The OptIPlanet Collaboratory Supporting Researchers Worldwide

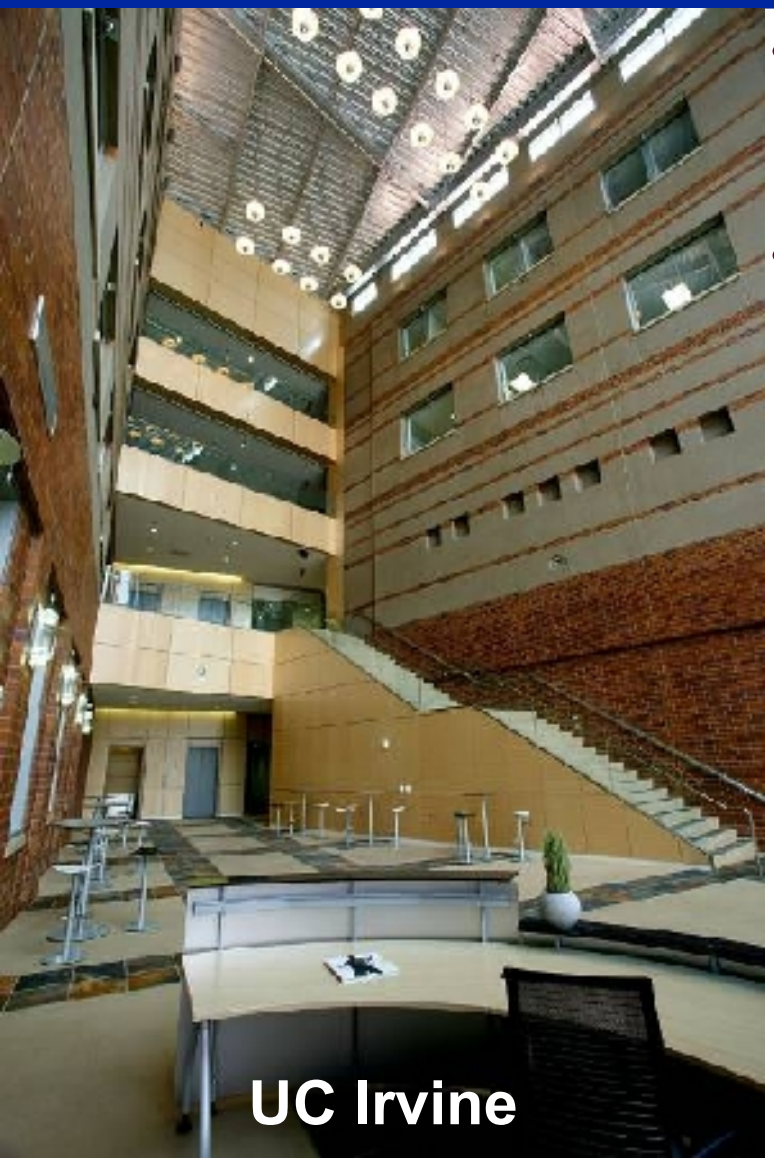
Talk
Australian American Leadership Dialogue
Calit2@UCSD
January 15, 2008

Dr. Larry Smarr
Director, California Institute for Telecommunications and Information Technology
Harry E. Gruber Professor,
Dept. of Computer Science and Engineering
Jacobs School of Engineering, UCSD

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UCIrvine

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Two New Calit2 Buildings Provide New Laboratories for "Living in the Future"



- "Convergence" Laboratory Facilities
  - Nanotech, BioMEMS, Chips, Radio, Photonics
  - Virtual Reality, Digital Cinema, HDTV, Gaming
- Over 1000 Researchers in Two Buildings
  - Linked via Dedicated Optical Networks



www.calit2.net

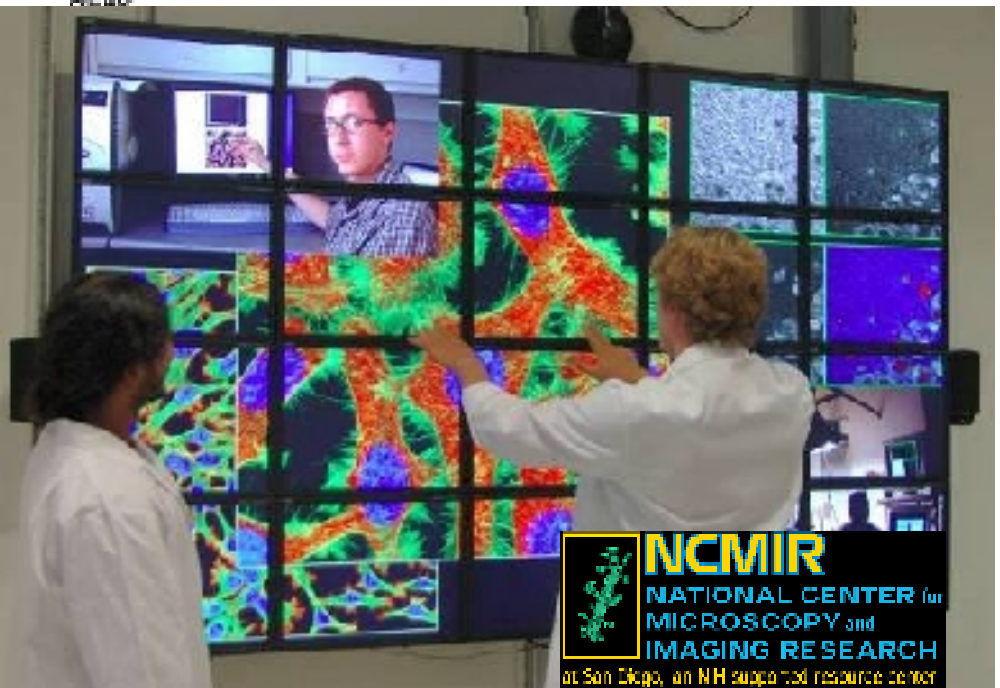
Preparing for a World in Which Distance is Eliminated…

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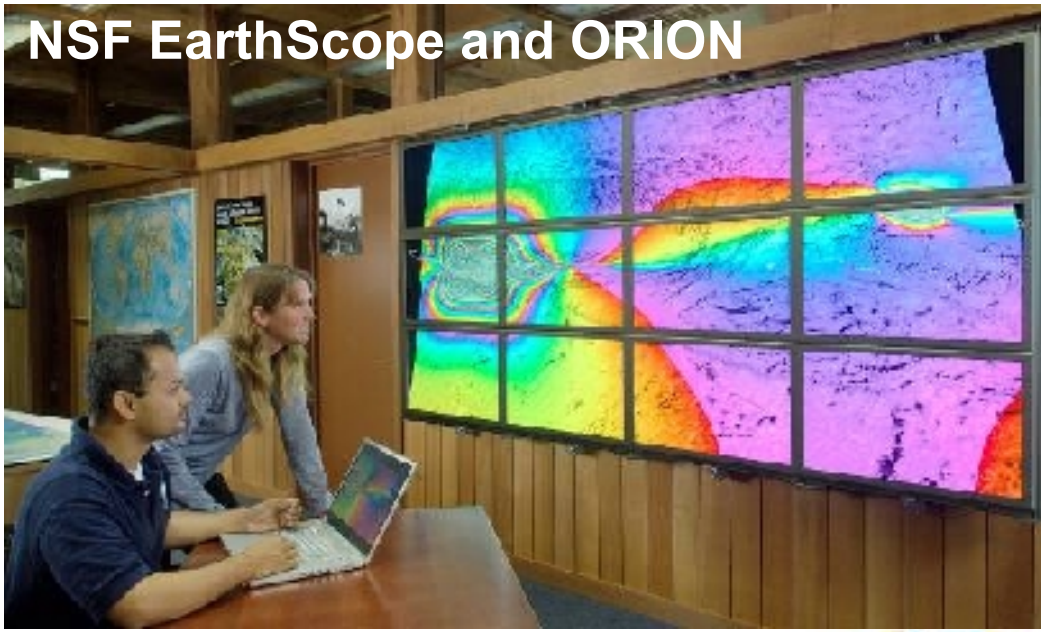
The OptIPuter Project – Creating High Resolution Portals Over Dedicated Optical Channels to Global Science Data

- NSF Large Information Technology Research Proposal
  - Calit2 (UCSD, UCI) and UIC Lead Campuses—Larry Smarr PI
  - Partnering Campuses: SDSC, USC, SDSU, NCSA, NW, TA&M, UvA, SARA, NASA Goddard, KISTI, AIST, CRC(Canada), CICESE (Mexico)
- Engaged Industrial Partners:
  - IBM, Sun, Telcordia, Chiaro, Calient, Glimmerglass, Lucent
- $13.5 Million Over Five Years—Now In the Six and Final Yea..

NIH Biomedical Informatics Research Network



NSF EarthScope and ORION



SCRIPPS INSTITUTION OF OCEANOGRAPHY

My OptIPortal™ – Affordable Termination Device for the OptIPuter Global Backplane

- 20 Dual CPU Nodes, 20 24” Monitors, ~$50,000
- 1/4 Teraflop, 5 Terabyte Storage, 45 Mega Pixels--Nice PC!
- Scalable Adaptive Graphics Environment (SAGE) Jason Leigh, EVL-UIC

evl electronic visualization laboratory





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Powered by Rocks ROCKS

Source: Phil Papadopoulos SDSC, Calit2

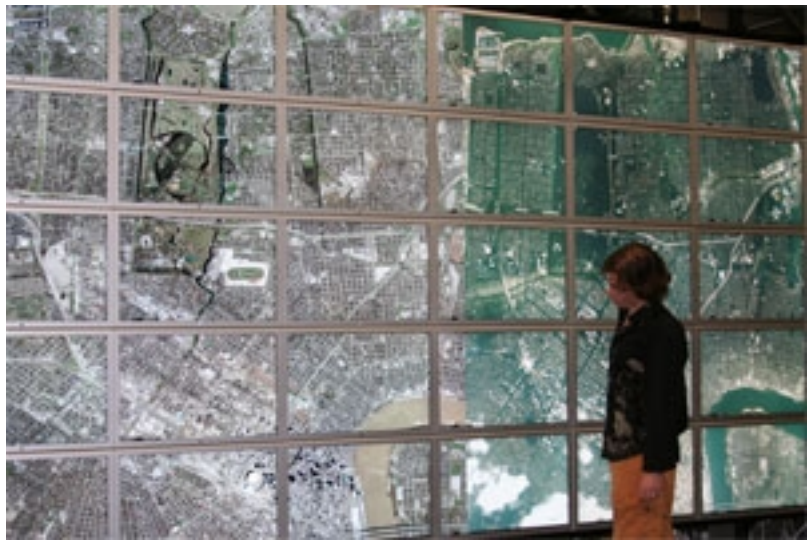
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Nearly One Half Billion Pixels in Calit2 Extreme Visualization Project!

Connected at 2,000 Megabits/s!







UCI HIPerWall Analyzing Pre- and Post- Katrina

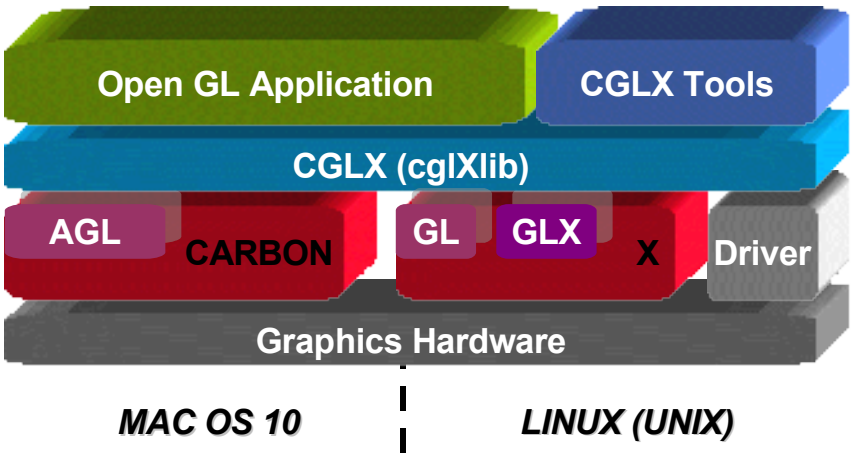
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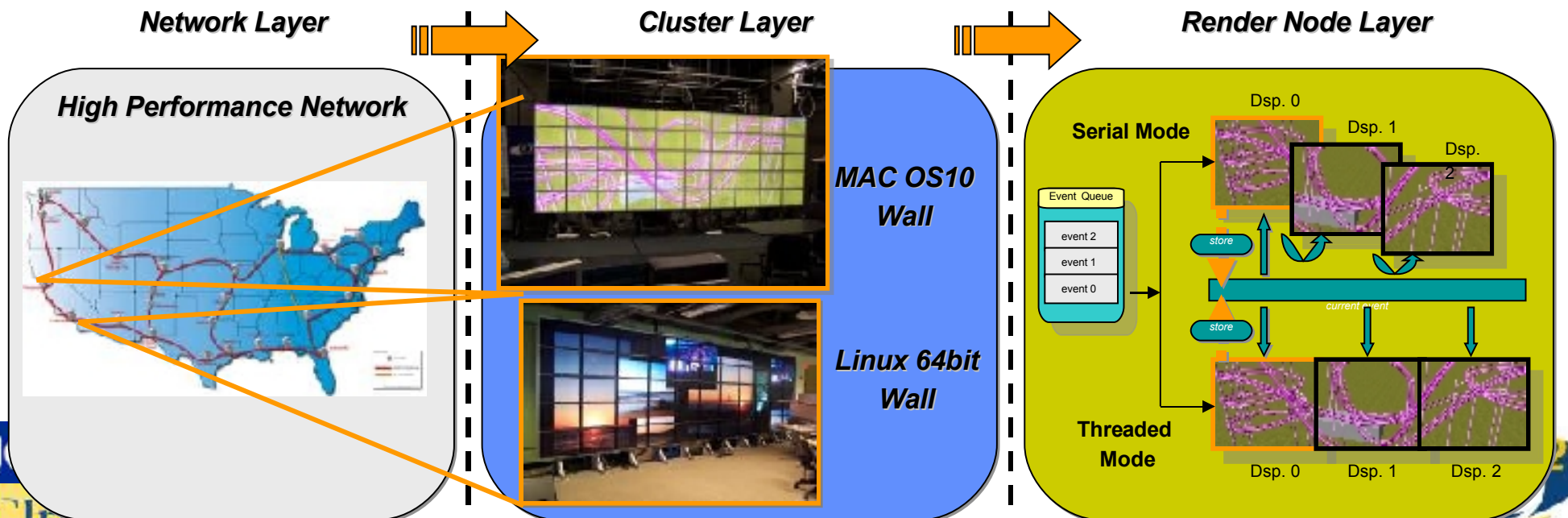
Falko Kuester, UCSD; Steven Jenks, UCI

Cluster-GL for Heterogeneous Systems (CGLX) Framework for OptIPortals

CGLX features:

- Crossplatform Hardware Accelerated Rendering.
- Synchronized Multi-Layer OpenGL Context Support.
- Distributed Event Management.
- Scalable Multi Display Support.





AALD Melbourne August 18, 2007
Keynote Talk

What I suggest is that we pose a stretch goal.

While I was at the University of Melbourne I had them measure their bandwidth from a campus PC to a server in the U.S. and found roughly 2-3 megabits/sec. Let's say by the time that the Leadership Dialogue gets back to San Diego in mid-January that we actually have established a gigabit per second link between at least one Australian university, say the University of Melbourne and Calit2—that is a bandwidth increase of 400-fold! The trans-pacific fiber carrying 10 gigabit/sec already exists between San Diego, Seattle, and Australia through your Australian Advanced Research Network (AARNET). Australia also has the different universities all hooked together at that 10 gigabit per second. But what we haven't had is a driving application and a deadline.

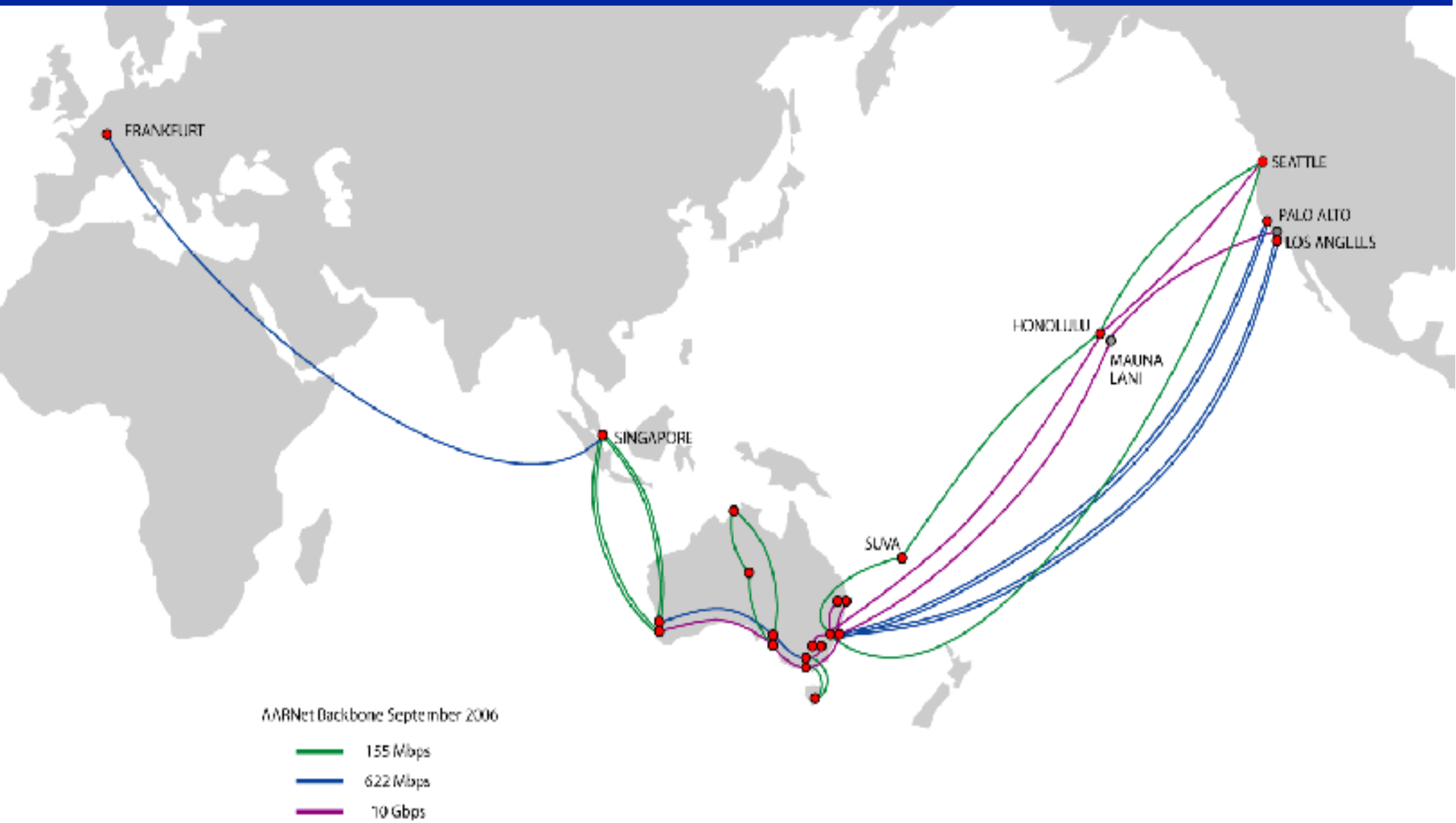
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Five Months From Challenge to Reality!

- Aug 15, 2007 — LS visits U Melbourne for first time
- Aug 18, 2007 — LS delivers AALD keynote and sets stretch goal
- Aug 20, 2007 — V-C Davis accepts challenge
- Aug 28, 2007 — Calit2/UM discussions start on establishing gigabit link
- Aug 29, 2007 — UM V-C Davis asks Mark Raphael to organize team
- Sept 7, 2007 — Premier Brumby and V-C Davis supply funds
- Sept-October — Last mile on UM campus; extensive Calit2/UM talks
- Nov 2, 2007 — Agreement on overall plan for Jan event
- November — Extensive discussions on how to build OzIPortal
- Nov 30, 2007 — First light path “ping” between Calit2 and UM
- Dec 12, 2007 — First video transmission
- Dec 18, 2007 — CGLX runs on Melbourne OzIPortal
- Dec-Jan — Extensive testing of integrated system
- Jan 15, 2007 — AALD meeting at Calit2 – Showtime!

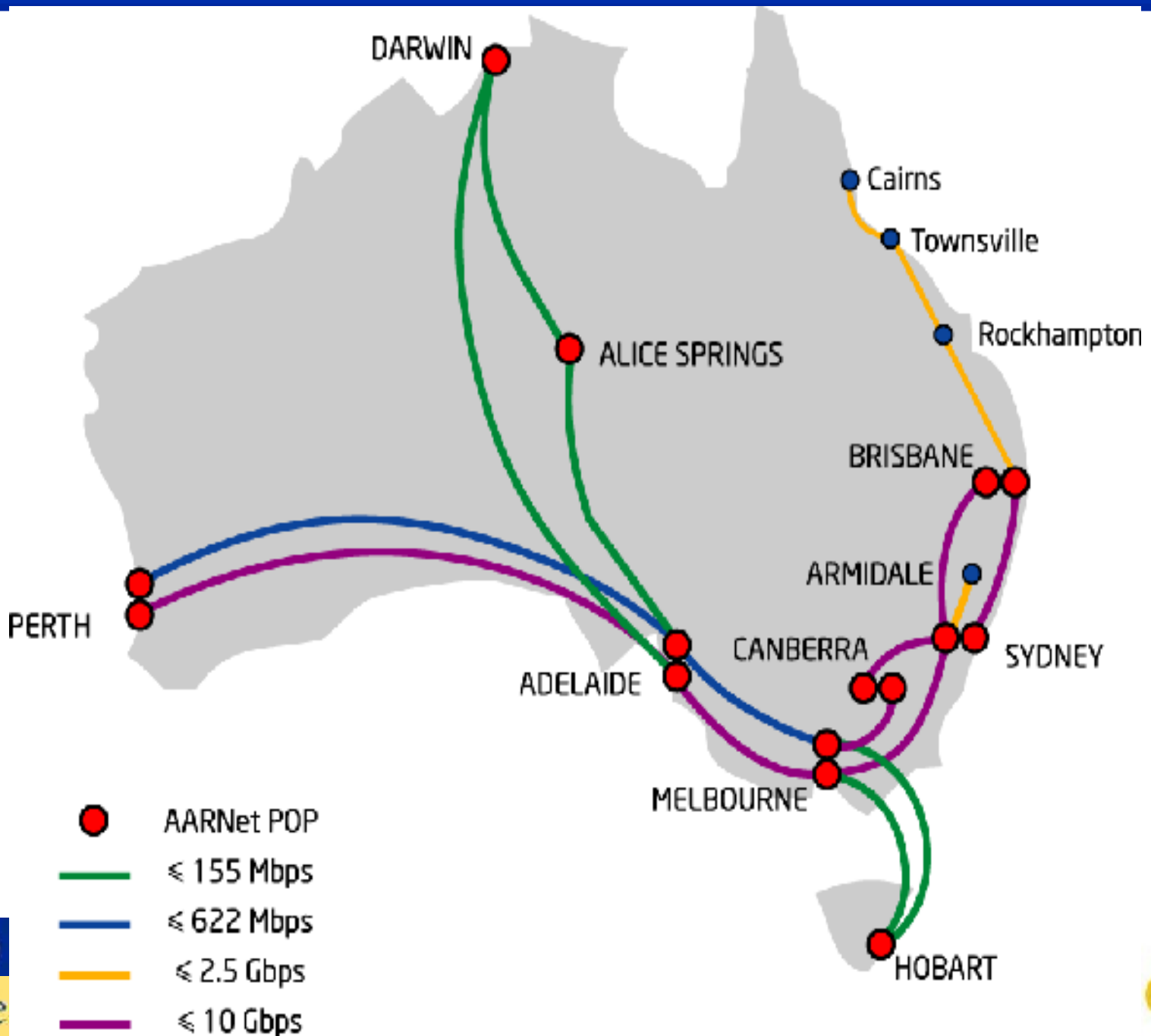
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AARNet International Network



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AARNet Domestic Network



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AARNet Pioneered Uncompressed HD VTC with UWashington Research Channel--Supercomputing 2004





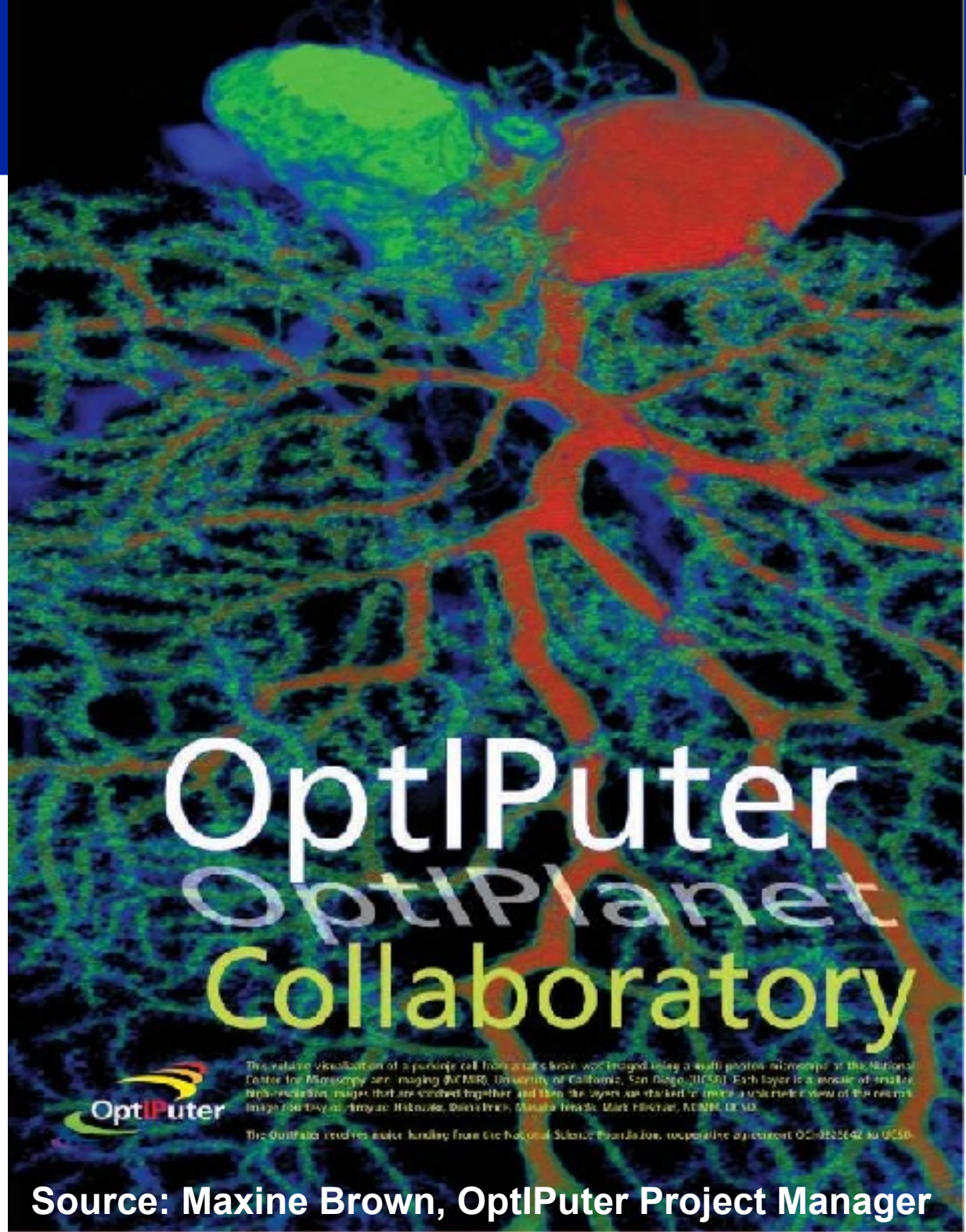
Canberra



Pittsburgh

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Source: Maxine Brown, OptIPuter Project Manager

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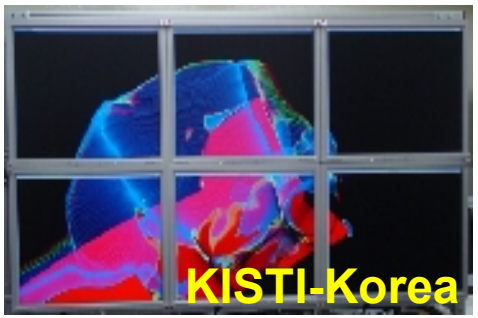
An Emerging High Performance Collaboratory for Microbial Metagenomics

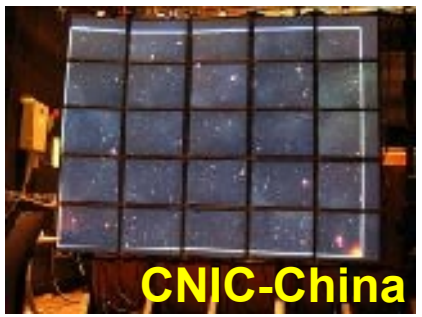


OptIPortals
Are Being Adopted Globally


AIST-Japan


Osaka U-Japan


KISTI-Korea


CNIC-China


NCHC-Taiwan


UZurich


SARA- Netherlands


Brno-Czech Republic


EVL@UIC


Calit2@UCSD


Calit2@UCI

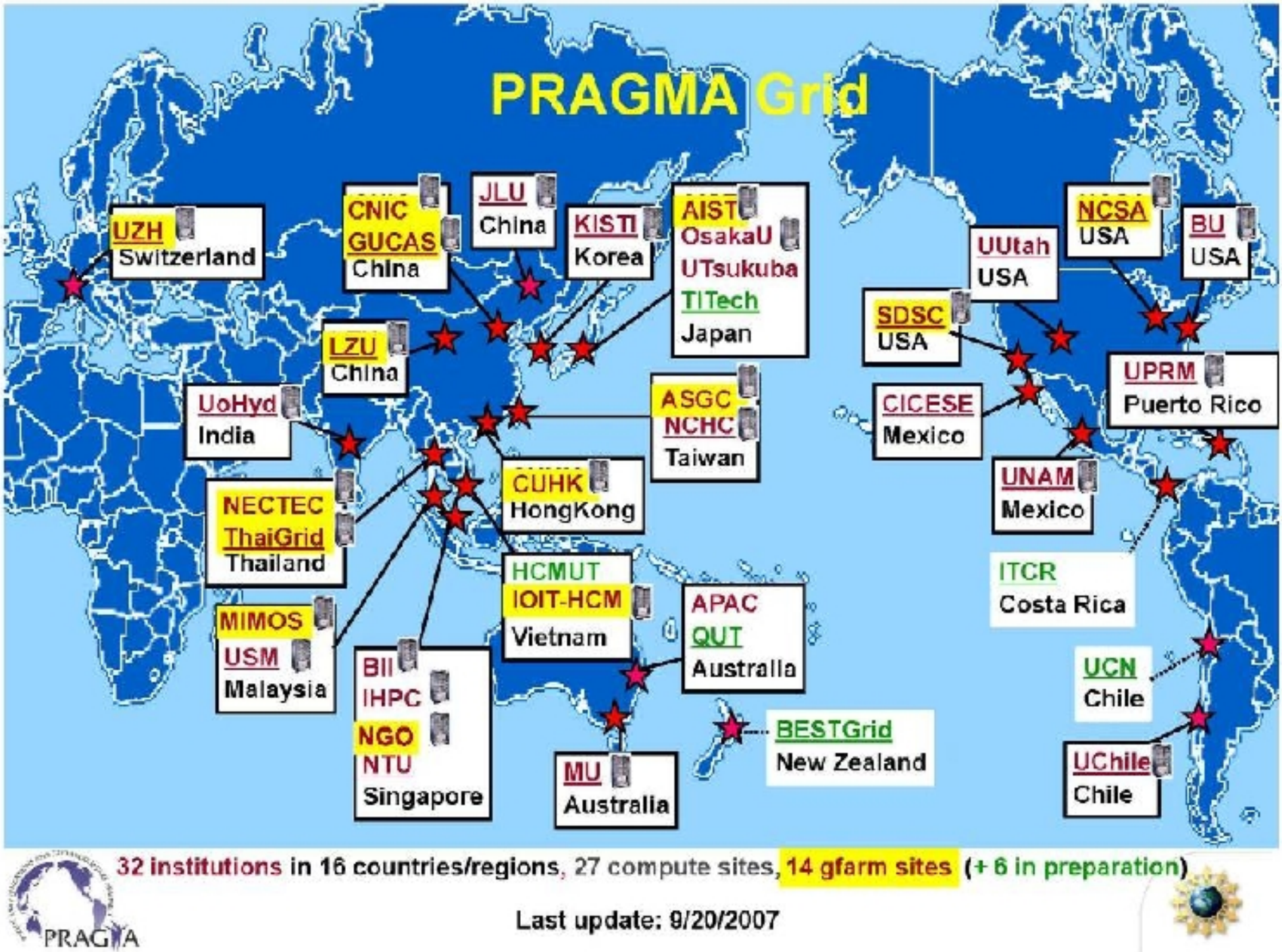

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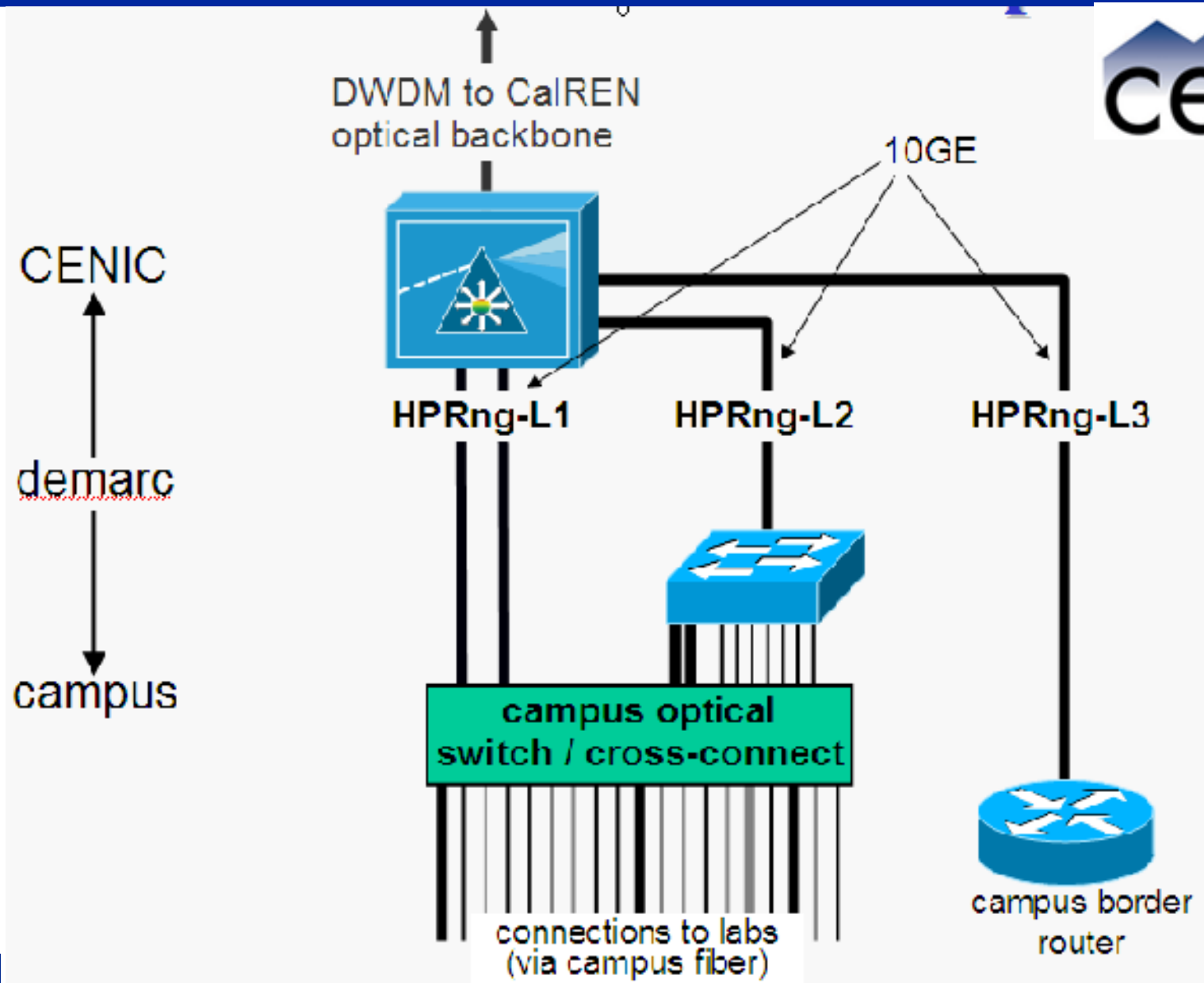
evl electronic visualization laboratory

it2



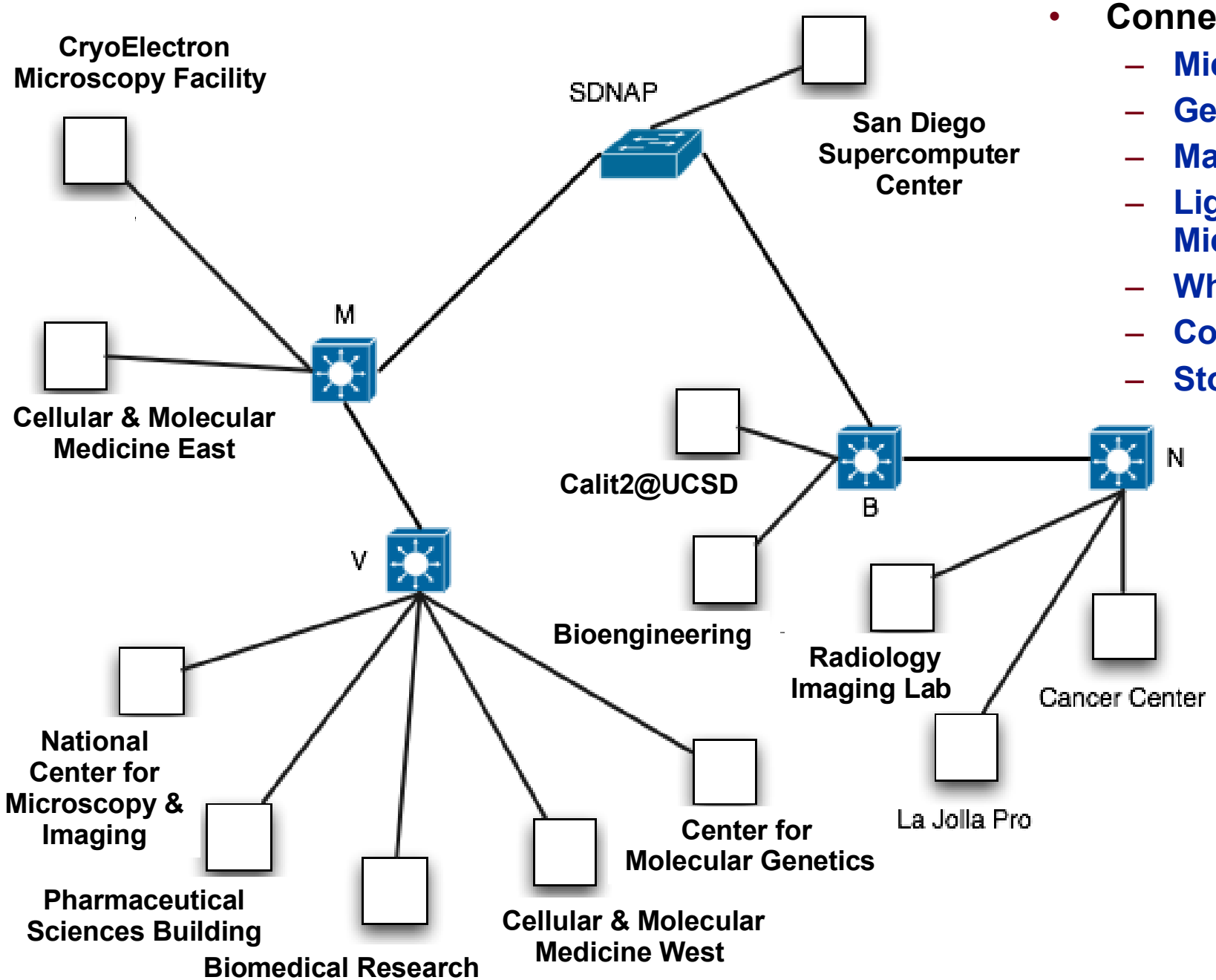
Source: Cindy Zheng

Campus Preparations Needed to Create Lambda "On-Ramps" to Their Campus Researchers



Source: Jim Dolgonas, CENIC

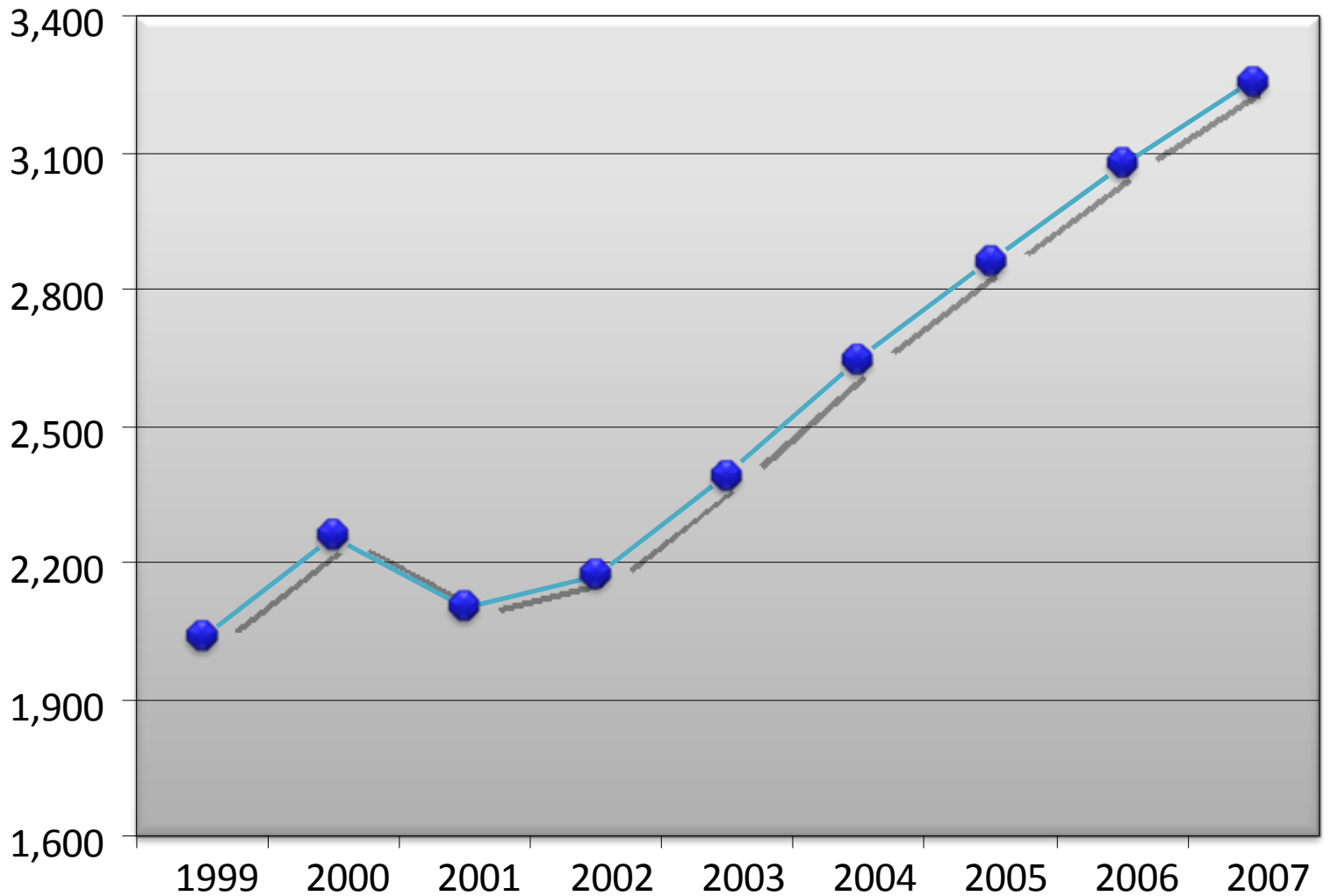
UCSD Planned Optical Networked Biomedical Researchers and Instruments



- **Connects at 10 Gbps :**
  - **Microarrays**
  - **Genome Sequencers**
  - **Mass Spectrometry**
  - **Light and Electron Microscopes**
  - **Whole Body Imagers**
  - **Computing**
  - **Storage**

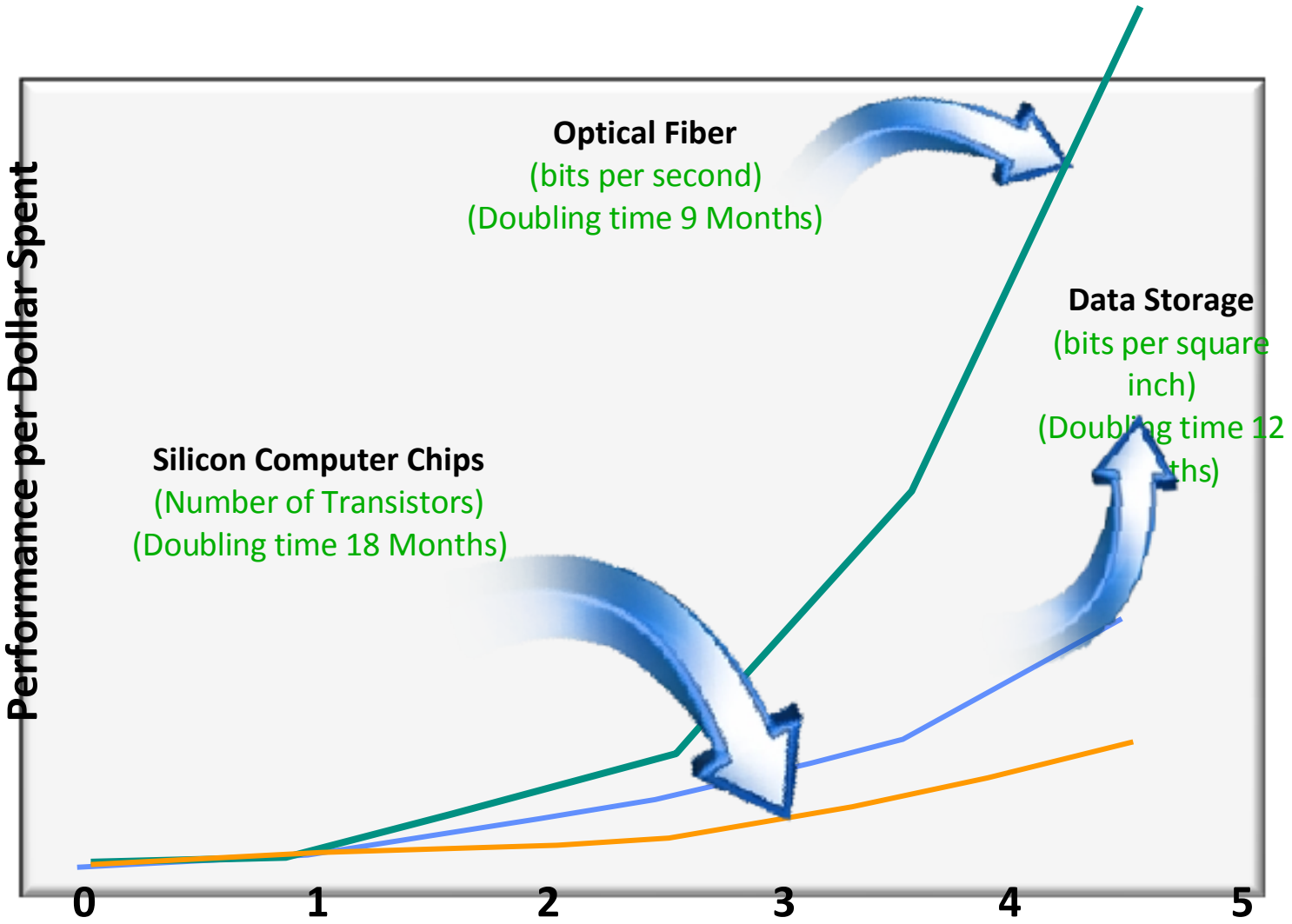
The Market Stakes are Very Big: Global ICT Spending ($US Billions)

- **Source: WITSA's 2004, Digital Planet: The Global Information Economy.**



Source: Peter Cowhey, UCSD

The Cheap Revolution



Scientific American, January 2001

Source: Peter Cowhey, UCSD

Predicting Bandwidth Utilization and Innovation

- The research networks lead “high end” commercial use by about 7 years
- The research networks lead “high end” consumer use by about 12 to 15 years
- The leading edge use for pictures and sound today is illegal sharing of movies and music
- The leading edge tomorrow will be interactive visual and data applications for work and personal uses



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Source: Peter Cowhey, UCSD