Internet2: Opportunities

Douglas Van Houweling
President & CEO, Internet2
dvh@internet2.edu

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Outline

- Thank you!
- Internet2:
  - Background
  - Quick overview of program areas and strategic foci
  - Opportunities: CUDI and Mexican universities

Internet2: Mission and Goals

- Develop and deploy advanced network applications and technologies, accelerating the creation of tomorrow's Internet.
  - Membership organization of US research universities
  - Key partnerships with government, industry and international counterparts
- GOALS:
  - Enable new generation of applications
  - Re-create leading edge R&E network capability
  - Transfer technology and experience to the global production Internet

Partnership as a core value: Internet2 today

- University Leadership:
  - 207 regular University members
  - Universities' research and education mission require an advanced Internet and have demonstrated they can develop it
- 66 Corporate members
- 42 Affiliate members
- Expanded access:
  - Over 30-based state-based education networks across the country
- 45 International Partners
  - Over 30 peer networks extending Internet2 backbone to more than 50 countries

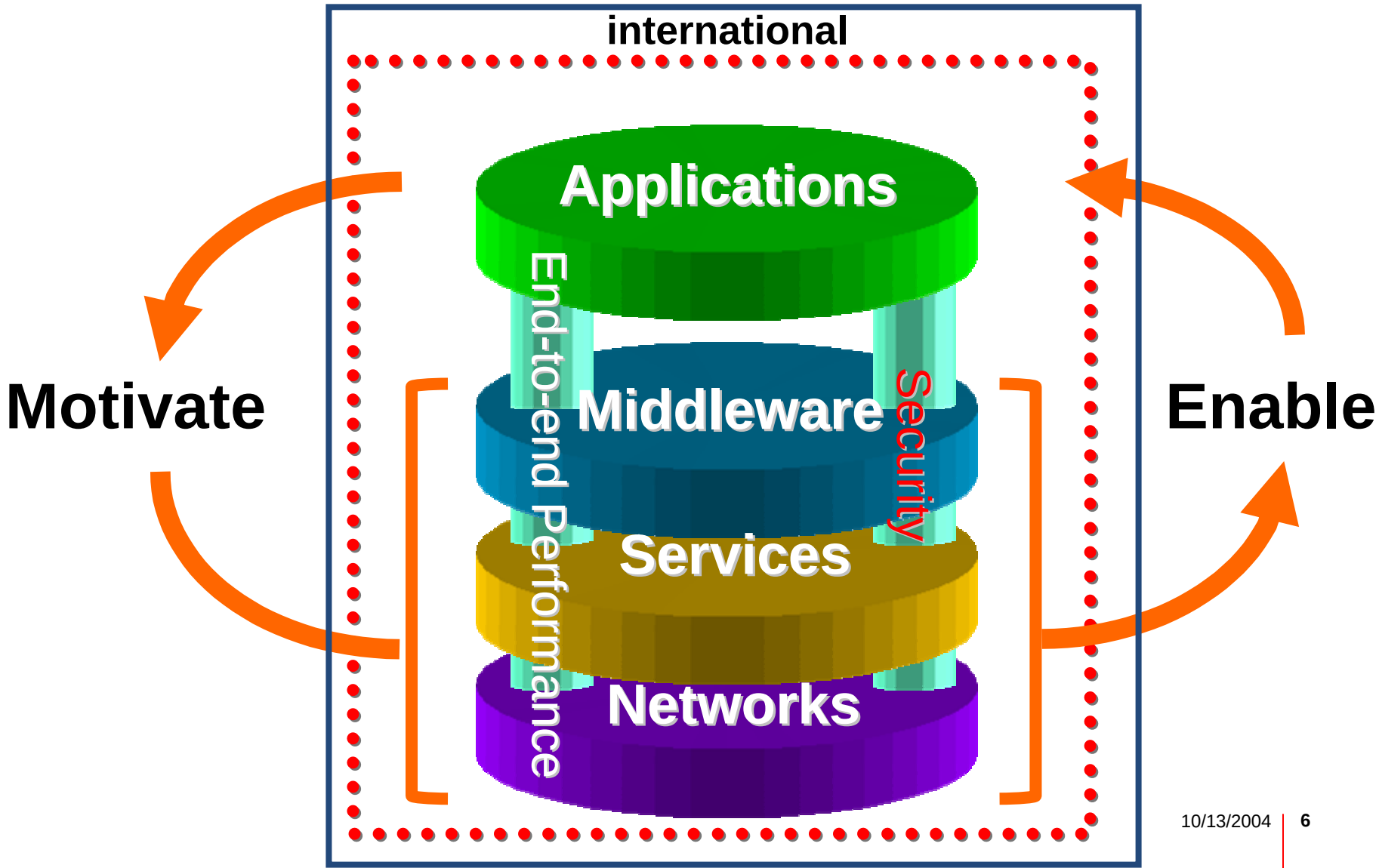
Internet2 Governance Structure

- Internet2 Board of Trustees
- Four Advisory Councils:
  - Applications Strategy Council
  - Industry Strategy Council
  - Networking Planning and Policy Advisory Council
  - Network Research Liaison Council

http://www.internet2.edu/about/board.html

http://www.internet2.edu/about/councils.html

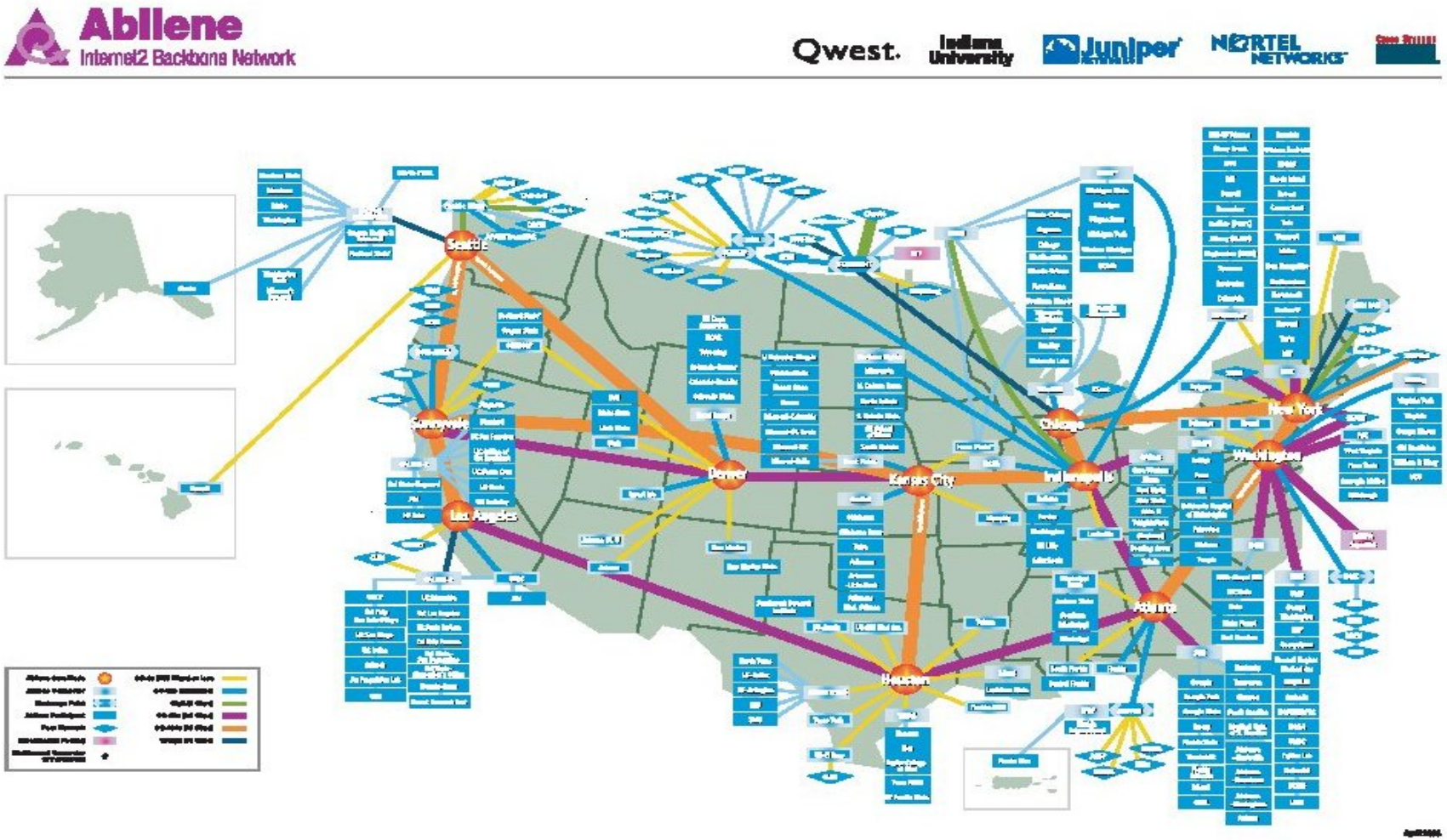
Internet2 Today (and Tomorrow)



Internet2 2004 Emphasis

- Advanced Network Infrastructure
- End to End Performance
- Middleware
- Security
- International Connections
- Applications

High Capacity Networks



- They Enable New Applications

US R&E optical networking

- Campus/State/regional optical networking efforts
  - *Facility-based networking built with owned assets* (vs. bought telecom services) – from metro and out (beyond gigapops) – Regional Optical Networks *(RONs)*
- National LambdaRail – NLR (www.nlr.net)
  - Enabling fiber infrastructure to support networks:
    - for research and development of Internet technologies and protocols
    - new applications and services
- Fiberco – www.fiberco.org
  - A fiber holding company; holds national/regional fiber assets with the capability of assignment to other organizations
- Hybrid Optical and Packet Infrastructure Project (HOPI)
  - A testbed for experimenting with future network infrastructures leading to the next generation Internet2 architecture.
  - http://networks.internet2.edu/hopi/

International Networks – reachable by Internet2 infrastructure

Europe-Middle East

Austria (ACOnet)
Belgium (BELNET)
Croatia (CARNet)
Czech Rep. (CESNET)
Cyprus (CYNET)
Denmark (Forskningsnettet)
Estonia (EENet)
Finland (Funet)
France (Renater)
Germany (G-WIN)
Greece (GRNET)
Hungary (HUNGARNET)
Iceland (RHnet)
Ireland (HEAnet)
Israel (IUCC)
Italy (GARR)
Latvia (LATNET)
Lithuania (LITNET)
Luxembourg (RESTENA)
Malta (Univ. Malta)
Netherlands (SURFnet)
Norway (UNINETT)
Poland (POL34)
Portugal (RCTS2)
Qatar (Qatar FN)
Romania (RoEduNet)
Russia (RBnet)
Slovakia (SANET)
Slovenia (ARNES)
Spain (RedIRIS)
Sweden (SUNET)
Switzerland (SWITCH)
United Kingdom (JANET)
Turkey (ULAKBYM)
*CERN

Asia-Pacific

Australia (AARNET)
China (CERNET, CSTNET, NSFCNET)
Hong Kong (HARNET)
Japan (SINET, WIDE, IMNET, JGN)
Korea (KOREN, KREONET2)
Singapore (SingAREN)
Philippines (PREGINET)
Taiwan (TANet2, ASNet)
Thailand (UNINET, ThaiSARN)

Americas

Argentina (RETINA)
Brazil (RNP2/ANSP)
Canada (CA*net)
Chile (REUNA)
Mexico (Red-CUDI)
United States (Abilene, vBNS)
Venezuela (REACCIUN-2)

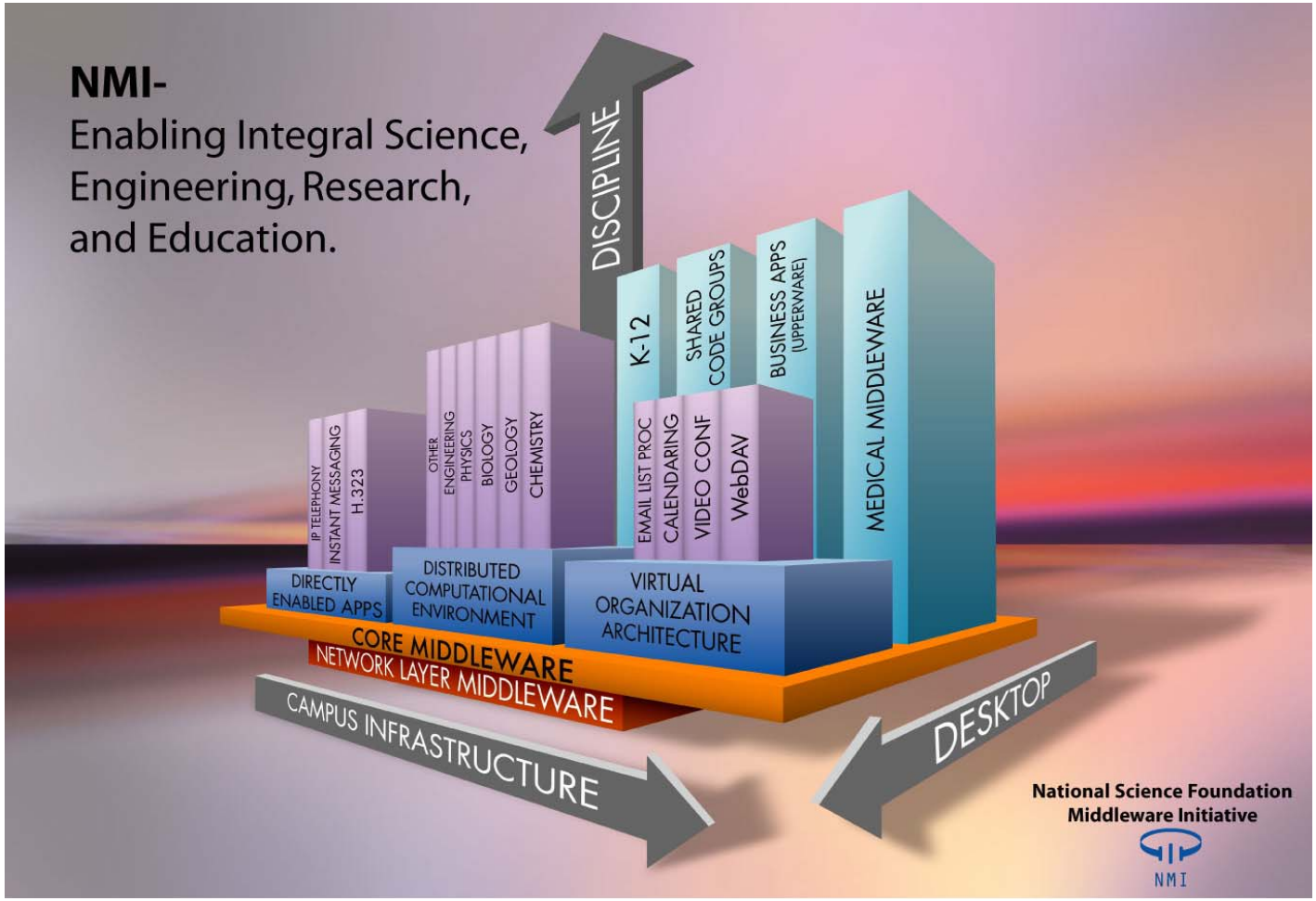
More information at
http://abilene.internet2.edu/peernetworks/international.html

Beyond networking

- Measurement/monitoring infrastructure across backbone, regional, campus networks
  - http://abilene.internet2.edu/observatory/
- End-to-End Performance Initiative:
  - New architectures providing flexible, dynamic, controllable paths across common infrastructure
  - http://e2e.internet2.edu
- Security
- Middleware

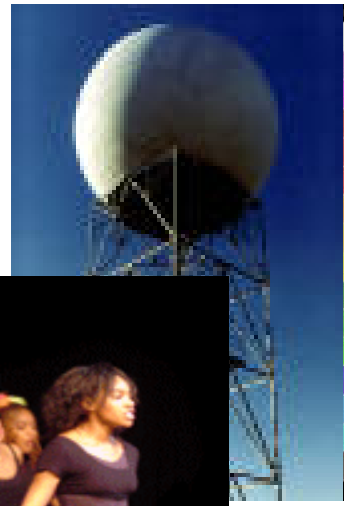
Middleware

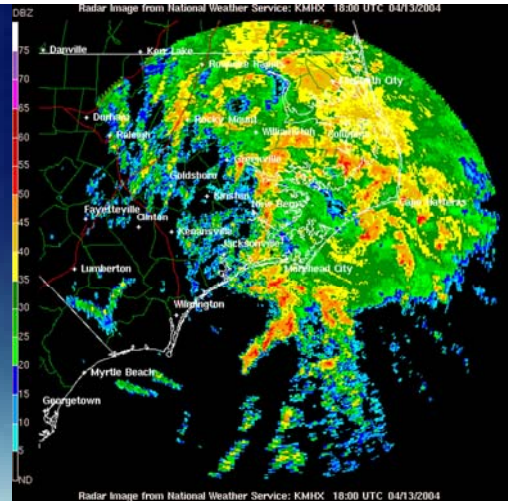
- Middleware is the stuff that makes “transparently use” happen, providing persistency, consistency, security, privacy, and capability

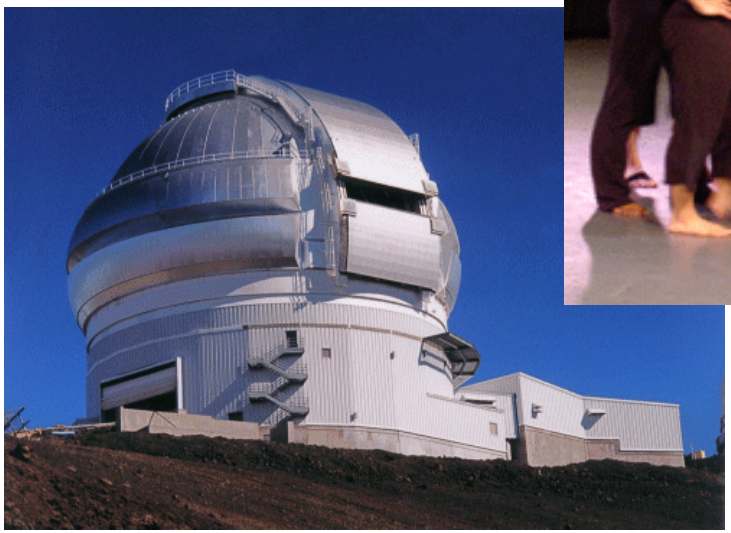


http://middleware.internet2.edu

Advanced Networking in Action







Supporting science user communities and beyond

- Research increasingly dependent on access globally to resources, collaborators, data, scientific instruments.
  - Access to scientific instruments with specific geo-location needs (e.g., optical and radio telescopes)
  - Singular instruments: not possible for each country to "afford" for their own country (e.g., Large Hadron Collider, electron microscope in Japan)
  - Access to/collecting geo-specific data and getting it back for analysis, visualization, sharing, prevention
    - Environmental, Atmospheric/Oceanographic Studies
- Access to people for teaching/learning
  - Bring world-class teaching/learning opportunities to broader community

International Partnerships

- Ensure global interoperability
  - of the next generation of Internet technologies and applications
- Enable global collaboration
  - in research and education providing/promoting the development of an advanced networking environment internationally
- 45 International MoU partners
  - with advanced networking organizations around the world
  - international.internet2.edu

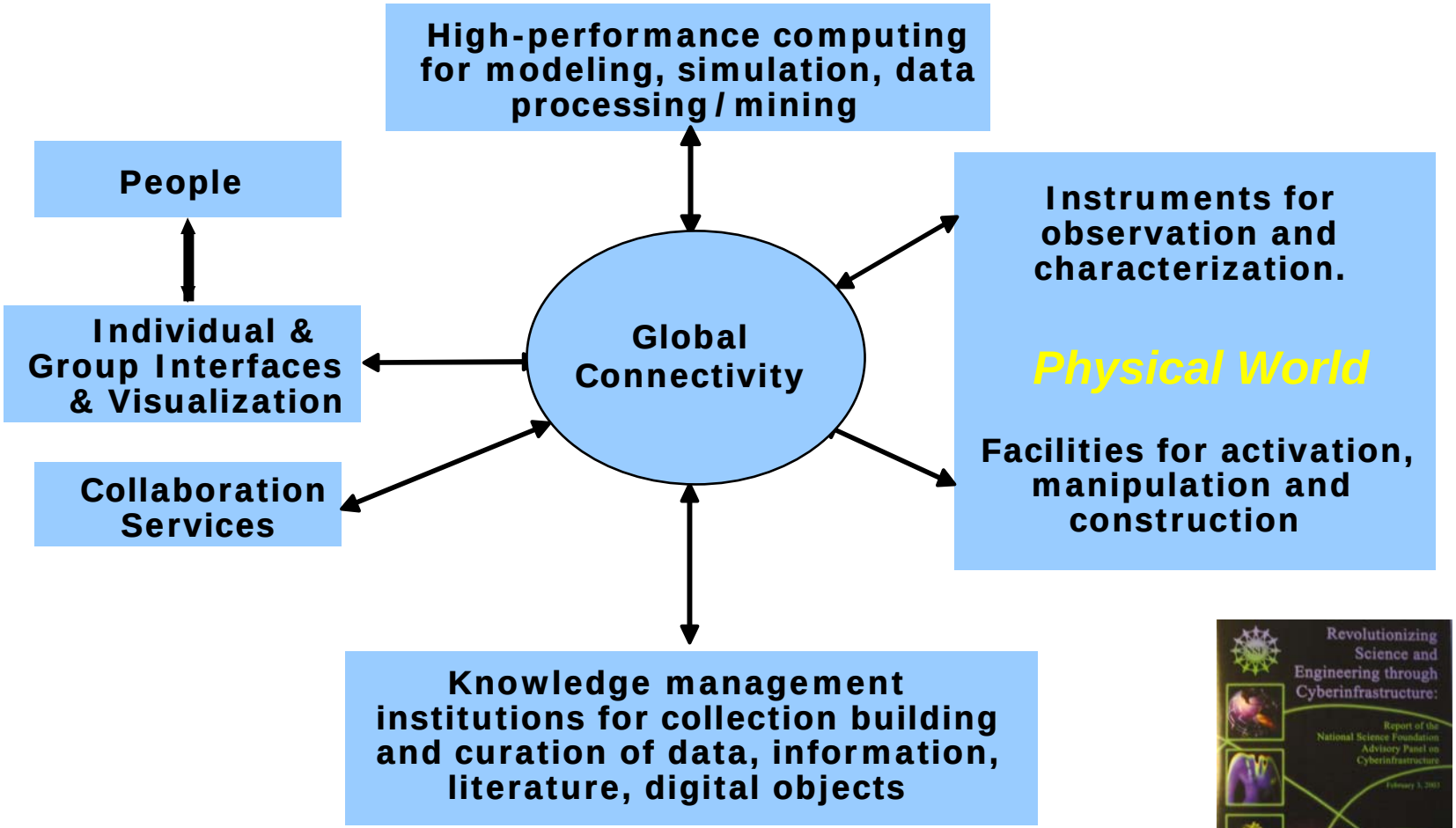
Americas


CANARIE INC.
cudi
INTERNET2
SENACYT
SECRETARIA NACIONAL DE CIENCIA, TECNOLOGIA E INNOVACION
CNTI
CEDIA
RNP
Clara
Reuna
Red Universitaria Nacional
RETINA
Red Teleinformática Acadêmica
Latin America and Caribbean (16 countries)

Thoughts on elements in LA&C

- Global cyber-infrastructure
- Advanced networking and information infrastructure
  - Critical vehicles for propelling countries of the region into competitive knowledge-based economies
  - Access to global scientific and technology resources
  - Strengthen other areas (science, health, education)
  - Can empower critical social and economic activities
  - Opportunity costs of failure to make this investment will result in loss of competitiveness
  - Universities in the 21st century
- Role of NRENs in the region
  - Strategic role: policy/regulatory, capacity building, and 'bridging'

Components of CyberInfrastructure-enabled Science & Engineering



Source: Paul Messina – Fall 2003 Internet2 member meeting,
"Cyberinfrastrucutre: Promises and Challenges"
presentation at http://www.internet2.edu/presentations/fall-03/20031014-Plenary-Messina.htm

CUDI and NRENs in LA&C

- Emergence of concrete regional and core frameworks around which to organize national and international support
  - CLARA: working towards optimizing and enhancing networking in the Americas
- Internet2 – CUDI Partnership
  - via Memorandum of Understanding - May 1999
  - Strong and increasing Internet2 – CUDI collaborations
  - Abilene – red CUDI:
    - Over 400 Mbps of connectivity (via California and Texas)
    - Cross-border fiber connections

Internet2 – CUDI partnership

- Strategic to US-Mexico interests
- CUDI and Internet2:
  - Collaboration on research and education
  - Scientific user communities working further together
  - Conveying the framework and concepts behind cyber-infrastructure
  - Modeling new network solutions with demonstrable impact
  - Innovative network applications – transformative (in many realms)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