Phase Two:
The IT Forum

IT Forum

- James Duderstadt, President Emeritus, University of Michigan (Forum chair)
- Daniel Atkins, Professor, School of Information, University of Michigan
- John Seely Brown, Chief Scientist, Xerox Corp.
- Jared Cohon, President, Carnegie Mellon University
- Stuart Feldman, Vice President, Internet Technology, IBM
- Nils Hasselmo, President, Association of American Universities
- Brian Hawkins, President, EDUCAUSE
- Shirley Ann Jackson, President, Rensselaer Polytechnic Institute
- Sidney Karin, Professor of Computer Science and Engineering, University of California, San Diego
- Kevin Kelly, Editor-at-Large, *Wired*
- Shirley Strum Kenny, President, Stony Brook University

- Susanne Lohmann, Director, Center for Governance, University of California, Los Angeles
- Anne Margulies, Executive Director, OpenCourseWare, Massachusetts Institute of Technology
- Michael McRobbie, Chief Information Officer, Indiana University
- Diana Oblinger, Vice President, EDUCAUSE
- James O'Donnell, Provost, Georgetown University
- Marshall Smith, Professor, School of Education, Stanford University, and Program Officer for Education, Hewlett Foundation
- Lee Sproull, Professor, Stern School of Management, New York University
- Doug Van Houweling, CEO, University Corporation for Advanced Internet Development
- Robert Weisbuch, President, Woodrow Wilson National Fellowship Foundation
- Wm. A. Wulf, President, National Academy of Engineering (Program chair)

2003-2004 Activities

- IT Forum - Washington (2/22/03)
- AAU Presidents Summit (4/15/03)
- AAU Provosts Workshop (9/9/03)
- IT Forum - Carnegie Mellon (9/5/03)
- NSF Leadership "Tutorial" (10/29/03)
- IT Forum- Institute for Creativity Technologies (3/11/04)
- NSF Cyberinfrastructure Program
- Executive Leadership Core Workshops MIT (8/1/04); UNC; UT-Austin; California; …
- IT Forum-Ann Arbor (11/12/04)

AAU

Association of American Universities

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An association of 62 leading research universities in the United States and Canada

Search

Founded in 1900 to advance the international standing of US research universities, the Association of American Universities (AAU) today focuses on issues that are important to research-intensive universities, such as funding for research, research policy issues, and graduate and undergraduate education.

NASULGC/AAU Homeland Security Resources

what's new

May 15, 2004

- CFR Weekly Wrap-up - pdf - May 14, 2004
- Congressional Events Schedule - May 14, 2004
- Presentation by Neal Sullivan on Defense Basic Research - pdf - May 6, 2004
- Press Release on Community Visa Recommendations - pdf - May 12, 2004
- Community Recommendations on Visa Policies - pdf - May 12, 2004
- AAU Letter Endorsing H.R. 107 on Digital Copyright Law - pdf - May 10, 2004
- AAU Summary of H.R. 4283 - pdf - May 10, 2004
- Presentation by Claude Canizares on Defense Basic Research - pdf - May 6, 2004
- "Visas 101"-Presentation by Peter Briggs - pdf - May 5, 2004
- Flowchart on Visa Application Process - pdf - May 13, 2004
- Visa Policies - Presentation by Kathie Bailey Mathae and Mary Malaspina - pdf - May 5, 2004

AAU Presidents' Summit

- First, the 2x4 (Lou Gerstner)

- Panel 1: Today's Issues

  - ("And, oh, by the way, everything is under control …)

- Discussion 2: Tomorrow's Challenges

  - ("But have you thought about …)

- Discussion 3: Where do you need help?

Looking at the In-Out Box

- How do we meet the demand for IT?

- How do we pay for it?

- What about security and privacy issues?

- (We just delegate these issues to our CIOs to handle, and they tell assure us that everything is under control …)

But what happens if …?

- Someone hands you a device the size of a football containing the entire Library of Congress …?

- Your faculty members become nomads in cyberspace with the rapid evolution of "cyberinfrastructure" as a functionally complete environment for scholarship and scholarly communities …?

- What if students use IT to take control of their learning environments?

And what about …?

- The "technological" generation gap among students and faculty?

- The disruptive force of the marketplace brought onto the campus by IT?

- The disaggregation (disintegration) and reaggregation of functions and roles?

Wait a second …?

- How can presidents possibly provide leadership with the future so uncertain?

- We need help!!!

- At last some progress: From denial to acceptance to seeking help …

Next, the AAU provosts

- What bothers you today?

- What do you see coming down the road?

- What are you going to do about it?

- How can we help?

The Near Term

- Network and bandwidth management

- How do we pay for this technology?

- How do we protect security and privacy?

- Data management and preservation issues

The Longer Term

- The digital generation

- Cyberinfrastructure

- Competition vs. cooperation

- Instability of university paradigm

- Survival of research university

  * (At least as we know it today)

  * (A subject that NO university president would allow on the table!!!)

The Longer Term

- The digital generation

- Cyberinfrastructure

- Competition vs. cooperation

- Instability of university paradigm

- Survival of research university
    - (At least as we know it today)
    - (A subject that NO university president would allow on the table!!!)

Cooperation vs Competition

- Concern: Being victimized by monopolies: PeopleSoft, Blackboard, Oracle, Microsoft

- Urgent Need: To form university alliances to develop open-source technologies to support instruction, research, and administrative needs

How does learning occur?

- Faculty believe they know … but in reality, they haven't a clue (they are of the "pre-digital" generation).

- Need sophisticated understanding of learning and cognition in technology-rich environments

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Keynote Speaker
L'Oréal Executive and Carnegie Mellon alumna and trustee Candace Sheffield Matthews will be the featured speaker at commencement, May 16.
More...

Honorary Doctorates
C.D. Mote Jr., William D. Ruckelshaus and Richard A. Tapia (l-r) will receive honorary degrees for their contributions in science, technology and public policy.
More...

DIVERSITY RESOURCE GUIDE

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Commencement 2004

IT Forum - Carnegie Mellon

- Today's students are "electrified"; they are a transformative force.

- Example: instant messaging, WiKi's, Blog's, always on-always connected

- Peer-to-peer learning

- Faculty has concluded that best approach is to turn the kids loose, letting them define their own learning environments.

Some Learning Characteristics
of the Digital Generation*

- Multiprocessing

- Multimedia literacy

- Knowledge navigators

- Discovery-based learning that merges with play

- Bricolage

- A bias toward action

*John Seely Brown, Xerox PARC

The New Students

- Active learners, building their own knowledge structures and learning through action and collaboration

- Use nonlinear learning ("hyperlearning")

- Develop peer groups of learning and build sophisticated learning environments

- Faculty will be challenged to shift from development and presentation of content to designing learning environments and mentoring (coaching) active learners
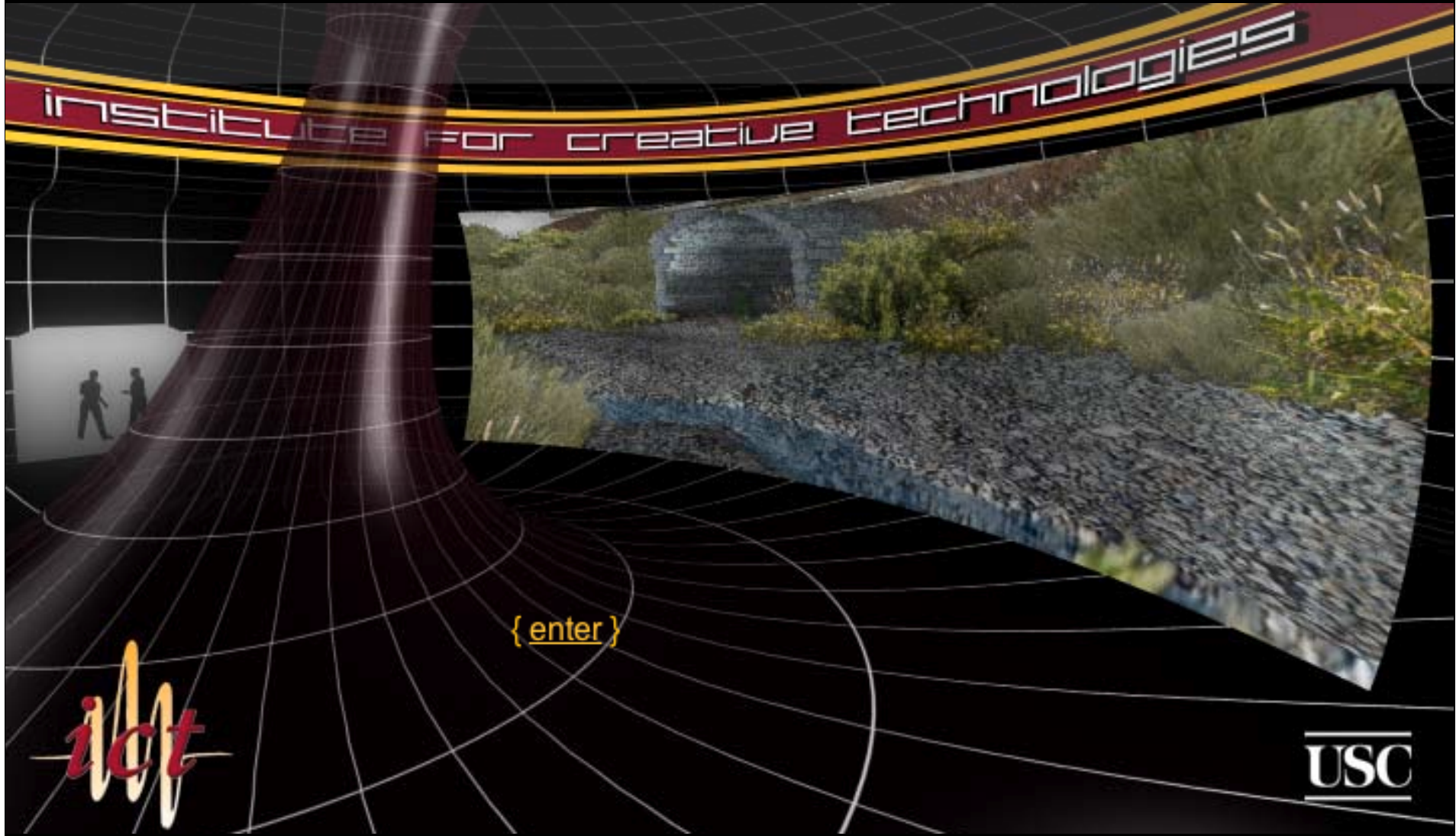
institute for creative technologies

{ enter }

ict

USC

Institute for Creative Technologies

- Goal: Use Hollywood and gaming technologies to build the Army a "holodeck"

- How can technology be used to create an emotional connection between knowledge and learning?

- Can you improve learning and decision making using virtual environments

Advanced Leadership Training Simulation

USC / Paramount Pictures

The Advanced Leadership Training Simulation project explored the role of storytelling for training teams of US Army soldiers for crisis management and leadership skills.

ALTSIM participants assumed various roles in an US Army tactical operations center, working as a team to address situations that were presented to the team through a web-based interface. ALTSIM presented these situations using media of high production value, including graphical maps, video-based news broadcast feeds, audio-based radio communications from soldiers in the field, and text-based intelligence reports, among others.

The ALTSIM project was a partnership between the Institute for Creative Technologies and Paramount Pictures. The research focus of the ALTSIM project was on the creation of highly interactive storylines for use in training applications. A central problem in the field of interactive drama is to enable a high degree of interactivity in virtual environments while preserving a degree level of narrative control necessary to achieve both pedagogical and entertainment goals. The solution explored in the ALTSIM project, called Experience Management, was to formally represent pre-authored storylines as a description of the expected user experience, and then employ storyline adaptation strategies to move the experience back on track in the face of unexpected user behavior.

The ALTSIM project ended in March of 2003, and led to the start of the ongoing "Leaders" project at ICT.

Research reports:

Gordon, Andrew S. and Iuppa, Nicholas V. (2003) Experience Management Using Storyline Adaptation Strategies. Proceedings of the First International Conference on Technologies for Digital Storytelling and Entertainment, Darmstadt, Germany, March 24-26, 2003.

FlatWorld: The Mixed Reality Simulation Space

The FlatWorld project is a mixed reality simulation environment merging cinematic stagecraft techniques with immersive media technology. FlatWorld is a joint effort between the University of Southern California's Institute for Creative Technologies (ICT) and Integrated Media Systems Center (IMSC).

Current virtual environments have severe limitations that have restricted their use. For example, users are often required to wear bulky head mounted displays that restrict a person's freedom to physically move as they would in the real world. Furthermore, a person cannot touch or feel objects in the virtual world.

This project addresses these issues by developing an approach to virtual reality simulation which allows individuals to walk and run freely among simulated rooms, buildings, and streets.

Click here for the Flatworld Photo Gallery

In film and theatrical productions, sets are constructed as modular components called "flats". Using flats, set designers produce physical, tangible structures that convey a sense of place or activity. FlatWorld utilizes a "digital flat" system. A digital flat is effectively a large screen display. A single digital flat has the ability to appear as an interior room wall or an exterior building face. When physical props are used in conjunction with digital flats, doors and windows can be simulated. Users can touch and open these portals to view an exterior virtual world. Because of their modular characteristics, several digital flats can be rapidly assembled in any open space to simulate multiple situations in a variety of geographic locations. The immersive experience is heightened through the use of immersive audio, tracked stereoscopic graphics, and "4D" sensory effects such as blowing wind and vibrating floors. This approach of using physical props within a virtual environment can create a "mixed reality" world where the physical and the virtual seamlessly coexist.
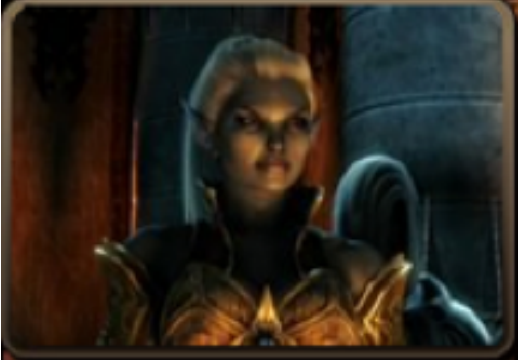
Observation

- Hollywood (and gaming industry) have figured out how to engage large numbers of people with quite primitive technologies.

- Everquest: hundreds of thousands of participants, many living their lives now in "virtual worlds" (work as well as play)

Pre-Or
Today!

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EVERQUEST
II

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WHERE ADVENTURE COMES ALIVE™

The New Literacy

- Not just from verbal to multimedia, but from "read only, listening, viewing" to composition in all media

- From analysis to synthesis: creativity!!!

- Dewey to Piaget to Papert: constructionist learning

- "I hear and I forget; I see and I remember; I do and I understand; I teach and I master!!!"

Perhaps it is time…

- To integrate the educational missions of the university with its research and service roles …

- To rip instruction out of the classroom (or at least the lecture hall) and place it instead in the discovery environment of the laboratory or studio or the experiential environment of professional practice.

National Science Foundation
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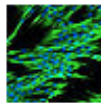
University of Colorado Tissue Engineer to Receive NSF's Coveted Waterman Award
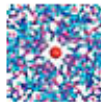
United States Still Leads in Science and Engineering, But Uncertainties Complicate Outlook
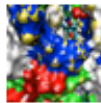
Oldest Hemoglobin Ancestors Offer Clues to Earliest Oxygen-Based Life

President Bush Honors Excellence in Science, Mathematics and Engineering Mentoring

Program Areas

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Biology

Computer, Information Sciences

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Education

Engineering

Environmental Research & Education

Geosciences

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Math, Physical Sciences

Polar Research

Social, Behavioral, Economic Sciences

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NSF Leadership Tutorial

- NSF's role in technology and learning?

- Recognize that NSF is MOST of the action in education research (80% or greater)

- BUT, NSF programs tend to be overly constrained by tradition, by practice, and by Congress.

- Not known for innovative or significant work, at least in this area.

Premise of Meeting

- Both the changing needs of our society and the disruptive nature of IT may , may extend beyond the capacity of our existing learning infrastructure of schools, universities, training programs, and cultural institutions.

- Approaching the challenge by <u>reforming</u> existing institutions may not be sufficient. After all, "a butterfly is not simply a better caterpillar"!

- Instead, NSF needs to explore entirely different "learning ecologies".

Urgency of the Moment

- Not just the disruptive impact of exponentially evolving technology on world

- But pending turnover in nation's K-12 teacher cadre (over next 5-7 years)

- Impact of 9-11 and Iraq on STEM pipeline of foreign nationals

- Human resource implications of a global, knowledge-driven economy

What to do?

- First, need to observe and understand what is actually happening (with individuals and institutions)

- Importance of assessment

- NSF needs to be far more activist, searching for tipping points

- Linkages with scientific community

- A possible DARPA-like model???

Most important …

- NSF needs to become an learning organization!!! (For that matter, so do most universities.)

- Today the human resource needs of the nation, an increasingly competitive global, knowledge-driven economy, and the challenge and promise presented by exponentially evolving digital technology presents a new and compelling challenge to NSF to provide leadership and stimulate change in our nation's learning enterprise.

NSF

Revolutionizing Science and Engineering through Cyberinfrastructure:

Report of the
National Science Foundation
Advisory Panel on
Cyberinfrastructure

February 3, 2003

(Cyber) infrastructure

- The term *infrastructure* has been used since the 1920's to refer collectively to the roads, bridges, rail lines, and similar public works that are required for an industrial economy to function.

- The recent term *cyberinfrastructure* refers to an infrastructure based upon computer, information and communication technology (increasingly) required for discovery, dissemination, and preservation of knowledge.

- Traditional infrastructure is required for an industrial economy. Cyberinfrastructure is required for an information economy.

NSF Atkins Report

"A new age has dawned in scientific and engineering research, pushed by continuing progress in computing, information, and communications technology and pulled by the expanding complexity, scope, and scale of today's challenges. The capacity of this technology has crossed thresholds that now make possible a comprehensive "cyberinfrastructure" on which to build new types of scientific and engineering knowledge environments and organizations and to pursue research in new ways and with increased efficacy."
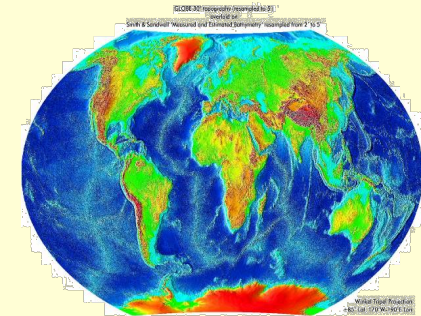
Cyberinfrastructure Enabled Science
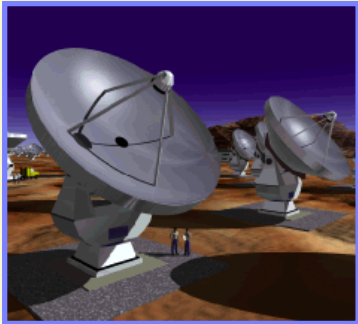
NVO and ALMA
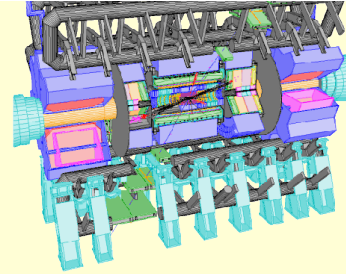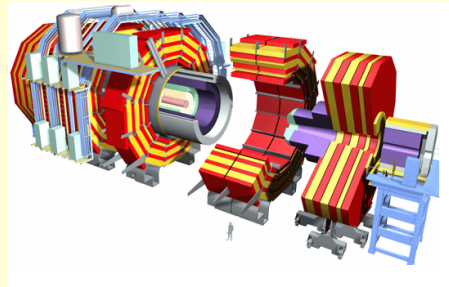
Climate Change

ATLAS and CMS
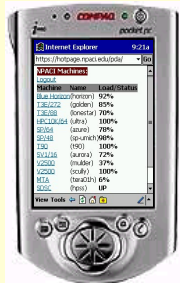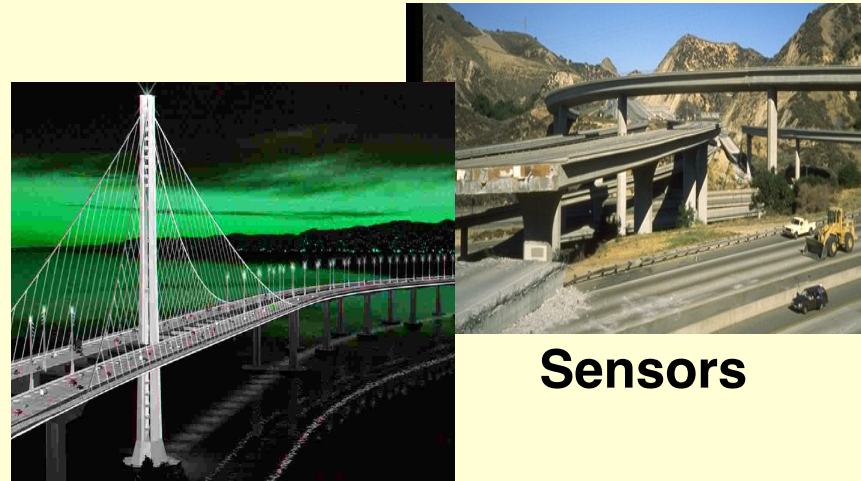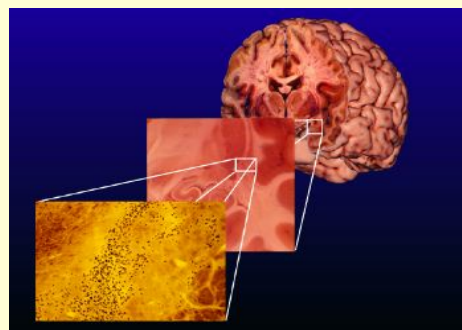
LIGO

The number of nation-scale projects is growing rapidly!

More Diversity, New Devices, New Applications

Personalized Medicine

Sensors
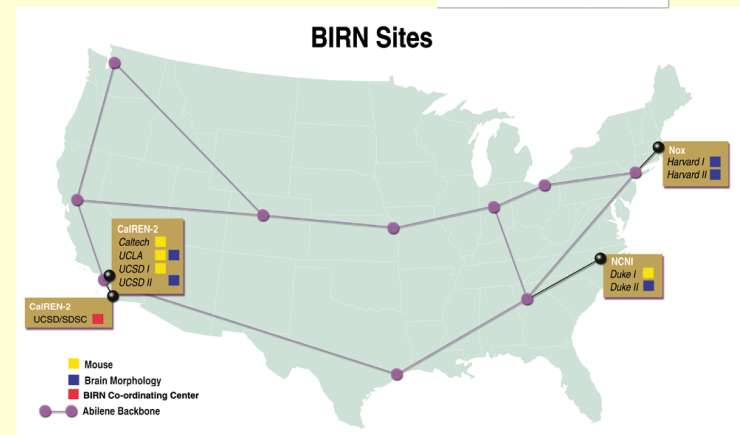
Wireless networks

Knowledge from Data
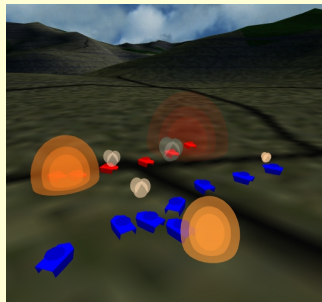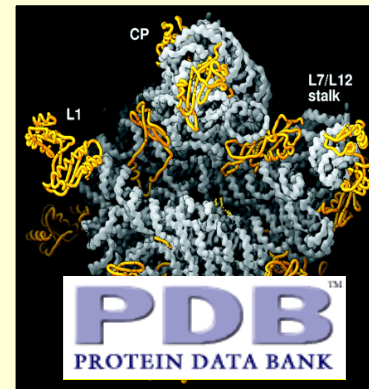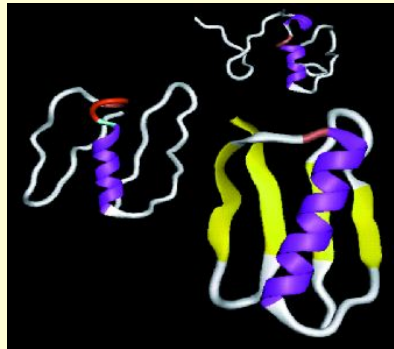
Instruments

# Cyberinfrastructure is a First-Class Tool for Science

About Internet2®

Internet2 is a consortium being led by over 200 universities working in partnership with industry and government to develop and deploy advanced network applications and technologies, accelerating the creation of tomorrow's Internet. Internet2 is recreating the partnership among academia, industry and government that fostered today´s Internet in its infancy. The primary goals of Internet2 are to:

- Create a leading edge network capability for the national research community
- Enable revolutionary Internet applications
- Ensure the rapid transfer of new network services and applications to the broader Internet community.

Through Internet2 Working Groups and initiatives, Internet2 members are collaborating on:

- Advanced Applications
- Middleware
- New Networking Capabilities
- Advanced Network Infrastructure
- Partnerships and alliances
- Initiatives

The Grid
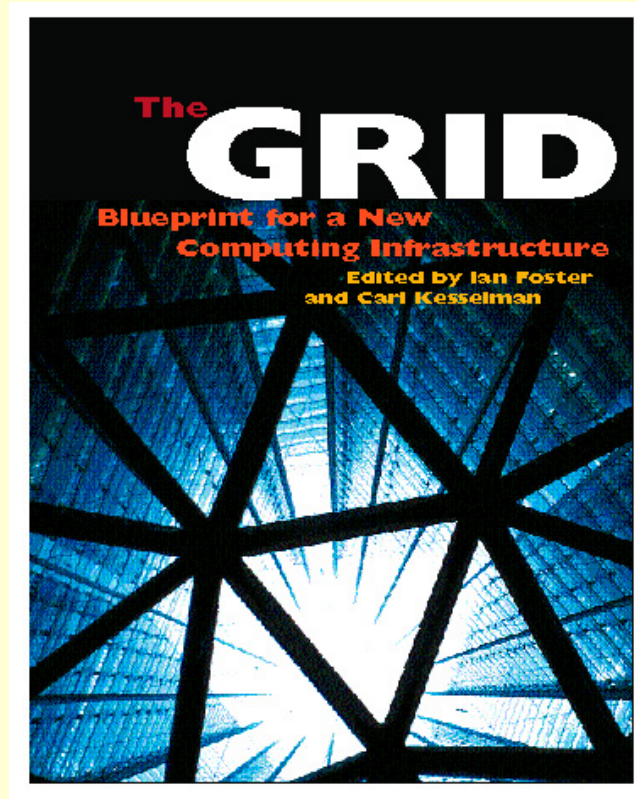
Ian Foster and Carl Kesselman, editors, "The Grid: Blueprint for a New Computing Infrastructure," Morgan Kaufmann, 1999, http://www.mkp.com/grids

Some Implications

- Globalization of scientific activity, as new collaborations enabled by cyberinfrastructure compete with traditional organizations such as the research university for the loyalty and participation of scholars.

- Newly emerging scientific communities are evolving that compete with and break apart the feudal hierarch that has traditionally controlled scientific training.

Implications (continued)

- The impact of cyberinfrastructure on the "culture" of scientific activities, e.g., publication, collaboration, competition, travel, multiple roles (leader, learner, lurker) is considerable.

- Possible new forms of the *universitas magistorium et scholarium* may appear spontaneously out of the vacuum state of cyberspace…

The role of universities

- There is a sense among many in the research university community that we will see a convergence and standardization of the cyberinfrastructure necessary for state-of-the-art research and learning over the next several years, built upon open source technologies, standards, and protocols.

- The higher education enterprise universities will play a leadership role in creating these technologies, much as it has in the past.

Executive Leadership Core Workshops

- To help university leadership identify the key challenges and opportunities presented by emerging information technologies by comparing perspectives with one another.

- To help the executive leadership team of a university get on the same page as it develops institutional strategies.

- To explore how to build stronger coalitions of universities working together to address some of these challenges.

MIT-CMU-Cornell Participants

- **Carnegie Mellon University**
- Jared Cohon, President
- Mark Kamlet, Provost
- Joel Smith, Vice Provost/Chief Information Officer
- Randal Bryant, Dean, School of Computer Science
- Jeannette M. Wing, Head, Computer Science Dept
- Pradeep Khosla, Dean, Carnegie Institute of Technology

- **Cornell University**
- Jeffrey Lehman, President
- Biddy Martin, Provost
- Polley McClure, Vice President, Information Technologies
- Robert Constable, Dean for Computing and Information Science
- Sarah Thomas, University Librarian
- Robert C. Richardson, Vice Provost for Research

- **Massachusetts Institute of Technology**
- Charles M. Vest, President
- Robert A. Brown, Provost
- John Curry, Executive Vice President
- Jerrold Grochow, Vice President for Information Services and Technology
- Jeffrey Schiller, Network Manager
- Lorna Gibson, Professor of Materials Science and Engineering
- M.S. Vijay Kumar, Assistant Provost and Director of Academic Computing
- Pat Dreher, Deputy Chair, IT-SPARCC

- **Forum members**
- Jim Duderstadt, President Emeritus, University of Michigan (Forum chair)
- Michael McRobbie, Vice President for Information Technology and CIO, Vice President for Research, Indiana University (Forum member)
- John Seely Brown, Former Chief Scientist, Xerox Corp.

Some Observations

- What excites you?

  * Emerging cyberinfrastructure

- What scares you?

  * Dramatic changes in the student culture (IM, peer-to-peer learning, etc.)

  * Faculty sometimes wishes they could require students to use of 110 bd modems and ban wireless from the classroom…

Observation

- Students are beginning to form communities capable of learning on their own.

- These communities involve teams and challenge the one faculty member-one course paradigm.

- Yet some (e.g., John Seely Brown) believe that this multi-tasking, community building, rapid context switching approach to learning may be the best preparation for leadership roles in the very complex, fast-moving social situations of 21st C society.

Observation

- CIOs are reaching a consensus on what the IT infrastructure for the university will be for the next 5 years or so.

- Based on open-source standards (I2, SAKAI, Grid, Cyberinfrastucture)

- Will challenge monopolies (Microsoft, PeopleSoft, Blackboard, …) or at least encourage them to adapt to open-source strategies…

Technology Management

- What do universities need to control?

  * Bandwidth?

  * Connectivity?

  * Security?

- How do we cope with "unbridled expectations"?

- Increasingly outsourcing "commodity" products and services to free up resources for creating the future.

- Different strokes for different folks: research, instruction, administrative, … have-nots…

Observation

● Good news: This stuff really works!

● Bad news: Our most hypothetical speculations will become real VERY soon.

● Example: Next generation Playstation and X-Box gaming consoles will have more processing power than most faculty have ever seen in their lifetimes.

Two Approaches

- The Optimists: Just let it happen. We'll be OK,since we are the leaders

- The Pessimists: We need to "guide" the revolution, getting the faculty engaged in the changing nature of scholarship and learning as an intellectual challenge.

- But just who is driving this revolution? Faculty? Students? The technology itself?

- Question: Is the faculty going to lead, follow, or just get out of the way? Or perhaps learn from their students?

The Challenge of Complacency

- Hakuna Matata…We've led in the past, and we will lead in the future, regardless of how disruptive digital technology becomes …(after all, we don't need to run faster than the tiger…just faster than our competition…)

- NOTE: This is a characteristic of most AAU-class research universities.

- Continuing concern: People are still not thinking deeply about the strategic issues posed by this technology.

Some Conclusions

Role of IT Forum

Perhaps we need to shift our studies from:

"How to save the research university?"

to

"How will scholarship and learning occur in the digital age…and where will they be conducted?"

An Interesting Comparison

In a single generation following the Civil War, higher education in America changed radically:

- From the colonial colleges to the Humboltian research university
- Land-grant acts creating the great public universities with service missions
- Growing from hundreds to thousands of students
- Empowerment of the faculty

Everything that could change, in fact, DID CHANGE!

An Emerging Consensus

The consensus in several of our workshops has been that we are well along in a similar period of dramatic change in higher education.

In fact, some of our colleagues were even willing to put on the table the most disturbing question of all: "Will the university, at least as we know it today–even exist–a generation from now?"

Disturbing, to be sure. But worthy of consideration.

For the Near Term

For the near term, meaning a decade or less, it is likely that most colleges and universities will retain their current form, albeit with some evolution and pedagogical and scholarly activities and in organization and financing.

While change will occur, and while it is likely to be both profound and unpredictable, it will be at least be comprehensible.

For the Longer Term

All bets are off…

If the past dictated by Moore's Law continues to characterize the evolution of information technology, over the next several decades we would see the power of this technology (and related technologies such as biotechnology and nanotechnology) increase by factors of one-thousand, one-million, one-billion, and so on, likely reshaping our society and most social institutions into unrecognizable forms.

Another Perspective …

The impact of information technology will be even more radical than the harnessing of steam and electricity in the 19th century. Rather it will be more akin to the discovery of fire by early ancestors, since it will prepare the way for a revolutionary leap into a new age that will profoundly transform human culture.

–Jacques Attali, *Millennium*