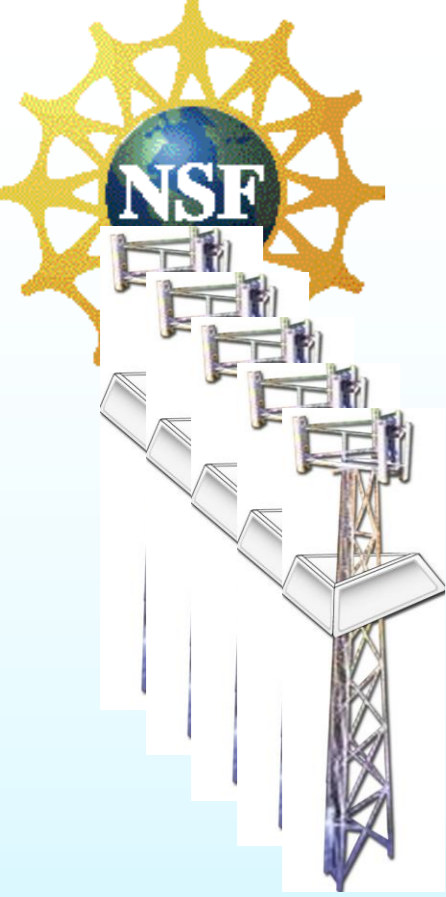
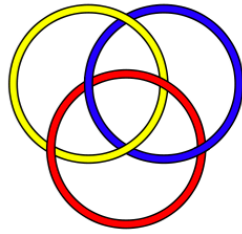
Older versions of Safari will experience

Welcome to the BIRN Portal

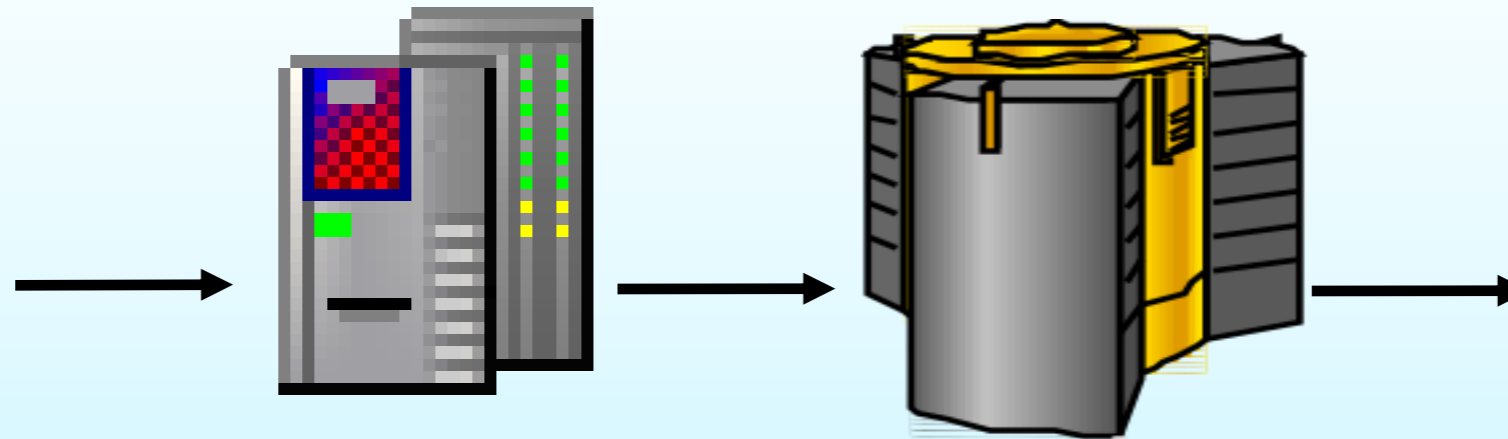
The Biomedical Informatics Research Network (BIRN) Portal provides BIRN members with a single sign on web portal to access data grid files, computation grid resources, and a variety of collaboration tools to facilitate the scientific needs of BIRN researchers. Non-BIRN participants may access the portal through a guest registration.

A banner for the BIRN Portal featuring the text "BIRN Portal" in large, stylized letters, with "Biomedical Informatics Research Network" below it. The background is a colorful, abstract image of a human head and brain with various data and network elements overlaid.

The LEAD Vision: Adaptive Cyberinfrastructure

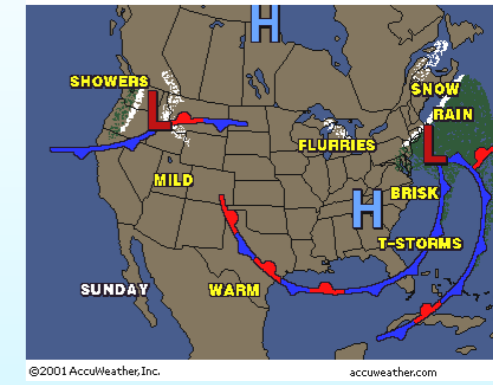


DYNAMIC OBSERVATIONS



Analysis/Assimilation

Prediction/Detection



Product Generation,
Display,
Dissemination

Quality Control
Retrieval of Unobserved
Quantities
Creation of Gridded Fields

PCs to Teraflop Systems

Models and Algorithms Driving Sensors

The CS challenge: Build cyberinfrastructure services that provide adaptability, scalability, availability, useability, and real-time response.

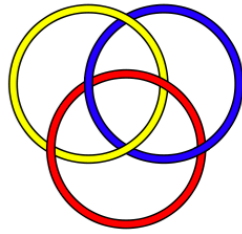


End Users

NWS
Private Companies
Students



Nanohub - nanotechnology



The screenshot shows a Microsoft Internet Explorer browser window displaying the Nanohub website. The address bar shows the URL: http://www.nanohub.org/index.php?option=com_wrapper&wrap=RasMol. The website header features the 'nanohub' logo and the tagline 'Online Simulation and More'. A search bar is located on the right side of the header. The main content area is dominated by a large window titled 'RasMol Version 2.7.1.1', which displays a 3D wireframe model of a carbon nanotube. The RasMol window has a menu bar with options: File, Display, Colours, Options, Export, and Help. On the left side of the website, there is a 'Navigation' sidebar with several categories and sub-items:

- Home
- On-Line Simulation
 - Electronics
 - MEMS
 - Materials
 - Chemistry
 - ECAD
 - Devices
 - Process
 - General Productivity
 - Tool Index
 - Help
- Resources
 - Courses
 - Short Courses
 - Seminars
- Education
 - Nano Curriculum
 - Summer Institute
 - Summer Schools
- Community
 - Linking Bio & Nano
 - Nanocomputing Debate
 - Forums
 - Repository

The status bar at the bottom of the browser window shows 'Applet vncviewer started' and 'Internet'.

Cyber-enabled Discovery and Innovation

NSF Priority Area (FY 2008 – 2012)

Cyber-enabled Discovery and Innovation (CDI) will broaden the Nation's capability for innovation by developing a new generation of computationally based discovery concepts and tools to deal with complex, data-rich, and interacting systems.

❖ Conduct of science and engineering has been revolutionized by

- the infusion of computational science and simulation in the traditional experimentation-observation-analysis-theory loop, and
- by eliminating the geographic constraints for collaboration and experimentation.

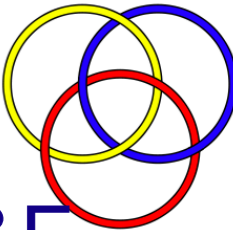
❖ Primary CDI Themes

- Knowledge Extraction
- Complex Interactions
- Computational Experimentation
- **Virtual Environments**
- Educating Researchers and Students
- Computational Discovery

❖ Be on the look-out during FY08



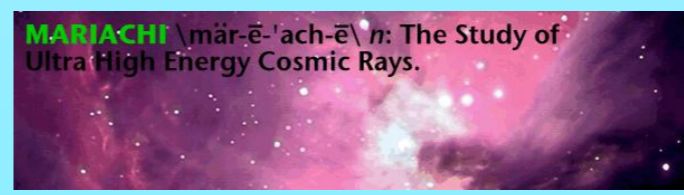
Courtesy of Deshmukh/OCI



- Learning **supported by** CI. (cyber-enabled learning).
- Workforce development **to create and use** CI for S&E research and education.
- **Broadened participation:** Exploit the new opportunities that cyberinfrastructure brings for ... people who, because of physical capabilities, location, or history, have been excluded from the frontiers of scientific and engineering research and education.
- Explore CI support for **integrated research and education.**
- Effective, Transferable, Sustainable, Scalable



EPIC



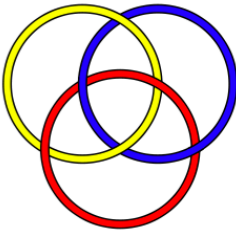
MARIACHI



CyberBridges



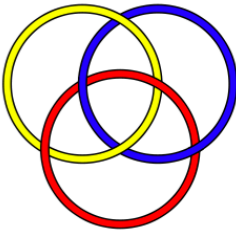
CI-TEAM



- ❖ The CI-TEAM program supports projects that position the national science and engineering community to engage in integrated research and education activities that promote, leverage, and optimize cyberinfrastructure technologies, tools, and services. CI-TEAM awards will:
 - **Prepare current and future generations** of scientists, engineers, and educators to use, support, deploy, develop and design cyber-augmented research and learning environments, both formal and informal;
 - **Establish collaborative teams** representing the expertise of at least one disciplinary domain with that of computer/information sciences and education or social sciences in order to inform CI-TEAM activities from an appropriately interdisciplinary knowledge base; and,
 - **Expand participation in cyberinfrastructure** activities of diverse groups of people and organizations, with particular emphasis on partnerships with traditionally underserved groups, communities, and institutions as both creators and users of CI.



CI-TEAM FY07-8



❖ Refined CI-TEAM Solicitation

- Reflects CI VISION statement
- Encourages INTEGRATION of research and education
- Emphasizes BROADENED PARTICIPATION of underrepresented populations, institutions, and fields
- Requires EVALUATION of project process and outcomes
- FY07/08 program funds ~ \$10M for two types of awards:
 - Demonstration Projects \leq \$250,000
 - Implementation Projects \leq \$1,000,000

❖ Grantees & Aspiring Grantees Workshop

- July 9-11, 2007 in Washington, DC
- 130-150 grantees, aspiring grantees and cyberlearning community builders F2F; ∞ by Webcast
- Where has CI-TEAM been and where should cyberlearning and discovery go?

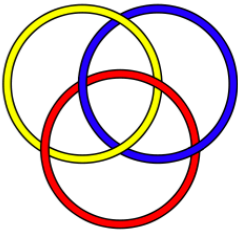
Proposals due August 27, 2007

Diana Rhoten drhoten@nsf.gov

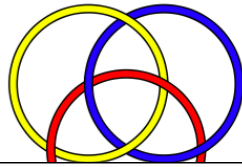
Courtesy of D. Rhoten/OCI



Software Development for CyberInfrastructure



- ❖ **NSF 07-503 (closed)**
- ❖ **Develop, deploy and sustain a set of reusable and expandable software components and systems that benefit a broad set of science and engineering applications**
 - **software activities for enhancing scientific productivity and for facilitating research and education collaborations through sharing of data, instruments, and computing and storage resources. The program requires open source software development**
- ❖ **Three focus areas: HPC, Middleware, Digital Data**
- ❖ **Pending funding will be re-issued in 2008**



HOME | FUNDING | AWARDS | DISCOVERIES | NEWS | PUBLICATIONS | STATISTICS | ABOUT | FastLane

National Science Foundation
OFFICE OF
Cyberinfrastructure

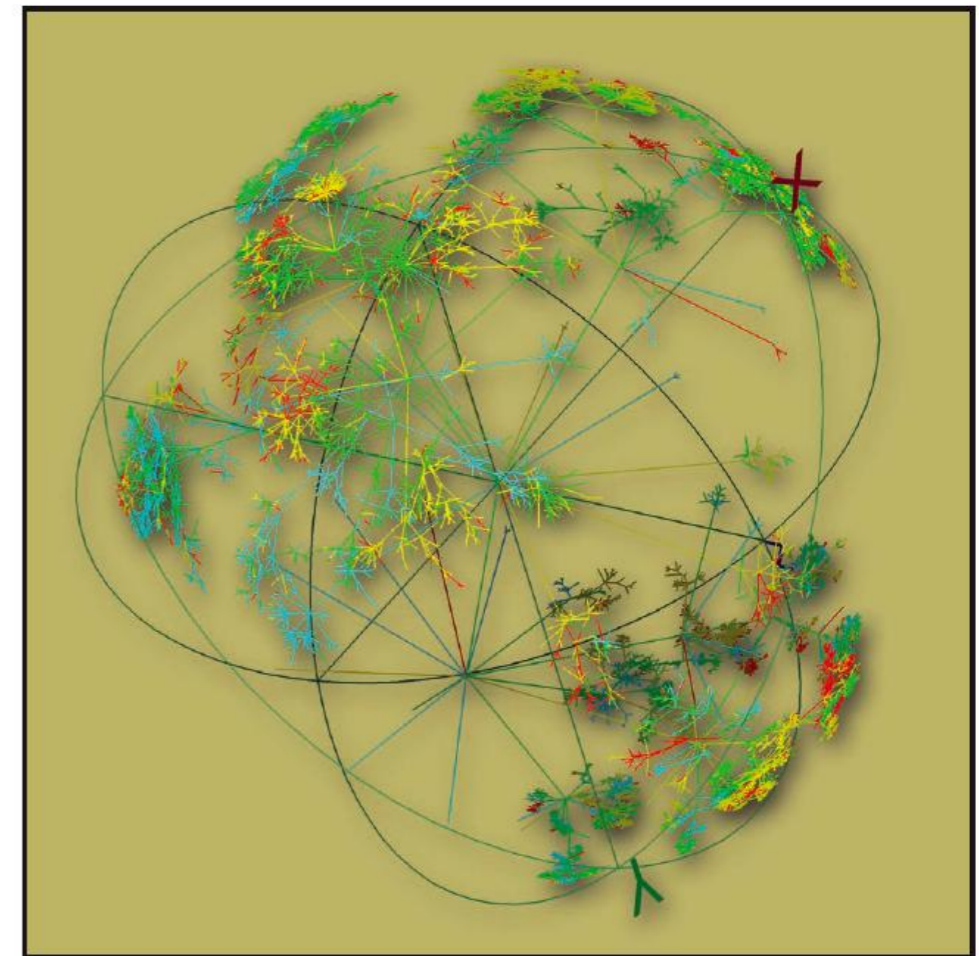
SEARCH
NSF Web Site

OCI Home | OCI Funding | OCI Awards | OCI Discoveries | OCI News | About OCI

Cyberinfrastructure - stimulating advances in 21st century science and engineering

<p>About OCI</p> <p>View OCI Staff Directory</p> <p>Search OCI Staff Directory</p> <p><input type="text"/></p> <p>General Information About OCI</p> <p>Career Opportunities</p> <p>Advisory Committee</p> <p>Budget Excerpt</p> <p>How to Prepare Your Proposal</p> <p>Grant Proposal Guide</p> <p>Frequently Asked Questions</p> <p>Other Types of Proposals</p> <p>Regional Grants Conferences</p> <p>How to Manage Your Award</p> <p>Grant Policy Manual</p> <p>Grant General Conditions</p> <p>Cooperative Agreement Conditions</p> <p>Special Conditions</p> <p>Federal Demonstration Partnership</p> <p>Policy Office Website</p>	<p>Special Announcements</p> <ul style="list-style-type: none"> <p>Career Opportunities - Dear Colleague Letter</p> <p>The Office of Cyberinfrastructure (OCI) announces a nationwide search to fill a number of Program Director positions. For more information, click on the link http://www.nsf.gov/publications/vacancy.jsp?org=OCI&nsf_org=OCI</p> <p>Petascale Acquisition Forum, Mar 24, '06</p> <p>NSF Invites Prospective Proposing Institutions and Vendors to a Discussion of Plans for a Petascale HPC Acquisition</p> <p>As Indicated in the President's FY 2007 Budget Request, NSF is planning for the acquisition of a petascale high-performance computing (HPC) system. Subject to the availability of funds, NSF expects to begin funding the resulting multi-year acquisition project in FY07. The petascale HPC system to be acquired will permit science and engineering communities to address some of their most computationally challenging research needs.</p> <p>HPC system vendors and potential resource provider organizations (organizations who, either separately or in collaboration with others, wish to propose to manage the development, deployment, and operation of a petascale system on behalf of the science and engineering research community) are invited to meet with each other and with NSF staff to discuss the time-line and strategy for this petascale system acquisition on Friday, March 24, 2006, from 9:00a.m. - 11:00a.m., at the National Science Foundation, 4201 Wilson Blvd., Arlington, VA, 22230. Those interested in attending this meeting should send email with their name and affiliation to HPC-Input@nsf.gov, no later than March, 20, 2006. Space is</p> 	<p>Quick Links</p> <p>Reports and Workshops Relating to Cyberinfrastructure and Its Impacts</p> <p>Publications See All</p> <p>Report of Blue-Ribbon Advisory Panel on Cyberinfrastructure</p> <p>Other Site Features</p> <p>Special Reports</p> <p>Research Overviews</p> <p>Multimedia Gallery</p> <p>Classroom Resources</p> <p>NSF-Wide Investments</p>
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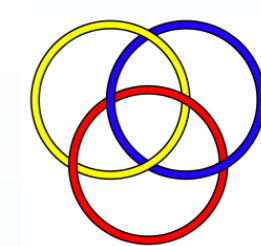
CYBERINFRASTRUCTURE VISION FOR 21ST CENTURY DISCOVERY



National Science Foundation
Cyberinfrastructure Council
March 2007

Solicitations Posted Here
Seeking more program officers.

<http://www.nsf.gov/pubs/2007/nsf0728/index.jsp>



CyberInfrastructure: The Tide that Raises All Boats



CyberInfrastructure

A collection of fish icons on a blue background. The fish are stylized and colorful. Some have labels: 'HPC' on a green fish, 'DATA' on a blue fish, 'VO' on a green fish, 'CI' on a green fish, and 'LWD' on a green fish. There are also several fish icons without labels.