Global Interdisciplinary Research

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Panel 1 Focus

- **Givens**
  - IT transcends boundaries of disciplines and geography.
  - We need global, interdisciplinary, multi-sector (academia, industry, government) research.

- **Questions**
  - What new/emerging areas of IT research call for international collaboration?
  - What are the barriers?
  - How can we mitigate/remove the barriers?
  - Retrospective on success & failure.
Nomenclature

ACLS-Mellon Study: Cyberinfrastructure for Humanities
http://www.acls.org/cyberinfrastructure/

HASTAC Project
http://www.hastac.org/

See C. M. Vest,
http://www.educause.edu/apps/er/erm06/erm0630.asp

e-research

e-science

e-infrastructure

research & learning

science

e-engineering

humanities

global meta-university

CI-enhanced | enabled

cyberinfrastructure (CI)

e = electronic | enhanced | enabled

Cyber science

Office of Cyberinfrastructure

D. E. Atkins

National Science Foundation
Where Discoveries Begin
Dualities

**cyberinfrastructure**

Cl is both an object and means for international/multidisciplinary R&D

**collaboration**

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

**learning | education**

Learning and workforce development initiatives required to create and use Cl; Cl enables/enhances learning/education
Investing Within the Framework of the NSF CI Vision

Advances in components of CI-systems for S&E R&E

Complex, multi-scale, multidisciplinary S&E research challenges

Blue Ribbon Panel reports plus 30+ disciplinary or interdisciplinary community workshops on CI

NSB and NSF internal working groups

Call for Action

Framework for Action

Cyberinfrastructure Vision for 21st Century Discovery

National Science Foundation
Cyberinfrastructure Council
March 2007

D. E. Atkins
CI Vision for 21st Century Discovery

Virtual Organizations for Distributed Communities

High Performance Computing

Data & Visualization/Interaction

Learning & Work Force Needs & Opportunities
HPC Multi Track Strategy

**Leading Edge Level**

"supports a more limited number of projects with highest performance demand"

**Track 1**

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

- 5+ Peta FLOPS
- at least one system

**Track 2**

Four solicitations over FY06-09: $30M/yr acquisition + additional O&M cost.

- 500+ TeraFLOPS
- multiple systems

**National Level**

"supports thousands"

**Campus Level**

"supports a more limited number of projects with highest performance demand"

- 1-100 TeraFLOPS
- significant number of systems
Instances of Virtual Organizations (VOs)

- **People***

Interfaces for interaction, workflow, visualization and collaboration for distributed teams in domain/project specific and potentially functionally-complete VOs.

Mechanisms for flexible secure, coordinated resource/services sharing among dynamic collections of individuals, institutions, and resources (the Grid or service layer problem)

Distributed, heterogeneous services for:

- **Computation**
- **Data, information management**
- **Sensing, observation, activation in the world**

Alternate Names for Instances of VOs:

- Co-laboratory
- Collaboratory
- Grid (community)
- Network
- Portal
- Gateway
- Hub
- Virtual Research Environment (VRE)
- Cyberinfrastructure Collaborative
- Other?

* People engaged in discovery and learning as individuals and in teams.
Virtual Organizations offer additional modes of interaction between People, Information, and Facilities

**Time**

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<td><strong>I</strong>: Web search</td>
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<td><strong>F</strong>: Online instruments</td>
<td><strong>F</strong>: Autonomous observatories</td>
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**P**: people, **I**: information, **F**: facilities, instruments

**Physical + Virtual, Not Physical vs. Virtual**
Science Gateways signal a paradigm shift from traditional high performance computing use. Gateways enable entire communities of users associated with a common scientific goal to use national resources through a common interface. Science gateways are enabled by a community allocation whose goal is to delegate account management, accounting, certificates management, and user support to the gateway developers.

NEESGrid

http://it.nees.org/

Providing software and services that enable earthquake engineers to...

- Organize and Share Data
- Participate in Remote Experiments
- Perform Hybrid Simulations

Learn More ➔
**BIRN – Biomedical Information**  
[http://www.nbirm.net/](http://www.nbirm.net/)

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### BIRN Collaborations
- **BIRN Multi-site Collaborations**
- **Information on NIH Program Announcements**
- **News and Events**
- **Comments and Suggestions**

### BIRN Research
- **BIRN Coordinating Center**
- **Morphometry BIRN**
- **Function BIRN**
- **Mouse BIRN**

### BIRN Tools
- **Browse Our Tools**
- **Use Our Tools**
- **Share Your Tools**

### BIRN Data Repository
- **View Data Currently Available**
- **Preview Data Coming Soon**
- **Data Use**
- **Share Your Data**

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*Office of Cyberinfrastructure  
National Science Foundation  
Where Discoveries Begin*
Mesoscale Meteorology

https://portal.leadproject.org/gridsphere/gridsphere

NSF LEAD project - making the tools that are needed to make accurate predictions of tornados and hurricanes.
Nanohub

www.nanohub.org/
Bringing the best brains together

Sharing the best scientific resources

Producing the best science
VO-platform: International R&E Networking
Achieving the CI Vision requires 3 types of activities and partnerships between them:

**All:** Transformative Application of CI - to significantly enhance research & learning

- Provide research challenges & experimental testbeds

**OCI:** Applied research, advanced development & deployment of shared and connecting cyberinfrastructure for supporting and bridging science & engineering, research & learning

- Cross-Foundation agent of the Office of Director

**Several:** Basic research to enhance technical and social performance of future CI environments

Requirements

New capabilities

Transition research results into use

Develop human-centered CI driven by science and engineering research and education opportunities.

Catalyze
Emerging Huge Opportunity

Virtual Worlds

International e-science, CI Movement (Research & Learning)

CI & Humanities

Open, Participatory Web Movement

Concepts, Visions, Aspirations

Multi-stakeholder Interest in Investment

Software
Education Resources
Licensing Mechanisms
Open Repositories, Libraries, Archives
Web 2.0
Scholarly Communication
Meta-University
World University
NAS ITFRU Studies
Culture of Learning
Digital Humanities
OECD & other International Studies
Government Research & Mission Agencies
Private Foundations
Business
Educational Institutions