The International Conference for
SCIENCE & BUSINESS INFORMATION ICIC

AT THE INTERSECTION OF SCIENCE AND TECHNOLOGY

Nimes, 22-25 October 2006

PROUS SCIENCE

The International Conference for SCIENCE & BUSINESS INFORMATION ICIC

Nimes, France 22-25 October 2006

Implications of Advanced Internet Networks In Biomedical Research and Clinical Practice: At The Intersection of Science and Technology

Jorge Manrique
Vice President, Sales & Marketing
Prous Science

PROUS SCIENCE

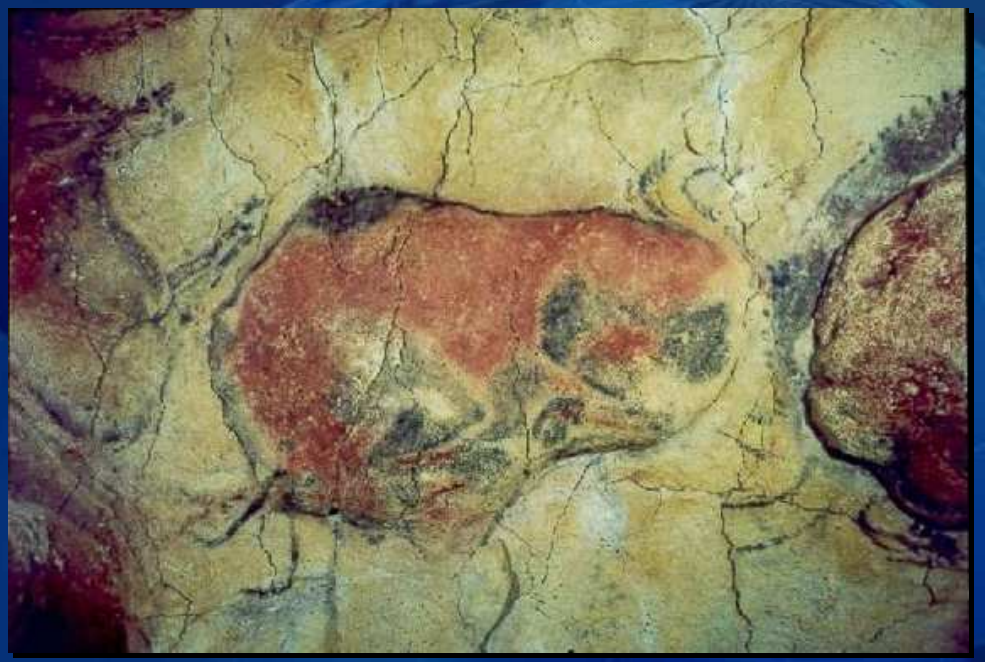
Why Do We Need Fast Networks…?

It is all about COMMUNICATION

Communication is in man's nature

From the dawn of Civilization

Man has strived to deliver information



Altamira Caves, Santander, Spain
14,000 to 12,000 BC

Communication is in man's nature

From the dawn of Civilization

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- Accurately

Communication is in man's nature

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- Accurately
- Quickly

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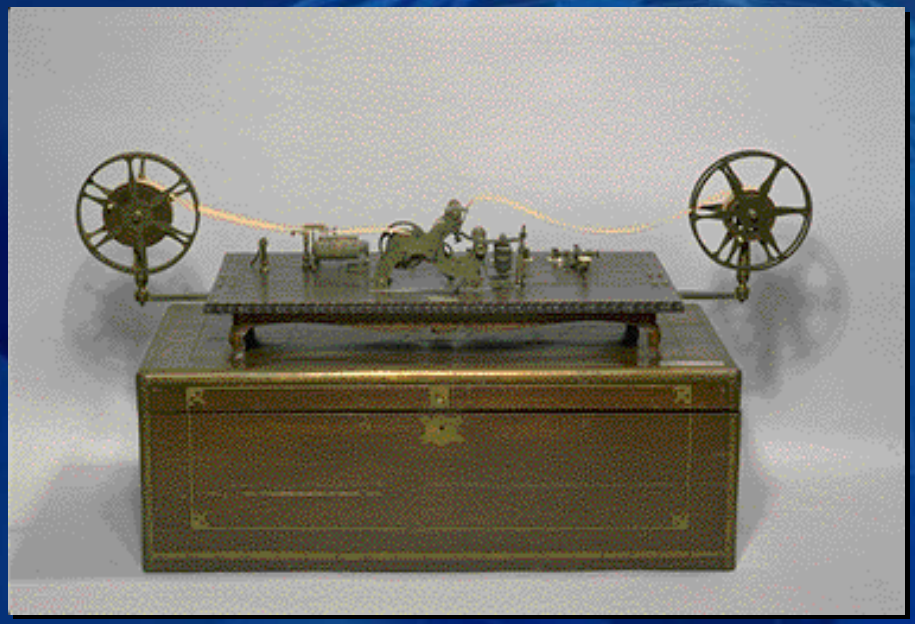
- Accurately
- Quickly
- Over longer distances…



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INTERNET 2 A Brief History of the Internet

- ARPAnet origins
- 1987 – NSFnet
- 1996
  - Telecomm Act
  - The WWW explodes…!
  - Federal Next Generation Internet Initiative
    - NSF provides grant funding to universities for network infrastructure
  - Internet2 founded
- 1999
  - Abilene network in production

INTERNET 2

A Brief History of the Internet

"The ARPA theme is that the promise offered by the computer as a communication medium between people, dwarfs into relative insignificance the historical beginnings of the computer as an arithmetic engine."

(ARPA draft, III-24)

INTERNET 2 A Brief History of the Internet

- ARPANET: designed in the 1960s for the US Department of Defense (DoD)
  - Needed new, bombproof, distributed network technology [packet-switching..??]
  - J.C.R. Licklider from MIT proposes a global network of computers; moves to DARPA to create it
  - Name from the provider of the funds, the Defense Advanced Research Projects Agency (ARPA)
  - In the Fall of 1969 the first ARPANET computer was connected to the ARPANET's IMP node at UCLA
  - Doug Engelbart's hypertext-project computer at Stanford Research Institute (SRI) was next
  - By yearend, network included UCSB and the University of Utah, i.e. four in all
  - All computers used different OS's and they were able to talk to each other across the network with equal status
- 1970s: ARPANET grew to connect research institutes and labs supported by DoD
  - Development of TCP/IP network and its applications for the Internet
- 1980: IP in US DoD
  - ARPANET adopted IP on Jan-01 1983, when it became a major part of the Internet
- 1980: DoD computers separated from ARPANET to form the MILNET network
- 1986: NSFNET constructs own backbone network to run in parallel to ARPANET
- Finally in 1990, with everyone using the newer, faster Internet backbone network, the original ARPANET with its network address 10.0.0.0 was shut down

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INTERNET 2

A Brief History of the Internet

When Senator Ted Kennedy heard in 1968 that the pioneering Massachusetts company BBN had won the ARPA contract for an "interface message processor (IMP)," he sent a congratulatory telegram to BBN for their ecumenical spirit in winning the "interfaith message processor" contract.

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INTERNET 2

A Brief History of the Internet

- 1985 – RFP for NSFnet released
- 1986 first 56 Kbps lines available
- T-1 lines available 01-Jul ’88
- 1992 (02-Dec ’92) T-3 implemented
- In 6 years: from 56 Kbps to T-3 [45Mbps]
- Ed Krol authors Hitchhikers' Guide to the Internet
- 1995 – NSFnet backbone decommissioned in April

INTERNET 2

A Brief History of the Internet

Team held quarterly meetings to work through the inevitable problems and issues and coordinate the evolution of the system.

Krol recalls that during one of these meetings, Dave Farber mentioned that he had dinner with Len Bozak from Stanford University the previous night. Bozak had mentioned that he had plans to build a machine that would handle a wide range of network protocol needs, including TCP/IP, and might by useful on the NSFNET.

Bozak's company was called Cisco…

INTERNET 2 A Brief History of the Internet

Ethernet, a protocol for local networks, appeared in 1974, an outgrowth of Harvard student Bob Metcalfe's PhD's dissertation on "Packet Networks"

The dissertation was initially rejected by the University for not being analytical enough. It later won acceptance when he added some more equations to it

INTERNET2 A Brief History of the Internet

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INTERNET 2 Mission and Goals

Internet2 Mission

- Develop and deploy advanced network applications and technologies, accelerating the creation of tomorrow's Internet.

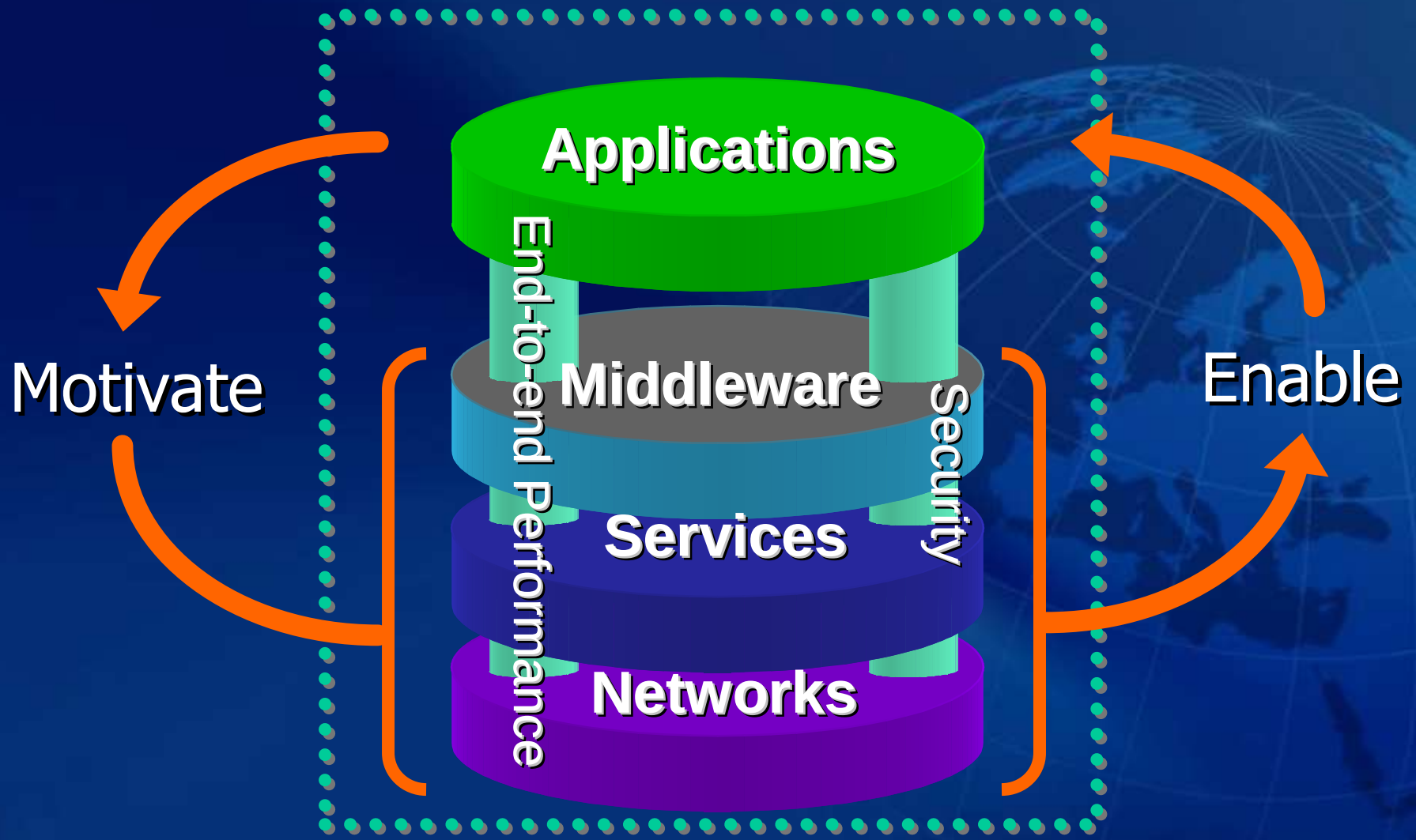
Internet2 Goals

- Enable new generation of applications
- Re-create leading edge R&E network capability
- Transfer technology and experience to the global production Internet

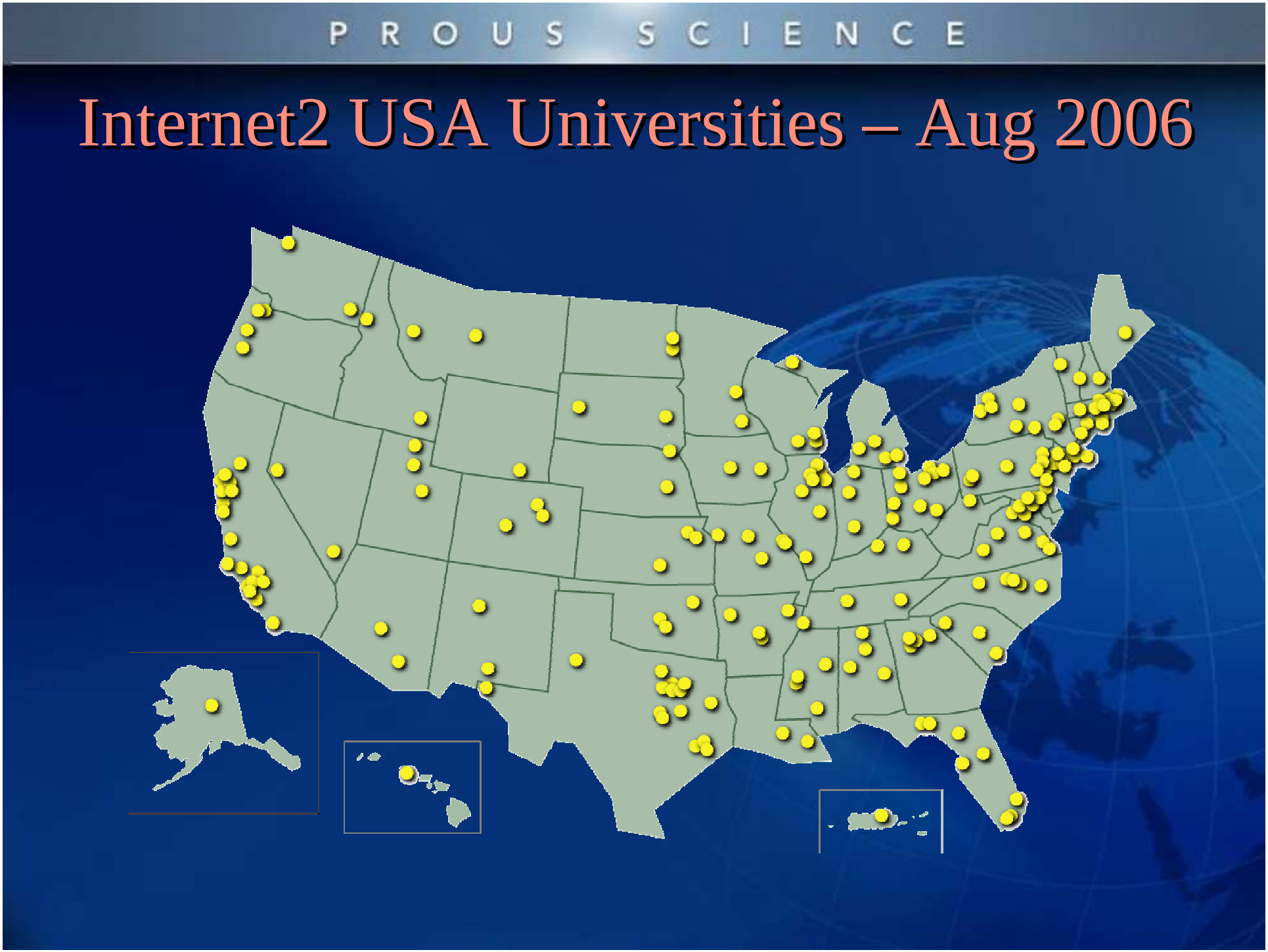
INTERNET 2 Network Infrastructure

- Backbone operates at 10 Gbps
- GigaPoPs provide regional high-performance aggregation points
- Local campus networks provide 100 Mbps to the desktop

Internet2: An Update



Internet2 USA Universities – Aug 2006



Internet2 US Network Environment

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Advanced Networking Organizations Around the World

Internet2 International Partners

Europe-Middle East

ARNES (Slovenia)
BELNET (Belgium)
CARNET (Croatia)
CESnet (Czech Republic)
DANTE (Europe)
DFN-Verein (Germany)
FCCN (Portugal)
GARR (Italy)
GIP-RENATER (France)
GRNET (Greece)
HEAnet (Ireland)
HUNGARNET (Hungary)
Israel-IUCC (Israel)
NORDUnet (Nordic Countries)
POL-34 (Poland)
Qatar Foundation (Qatar)
RedIRIS (Spain)
RESTENA (Luxemburg)
RIPN (Russia)
SANET (Slovakia)
Stichting SURF (Netherlands)
SWITCH (Switzerland)
JISC, UKERNA (United Kingdom)

Asia-Pacific

AAIREP (Australia)
APAN (Asia-Pacific)
ANF (Korea)
CERNET, CSTNET, NSFCNET (China)
JAIRC (Japan)
JUCC (Hong Kong)
SingAREN (Singapore)
NECTEC / UNINET(Thailand)
TANet2 (Taiwan)
NGI-NZ (New Zealand)

Africa

MCIT [EUN/ENSTINET] (Egypt)
TENET (South Africa)

Americas

CANARIE (Canada)
CLARA (Latin America & Caribbean)
CEDIA (Ecuador)
CNTI (Venezuela)
CR2Net (Costa Rica)
CUDI (Mexico)
REUNA (Chile)
RETINA (Argentina)
RNP [FAPESP] (Brazil)
SENACYT (Panama)

Internet2 Corporate Members

- ADVA Optical Networking
- Apparent Networks
- C-SPAN
- Caterpillar, Inc.
- Comcast Cable
- CommuniGate Systems
- EBSCO Information Services
- Eli Lilly and Company
- Fujitsu Laboratories of America
- GigaBeam Corporation
- HaiVision Systems, Inc.
- Hong Kong Cyberport Mgmt. Co. Ltd.
- Johnson & Johnson - Raritan
- KDDI Corporation
- LifeSize Communications
- Lucent Technologies
- Marratech AB
- McAfee, Inc.
- Meriton Networks
- Motion Picture Assoc'n of America
- Napster, LLC
- Nippon Telegraph and Telephone (NTT)
- Northrop Grumman Information Technology
- OCLC Online Computer Library Center
- PaeTec Communications, Inc.
- Prous Science
- Recording Ind Association of America, Inc.
- Red Hat
- Ruckus Network, Inc.
- Schlumberger
- SFI Financial Group
- Star Valley Solutions, Inc.
- Steelcase, Inc.
- The Thomson Corporation
- V3 Enterprises, Inc.
- Verisign Inc.
- Verizon Communications
- VoEx, Inc.
- VSNL International
- Warner Bros.

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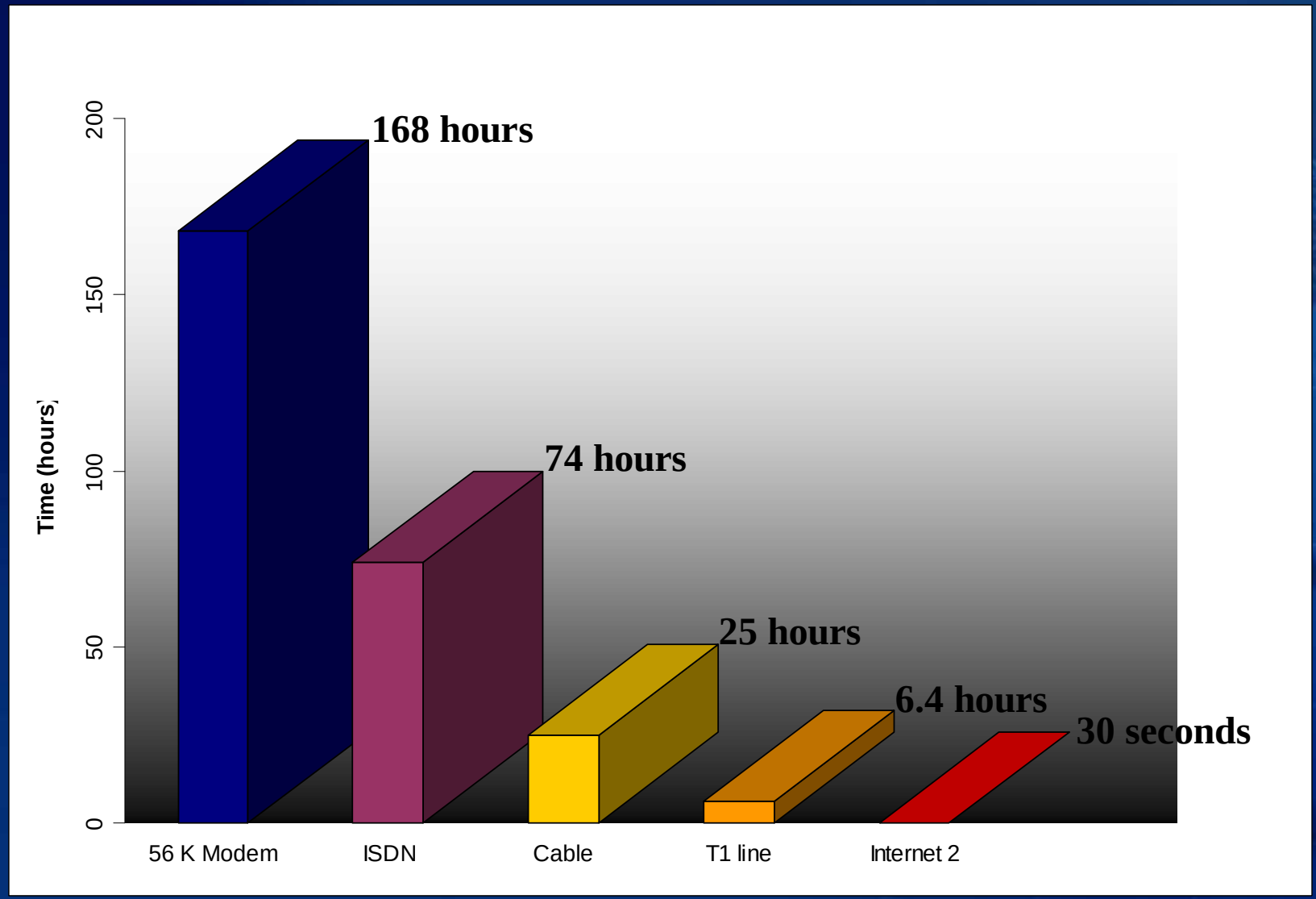
INTERNET 2 Focus Areas

- Advanced Network Infrastructure
- Middleware
- Engineering
- Advanced Applications
- Partnerships

Internet2 Land Speed Record

Internet2 Land Speed Record [4.7 GB]

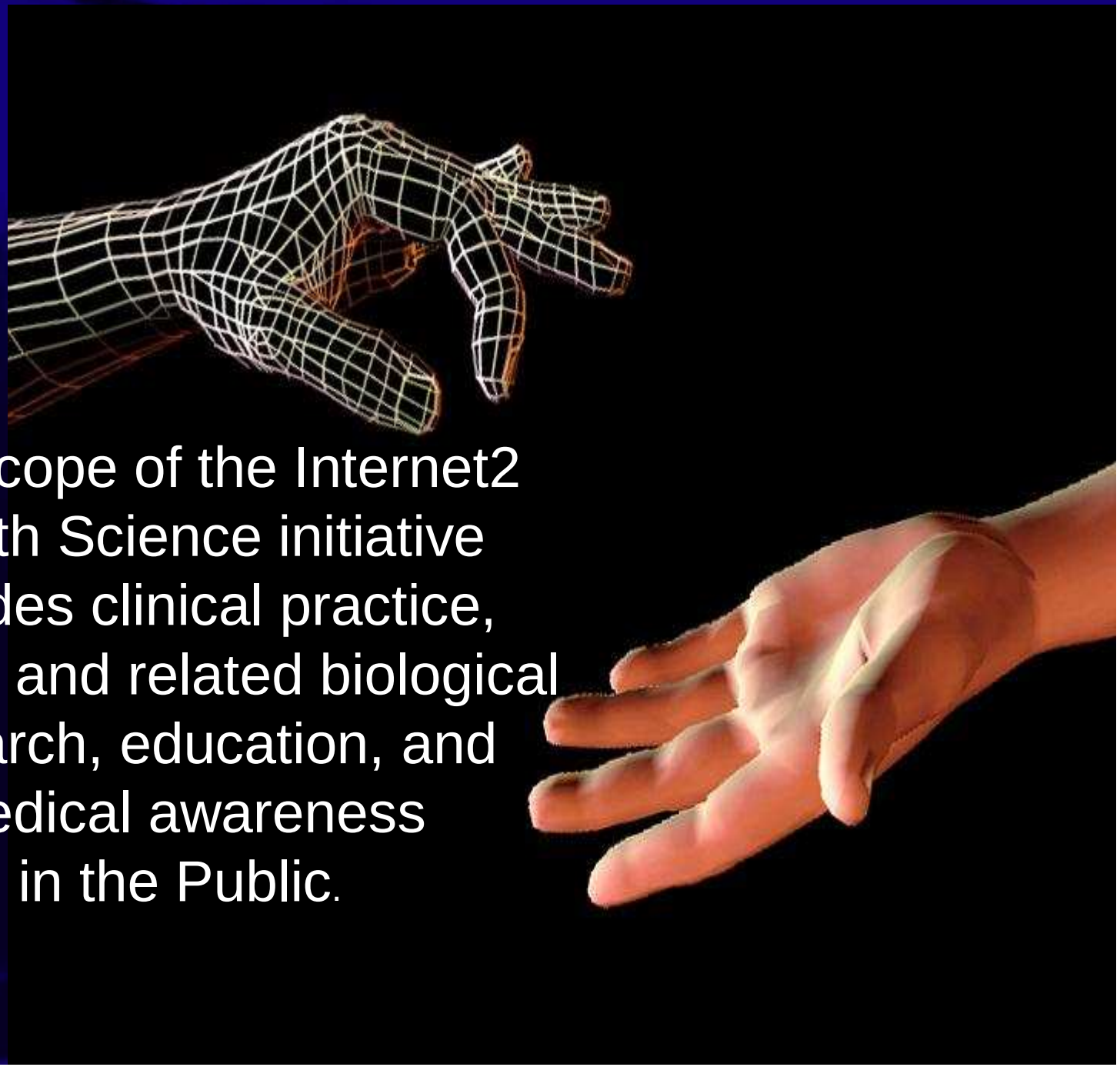


Advanced Internet2 Applications

- Digital libraries
- Digital video
- Distributed computation
- Distributed learning
- Tele-immersion
- Virtual laboratories
- A combination of all of the above…

http://apps.internet2.edu

INTERNET2®



The Scope of the Internet2 Health Science initiative includes clinical practice, medical and related biological research, education, and medical awareness in the Public.

The Challenges Ahead

- The amount of information is doubling about every three years
- Instantaneous global collaboration in clinical medicine will drive the need for high bandwidth applications
- Medical science will not progress without the aid of advanced Internet networks
- Global collaboration in drug Discovery and R&D will depend on the availability of secure, reliable, fast networks

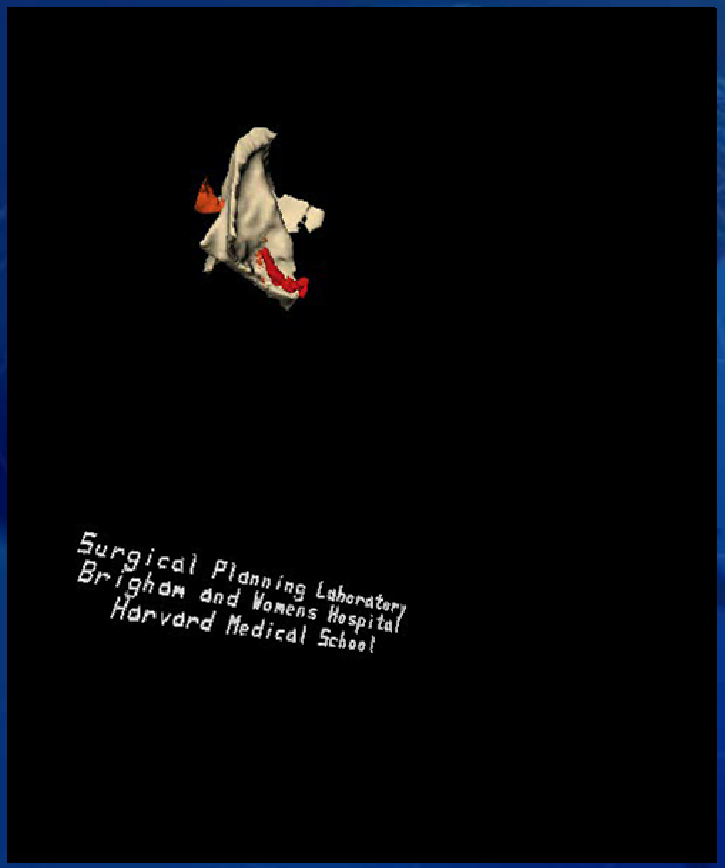
Key Health Science Members

- **112 Academic Medical Colleges (AAMC) and their medical centers**
- **130 Health Science related colleges**
  - Public Health, Nursing, Dentistry, Pharmacy
- **Affiliate Members**
  - NIH, NSF, NASA, NOAA
  - Howard Hughes Medical Institute
- **Pharmaceutical Companies**
  - Johnson & Johnson, Pfizer, Eli Lilly
- **Industry**
  - Prous Science, Cisco, IBM, Microsoft, SUN, Polycom, Ford Motor Company

Advanced Internet2 Applications

Improved Medical Training

The Surgical Planning Team of Harvard Medical School trains on a “flyover” of the human ear canal



Advanced Internet2 Applications

Improved Medical Training

- BOFs
  Digital Anatomy BOF

- SIGs
  Cardiovascular
  Health Science Education
  Advances of Relevance to Clinical Activities
  Health Science Research and Research Infrastructure

- Working Groups
  Medical Middleware
  Orthopedic Surgery

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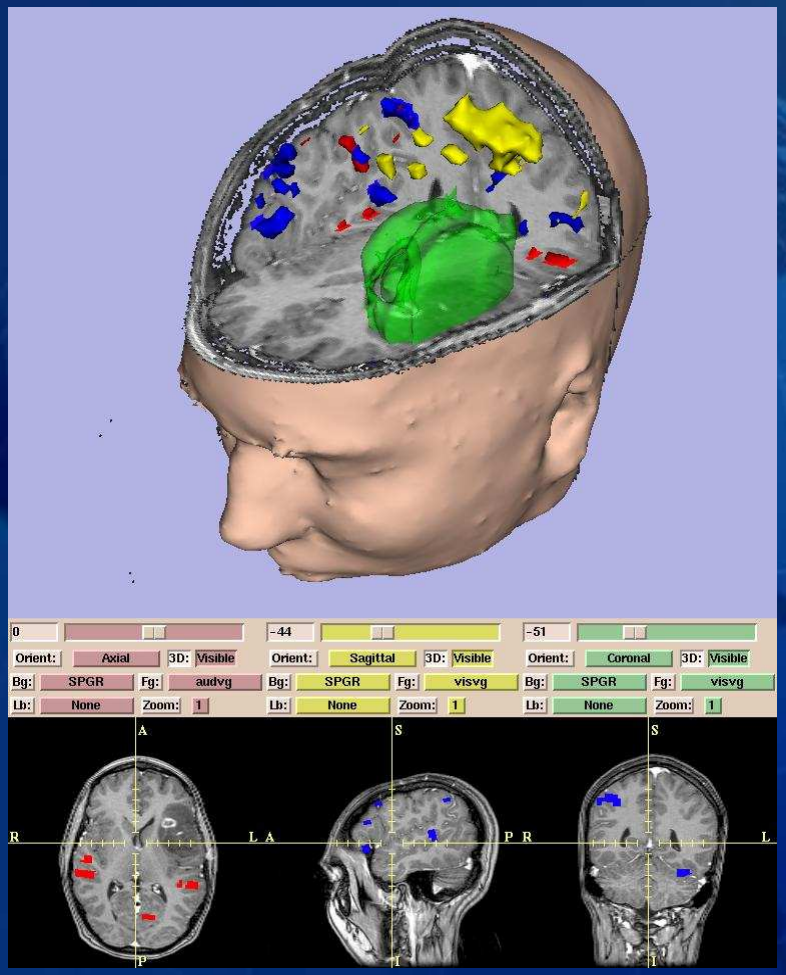
Advanced Internet2 Applications

Improved Medical Training

Advanced Internet2 Applications

Enhanced Surgical Planning

- Training
- Pre-surgical planning
- Interoperative segmentation
- Brain atlas
- fMRI



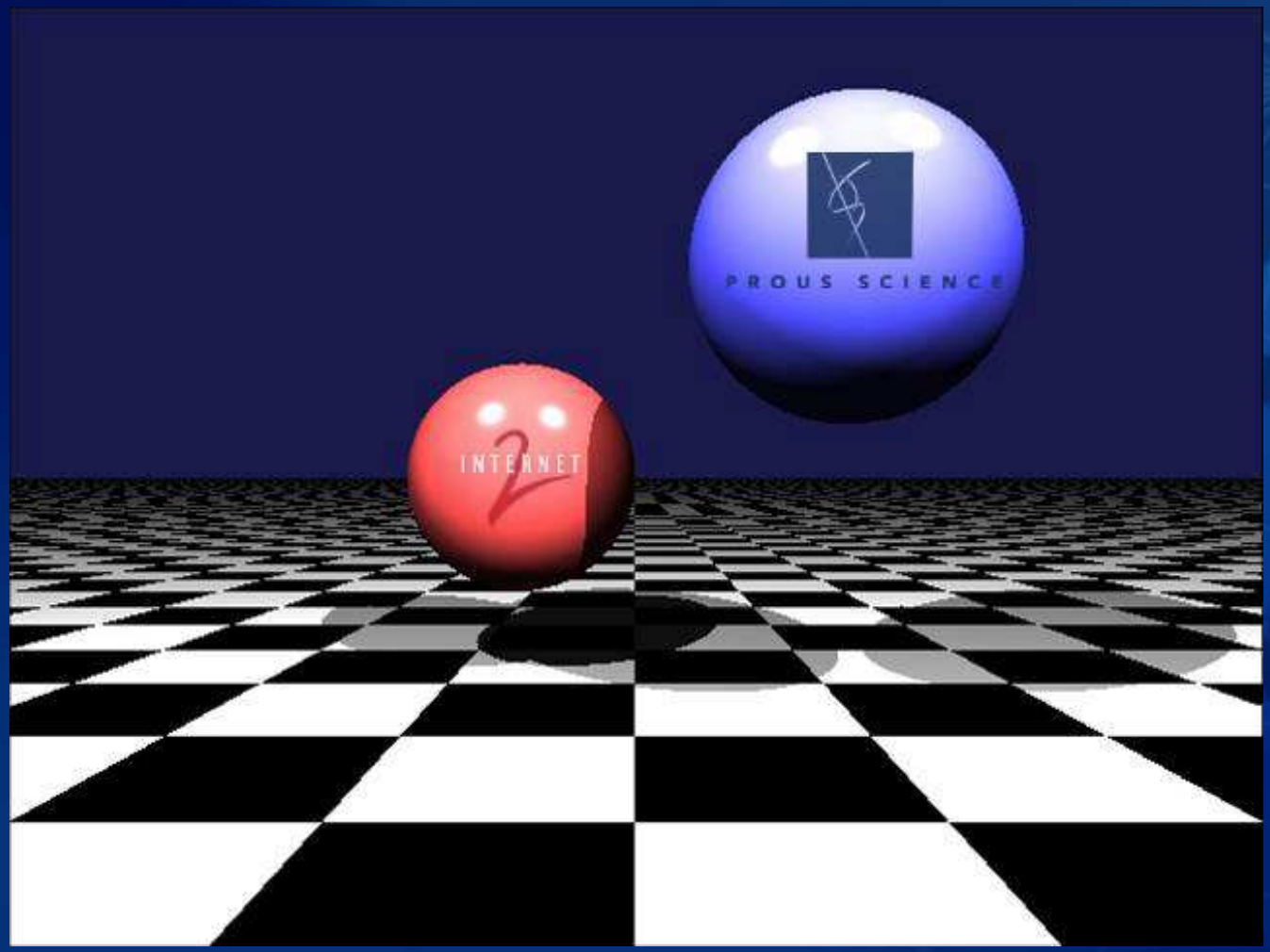
Ron Kikinis, M.D., Steve Pieper, Ph.D., Simon Warfield, Ph.D.

Brigham and Women's Hospital, NIH, Harvard Medical School

Role of the Internet in Medical Education

- Growing, but to be effective, it must meet physicians' needs
  - Convenient, fast, and
  - Relevant to their daily practice
- Until now, CME on the Internet
  - Digitized reproduction of conventional print materials
  - Reproduced live events without attention to improvement of outcome
- Advanced Internet
  - Unlimited possibilities for online or medical education
  - Access to equipment from a distance
  - Demonstrations of surgical techniques using virtual reality
- Advanced Internet
  - Can remedy some problems hindering growth of online CME
    - i.e., delays due to bandwidth, lack of interactivity
  - Turn static content into a dynamic, interactive platform for information exchange and improved outcomes

The Intersection of Science and Technology



Why Prous Science?

- Deep understanding of the needs and requirements of practicing scientists and clinicians
- Harnessing leading technologies, we bring the highest quality content to our customers around the globe
- A manifestation of our continuing efforts: INTERNET 2

Role of Prous Science and Advanced Internet Networks in CME

Mission: to deliver highest quality content via:

- Continuing Medical Education programs
- Prous Science Megaconferences
- LifeSci Channel

LifeSci Channel

LifeSciChannel.com: online gateway to the health sciences

- Utilizes the latest technology to host and stream
  - Health science news
  - Animations
  - Presentations
  - Webcasts
  - Company profiles
- Direct to your desktop
- Prous Science and the **LifeScienceChannel.com** make use of advanced network applications and technologies created by the Internet2 consortium

Prous Science Megaconferences

In 1998 Prous Science coordinated one of the first live conference transmissions via the Internet from Rio de Janeiro

More recently, in 2002, Prous Science presented the Respiratory Megaconference – one of the first interactive health science conferences online, utilizing *Internet2 technology* to link 8 sites simultaneously across the USA and Europe

http://webcasts.prous.com/copdmega/

Prous Science World-Wide Multicast

RSNA 2003 Presented First World-Wide Multicast of Image Interpretation Session Showcase Over Global Advanced Networks

EVANSTON, Ill. – December 4, 2003 - The Radiological Society of North America (RSNA), Northwestern University, Video Furnace, Prous Science, the Metropolitan Pier and Exposition Authority (MPEA), and the Metropolitan Research and Education Network (MREN), in collaboration with advanced digital networks around the world, multicast the Sunday Image Interpretation session during the annual RSNA conference.

Prous Science @ FDA Science Forum

Internet2 Participates in FDA 2004 Science Forum

The tenth annual FDA Science Forum 18-19 May, 2004 in Washington, DC. On 19 May, Kathleen Morrish, IT Director for Scientific Computing at the FDA, moderated a panel discussion including Mary Kratz, Internet2 Program Manager for Health Science initiatives, Michael Gill, National Library of Medicine and Jesus Salillas, Prous Science.

In addition, Internet2 and Prous Science each participated in the FDA Science Forum Exhibition.

PROUS SCIENCE

At The Intersection of Science and Technology

Integrity Seminars
provides up-to-date concise presentations from leading experts in industry and academia on drugs under active development and their corresponding targets

Select by: discipline | target | therapy

- Psychiatric Disorders
- Substance abuse and dependence
- Neurological Disorders
- Cardiovascular Disorders
- Gastrointestinal Disorders
- Endocrine Disorders
- Infections
- Musculoskeletal and Connective Tissue Disorders
- Immunological Disorders
- Cancer
- Metabolic Diseases
- Ear Disorders
- Eye Disorders
- Genetic disorders
- Other disorders
- Critical care medicine

Pazopanib A New Multitarget TK Inhibitor after Lapatinib

Jaap Verweij
Department of Medical Oncology, Erasmus University Medical Center
Rotterdam, Netherlands.

Drugs & Biologics | Presentation

Sorafenib (BAY 43-9006) : A Multitargeted Kinase Inhibitor

Walter Stadler
Associate Professor of Medicine The University of Chicago
Chicago, US

Drugs & Biologics | Presentation

The Role of Bevasuzimab in Colorectal Cancer

Eduardo Díaz Rubio
Jefe del Servicio de Oncología Médica del Hospital Clínico San Carlos
Madrid, Spain

Drugs & Biologics | Presentation

Novel Pathways Inhibitors:Mitotic Aurora Kinase

Paul Workman
Director of Centre for Cancer Therapeutics
Sutton, United Kingdom

Targets | Presentation

Hsp 90 and HDAC Inhibitors as Therapeutic Targets

David Solit
Memorial Sloan-Kettering Cancer Center
New York, US

Drugs & Biologics | Targets | Presentation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Integrity
The world's first integrated drug discovery and development portal
Powered by Prous Science - Microsoft Internet Explorer
Hsp 90 and HDAC Inhibitors as Therapeutic Targets
Presented by:
David Solit
Integrity® Channel
Seminars
David Solit
Memorial Sloan-Kettering Cancer Center
New York, US
00:00:01 / 00:20:17 slide: 1 of 24
Hsp90 as a Therapeutic Target
David B. Solit, M.D.
Memorial Sloan-Kettering Cancer Center
produced by:
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2
3
4
5
6
7

Integrity Animations
include a series of step-by-step animations that delineate the mechanism of action of research therapies on identified pathways and diseases

Select by: discipline | target | therapy

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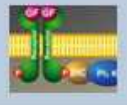
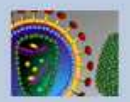
Antitumoral Activity of Taxanes and Epothilones Through Microtubule Stabilization and Mitosis Arrest



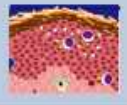
Antitumoral Activity of Vinka Alkaloids Through Microtubule Destabilization and Mitosis Arrest

Apoptosis Induction by Fasl, TNF and TRAIL Via Death Receptors and the Caspase Activation Cascade

Chaperone Function in the Cytosol



The Heat Shock Response. Model of HSF1 Regulation



Cytokine Receptors: Triggering MAPK Signaling Pathway and

Farnesylated Proteins: RAS Activation and Its Effects

Integrity Profiles
is committed to providing collaborative opportunities to companies and academic institutions operating in Drug R&D.

Select by | discipline | target | therapy | organization

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KOSAN BIOSCIENCES

Kosan

http://www.kosan.com/

Kosan uses its proprietary technologies to develop drug candidates from an important class of natural product compounds known as polyketides. Polyketides are a rich source of many pharmaceuticals, including antibiotics (e.g., Zithromax, Biaxin, erythromycin and tetracyclines), anticancer drugs (e.g., doxorubicin), cholesterol-lowering drugs (e.g., Zocor, Mevacor and Pravachol), immunosuppressants (e.g., FK506 and rapamycin) and other therapeutics. However, polyketides are made in very small amounts in microorganisms and are difficult to make or modify chemically.

Kosan's technologies enable the generation of novel polyketides as potential new drugs and the cost-effective production of novel and existing polyketides. These technologies include genetic manipulation of polyketide-producing organisms to introduce specific alterations in the structure of known polyketides, chemical derivatization, and production of polyketides through heterologous production in recombinant organisms, total chemical synthesis or a combination of the two.

Kosan's strategy is to apply its technologies to create new polyketides for pharmaceutical development, to make improved versions of known polyketide pharmaceuticals and to advance selected drug candidates into clinical trials. We are co-developing epothilones for the treatment of cancer with Roche and have U.S. co-marketing rights for epothilones approved for marketing. Our lead anti-cancer product candidate, KOS-862 (Epothilone D) is in Phase II human trials. In collaboration with the NCI, we are developing geldanamycin analogs for the treatment of cancer. The lead product, 17-AAG, is in Phase Ia human trials. Kosan has ketolide antibiotic product candidates in preclinical evaluation and two additional programs with product candidates in preclinical studies: discodermolide analogs for the treatment of cancer and non-antibiotic erythromycin derivatives for the treatment of gastro-intestinal motility disorders.

Prous Science: Our Continuing Mission

In years to come, Prous Science will continue to

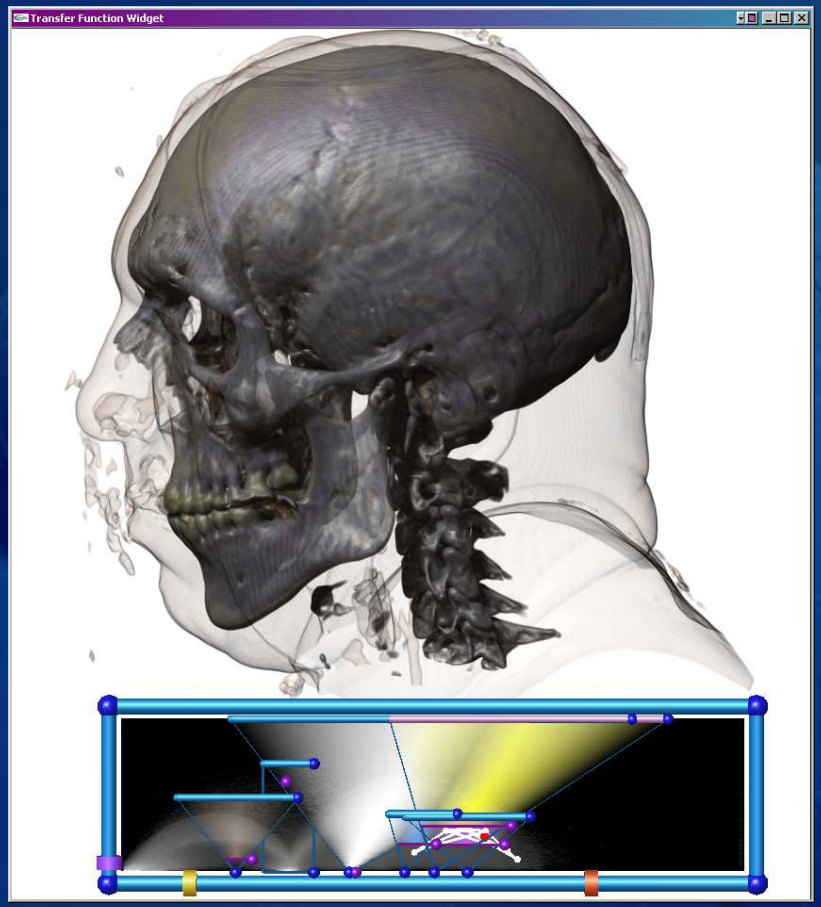
Lead – delivering content of great interest to the clinical medicine community

Innovate – by pushing ahead the frontiers of technology to extend the reach of the knowledge we create and compile

Create – the highest quality content focused on the needs of biomedical researchers and clinicians

Further Information

- On the Web
  - health/internet2.edu
  - www.internet2.edu/health
- Email
  - *Jorge Manrique*
  - *jmanrique@prous.com*



The Stages of Truth…

All truth passes through three stages:

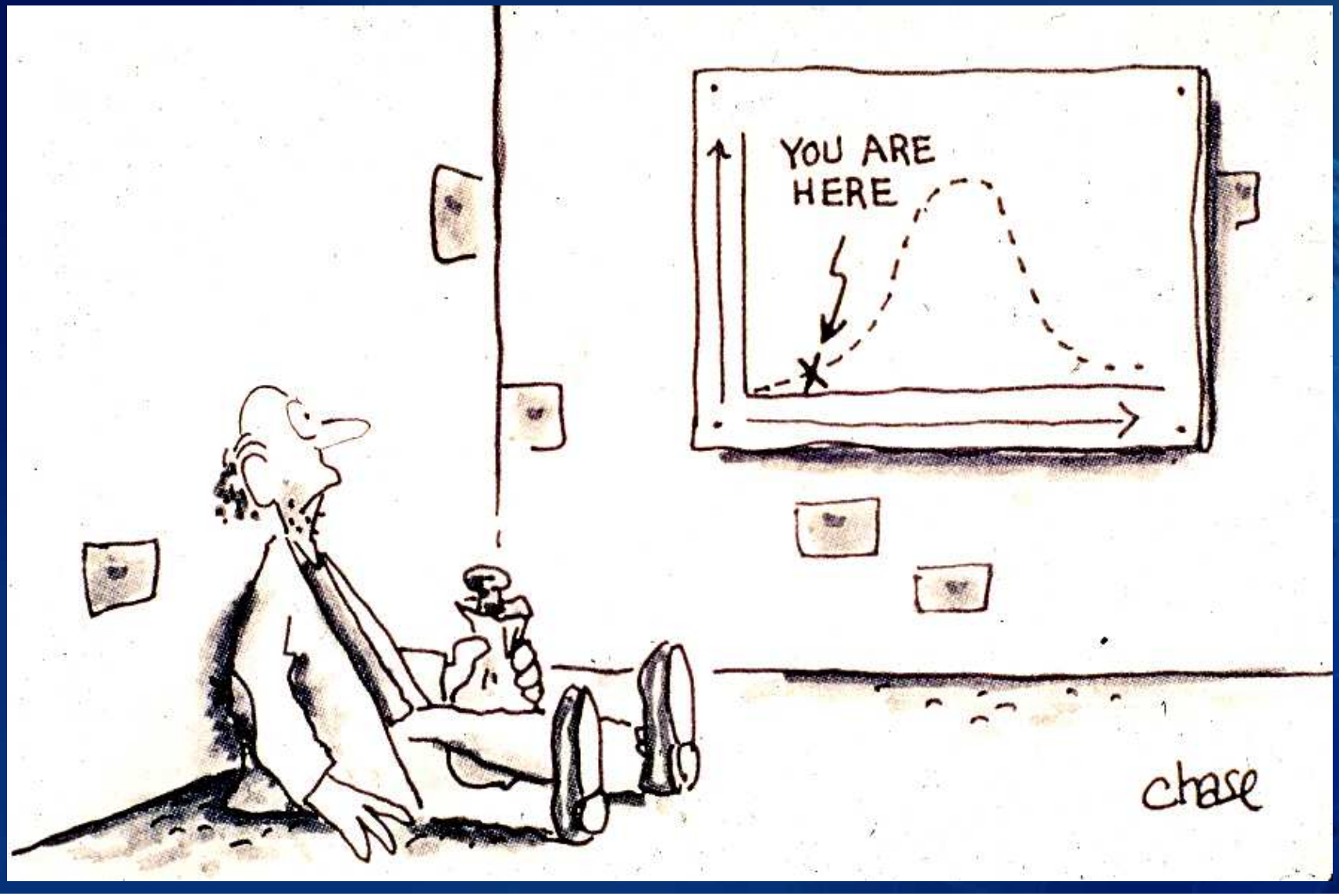
First, it is ridiculed;

Second, it is violently opposed; and

Third, it is accepted as self-evident.

Arthur Schopenhauer (1788-1860)

The Stages of Truth…

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At The Intersection of Science and Technology