The OptIPlanet Collaboratory

Invited Presentation

Calit2@UCSD

September 16, 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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Interactive OptIPlanet Collaboratory Prototype: Using Analog Communications to Prototype the Fiber Optic Future

"What we really have to do is eliminate distance between individuals who want to interact with other people and with other computers."
— Larry Smarr, Director, NCSA

SIGGRAPH 1989







**"We're using satellite technology…
to demo what It might be like to have
high-speed fiber-optic links between
advanced computers
in two different geographic locations."**

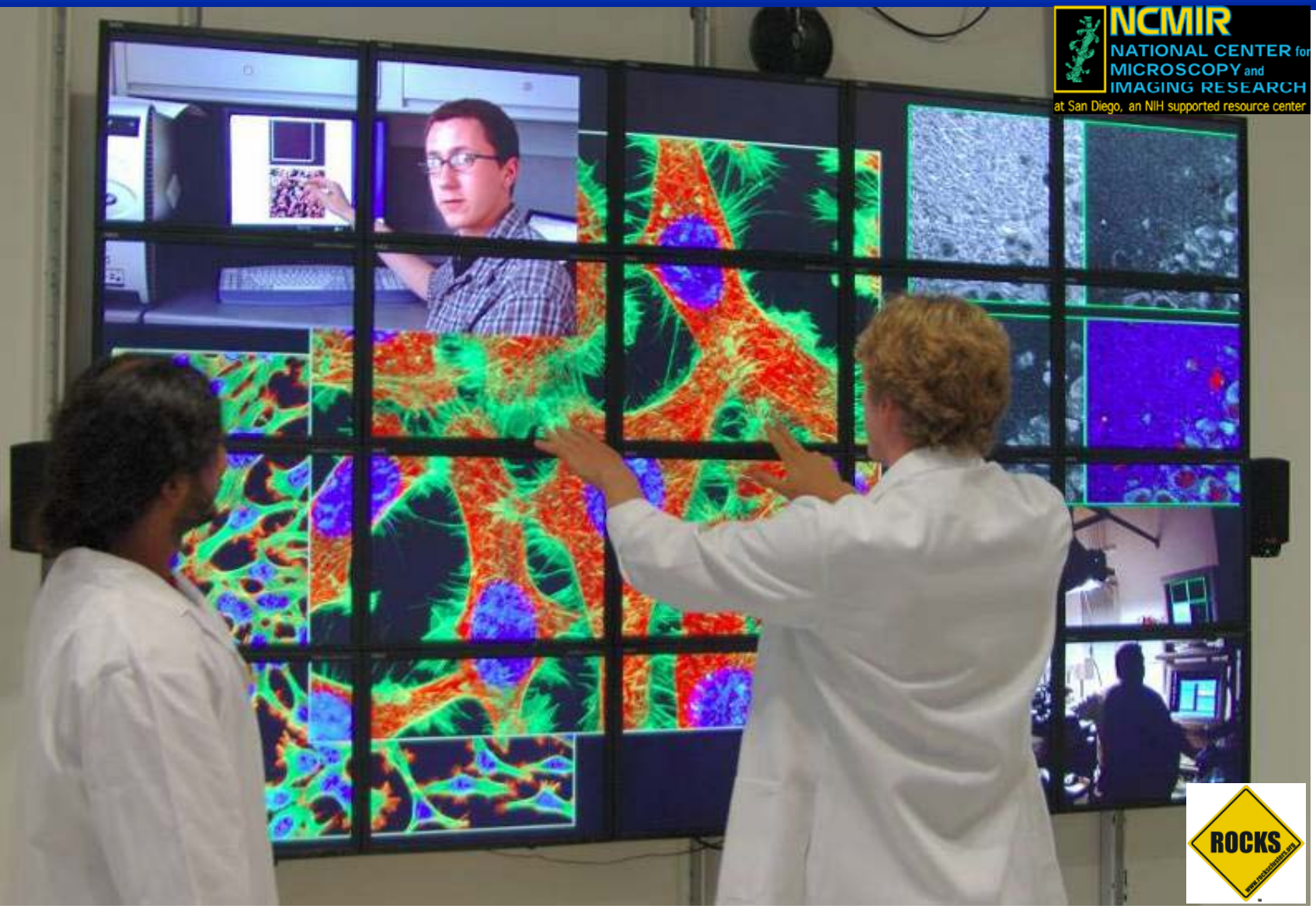
— Al Gore, Senator
Chair, US Senate Subcommittee on Science, Technology and Space

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The OptIPuter Project: High Resolution Collaboratory Over Dedicated Optical Channels to Global Science Data



Scalable Adaptive Graphics Environment (SAGE)

evl electronic visualization laboratory

NSF

Now in Sixth and Final Year

Picture Source: Mark Ellisman, David Lee, Jason Leigh

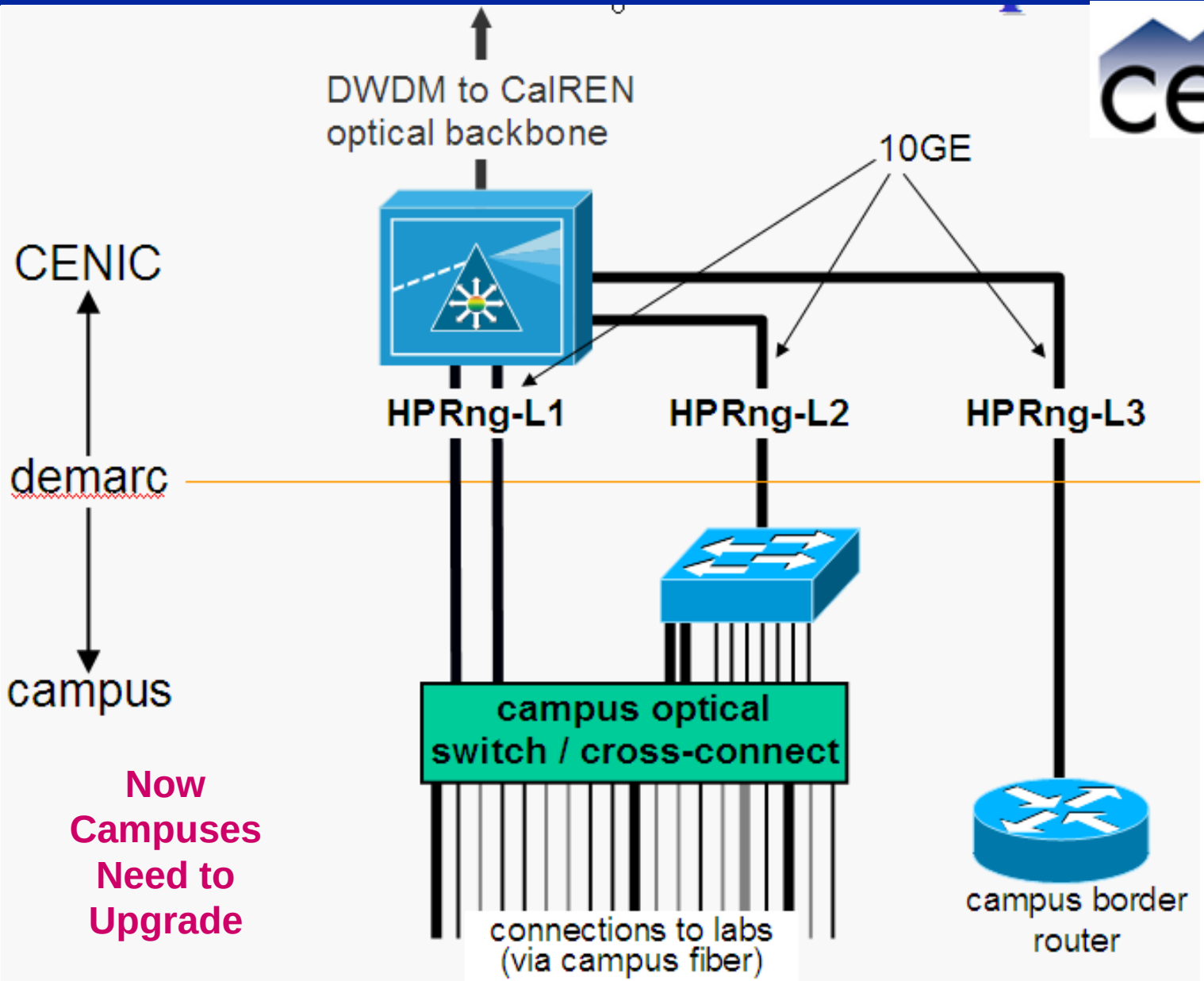
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Calit2 (UCSD, UCI), SDSC, and UIC Leads—Larry Smarr PI
Univ. Partners: NCSA, USC, SDSU, NW, TA&M, UvA, SARA, KISTI, AIST
Industry: IBM, Sun, Telcordia, Chiaro, Calient, Glimmerglass, Lucent

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CENIC's New "Hybrid Network" - Traditional Routed IP and the New Switched Ethernet and Optical Services

~ $14M Invested in Upgrade



Now Campuses Need to Upgrade

Source: Jim Dolgonas, CENIC

The "Golden Spike" UCSD Experimental Optical Core: Ready to Couple Users to CENIC L1, L2, L3 Services



Goals by 2008:

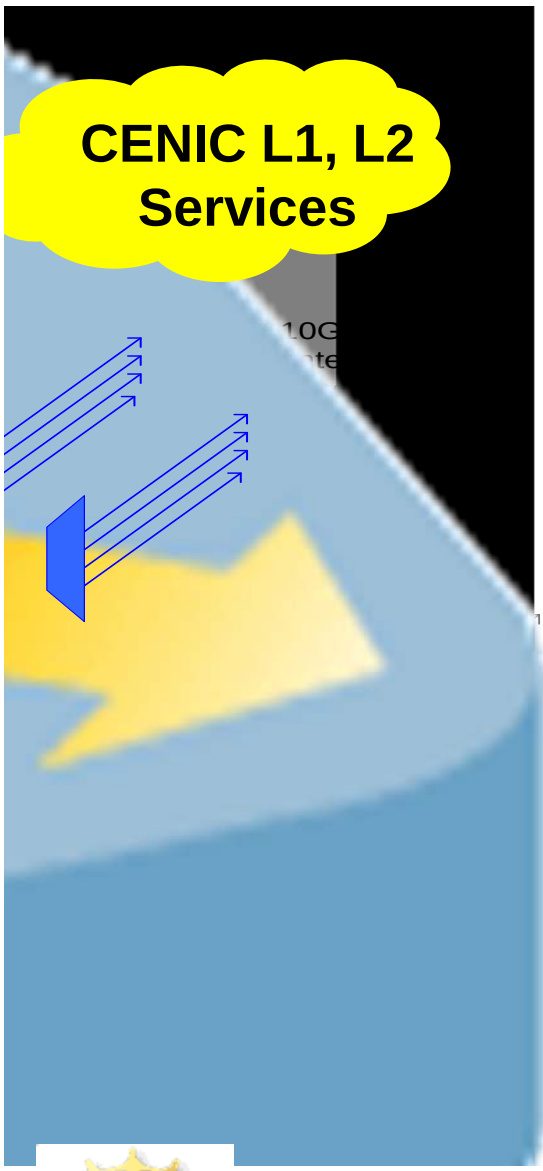
>= 60 endpoints at 10 GigE

>= 30 Packet switched

>= 30 Switched wavelengths

>= 400 Connected endpoints

Approximately 0.5 Tbps Arrive at the "Optical" Center of Hybrid Campus Switch



Funded by NSF MRI Grant

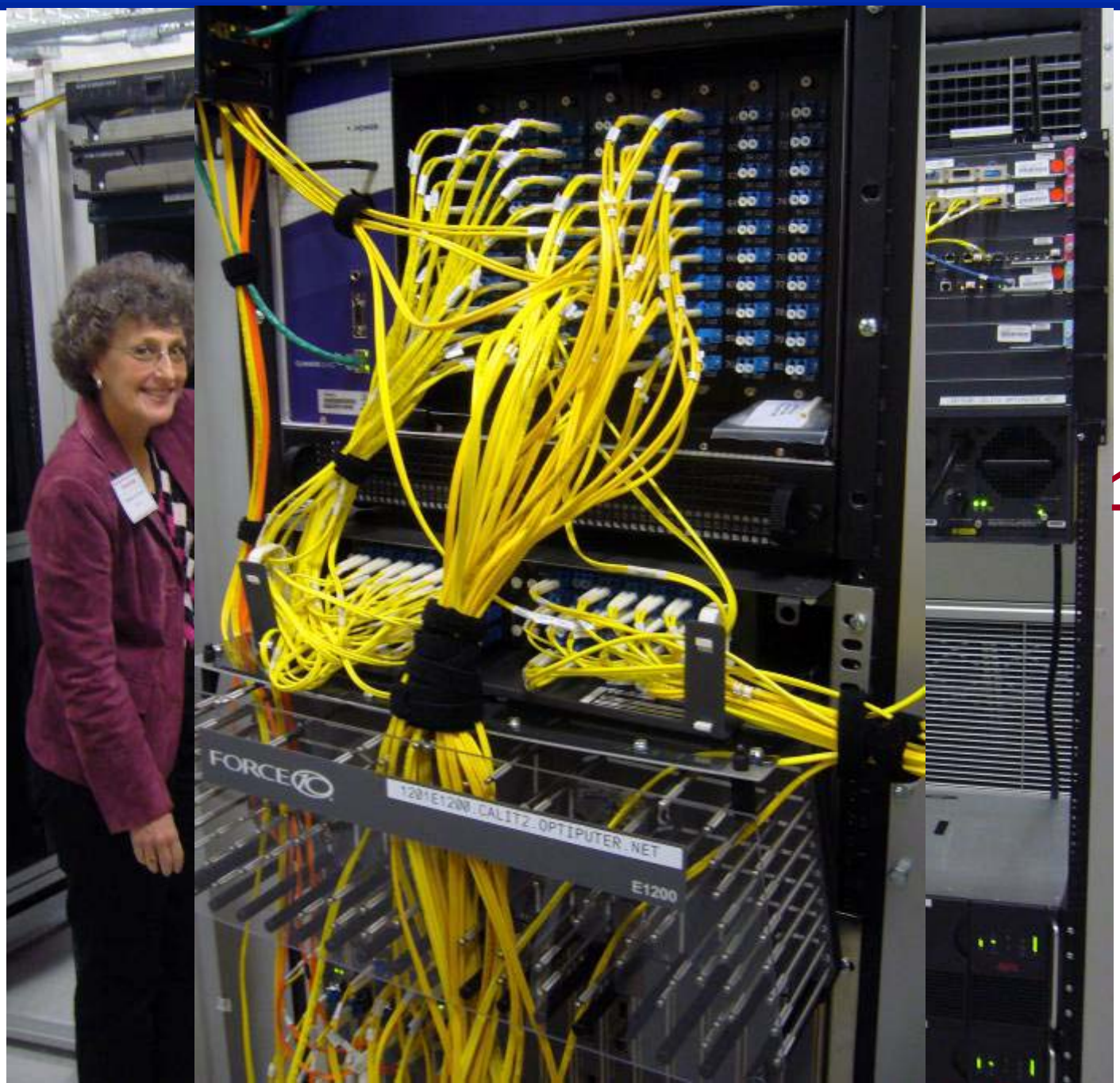
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Source: Phil Papadopoulos, SDSC/Calit2 (Quartzite PI, OptIPuter co-PI)

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Calit2 Sunlight
Optical Exchange Contains Quartzite

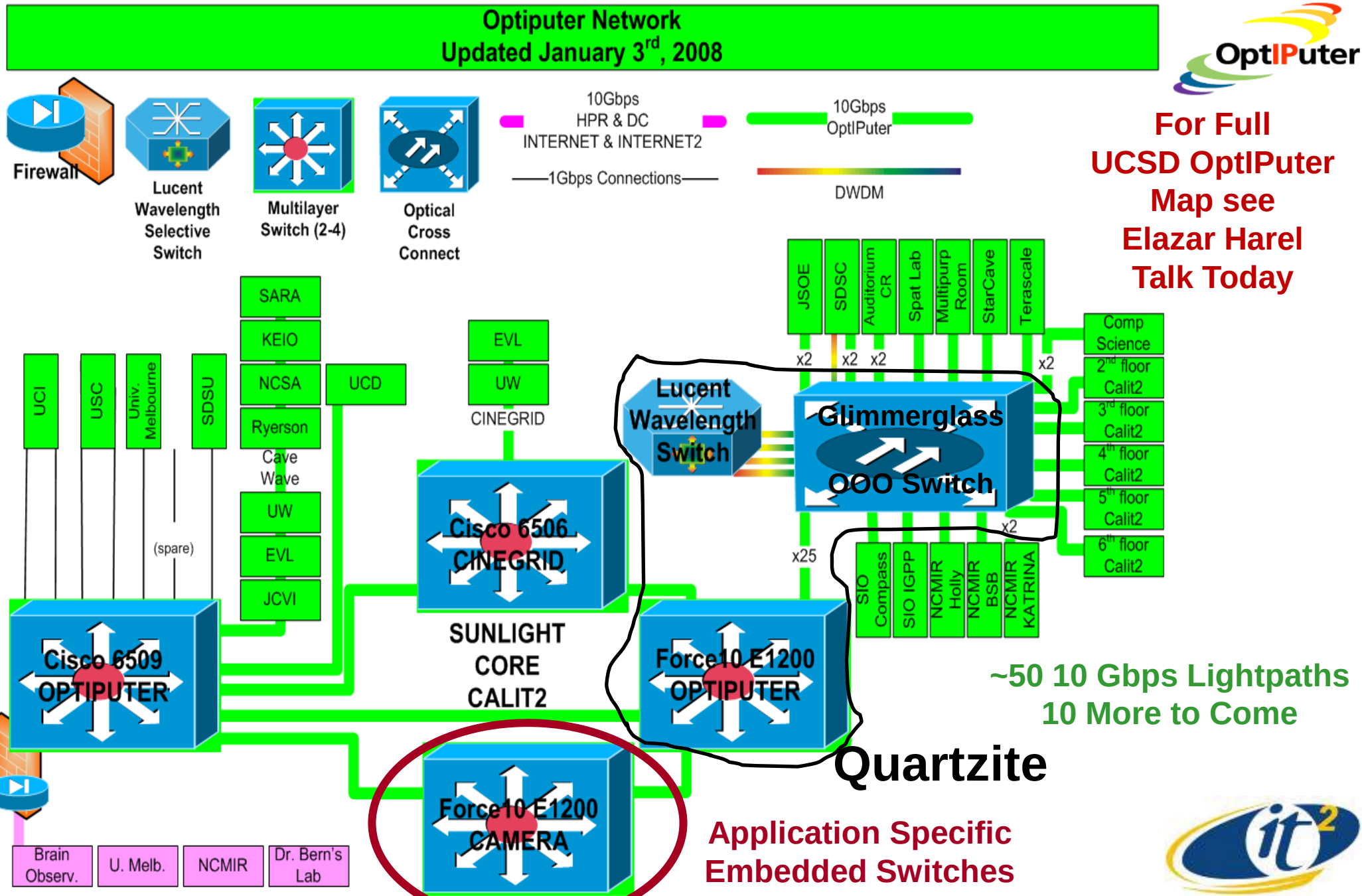


10:45 am Feb. 21, 2008

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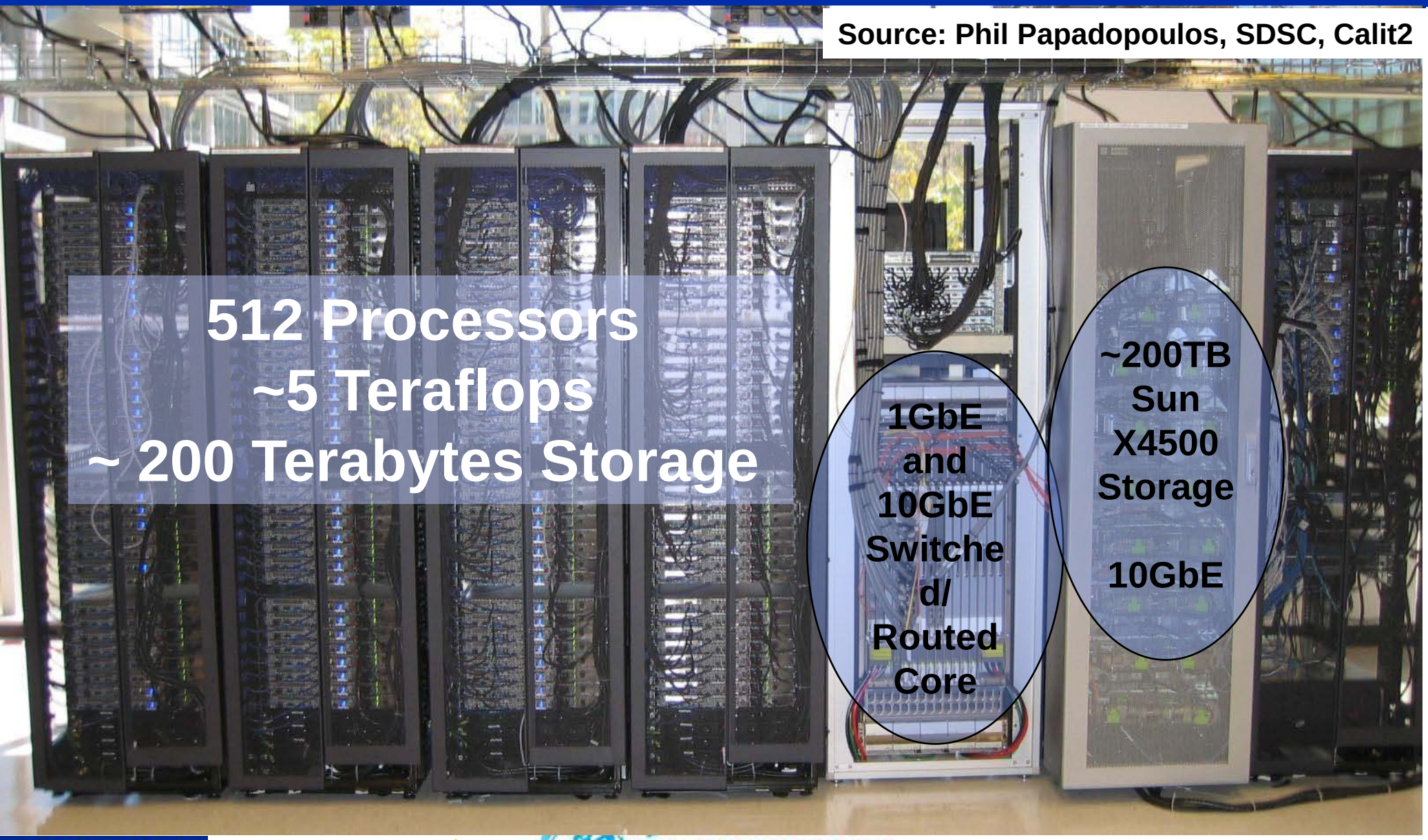
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Block Layout of UCSD Quartzite/OptIPuter Network



Calit2 Microbial Metagenomics Cluster- Next Generation Optically Linked Science Data Server

Source: Phil Papadopoulos, SDSC, Calit2



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CAMERA's
Global Microbial Metagenomics CyberCommunity

2200 Registered Users From Over 50 Countries



camera
Marine Microbial Ecology

J. Craig Venter
INSTITUTE

it²

Embedded iHDTV in an OptIPortal Enables Collaboration



Larry Smarr in Reno

Source: Michael Wellings
Research Channel
Univ. Washington

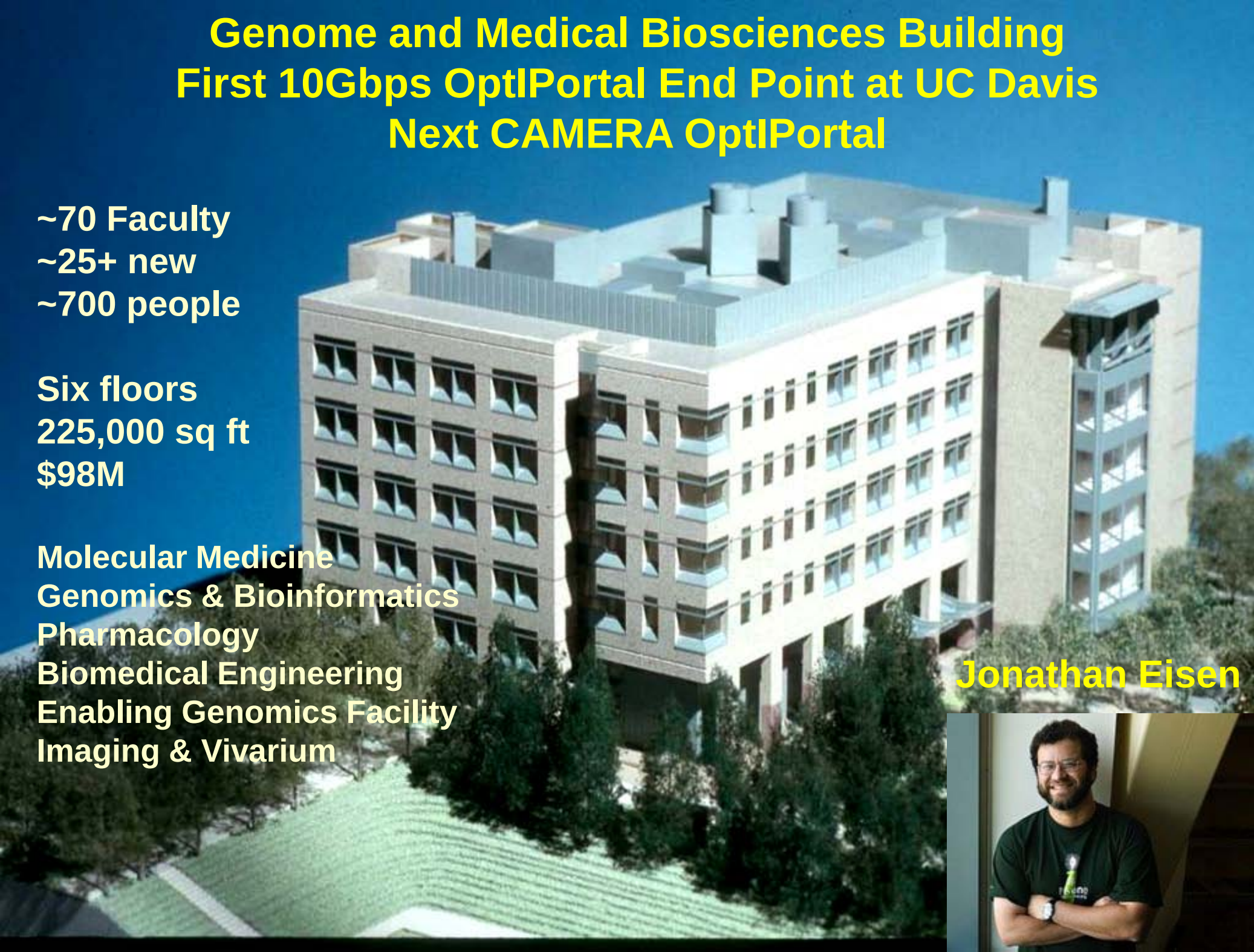
Ginger Armbrust in Seattle

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Genome and Medical Biosciences Building
First 10Gbps OptIPortal End Point at UC Davis
Next CAMERA OptIPortal



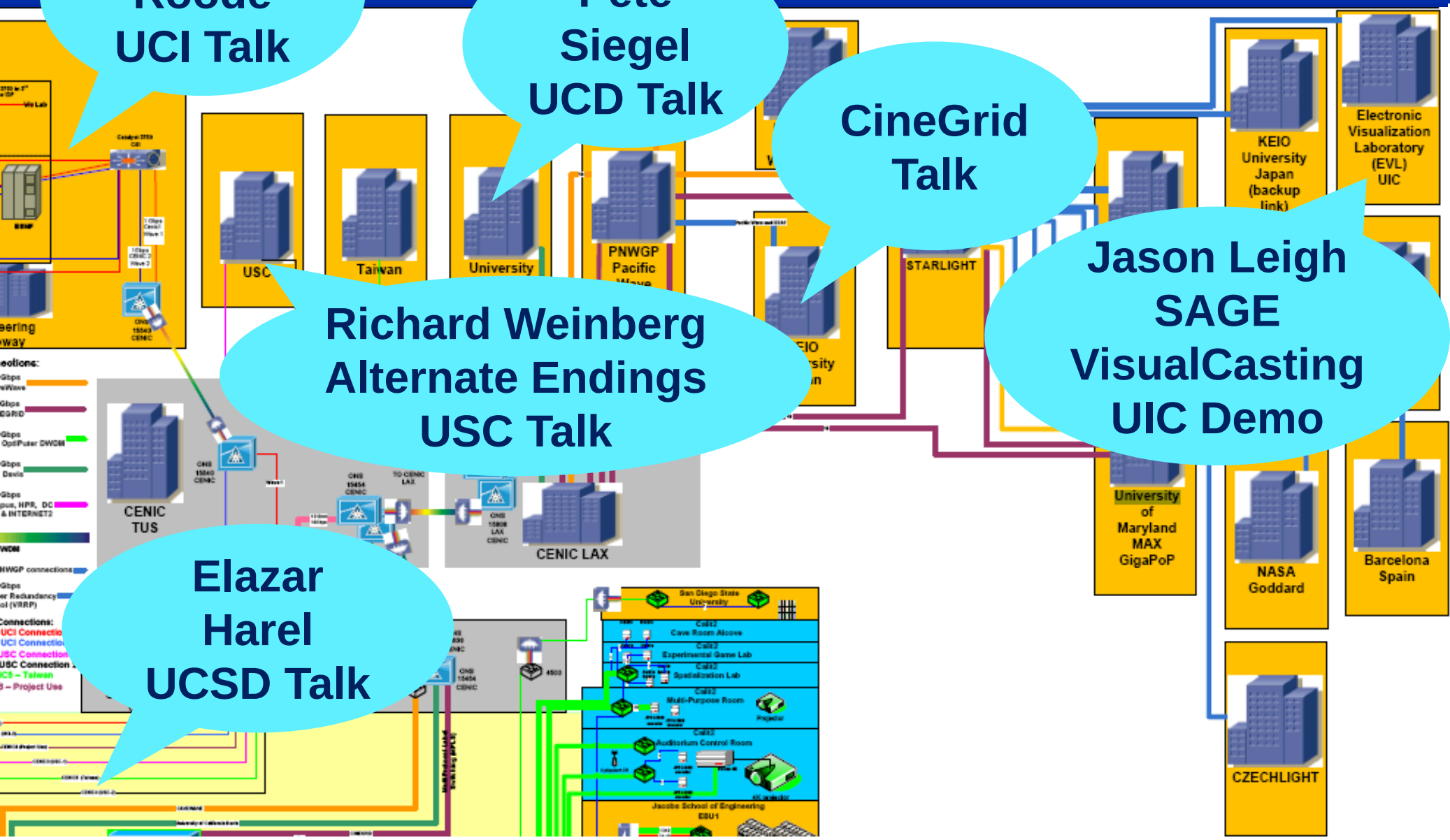
~70 Faculty
~25+ new
~700 people

Six floors
225,000 sq ft
$98M

Molecular Medicine
Genomics & Bioinformatics
Pharmacology
Biomedical Engineering
Enabling Genomics Facility
Imaging & Vivarium

Jonathan Eisen

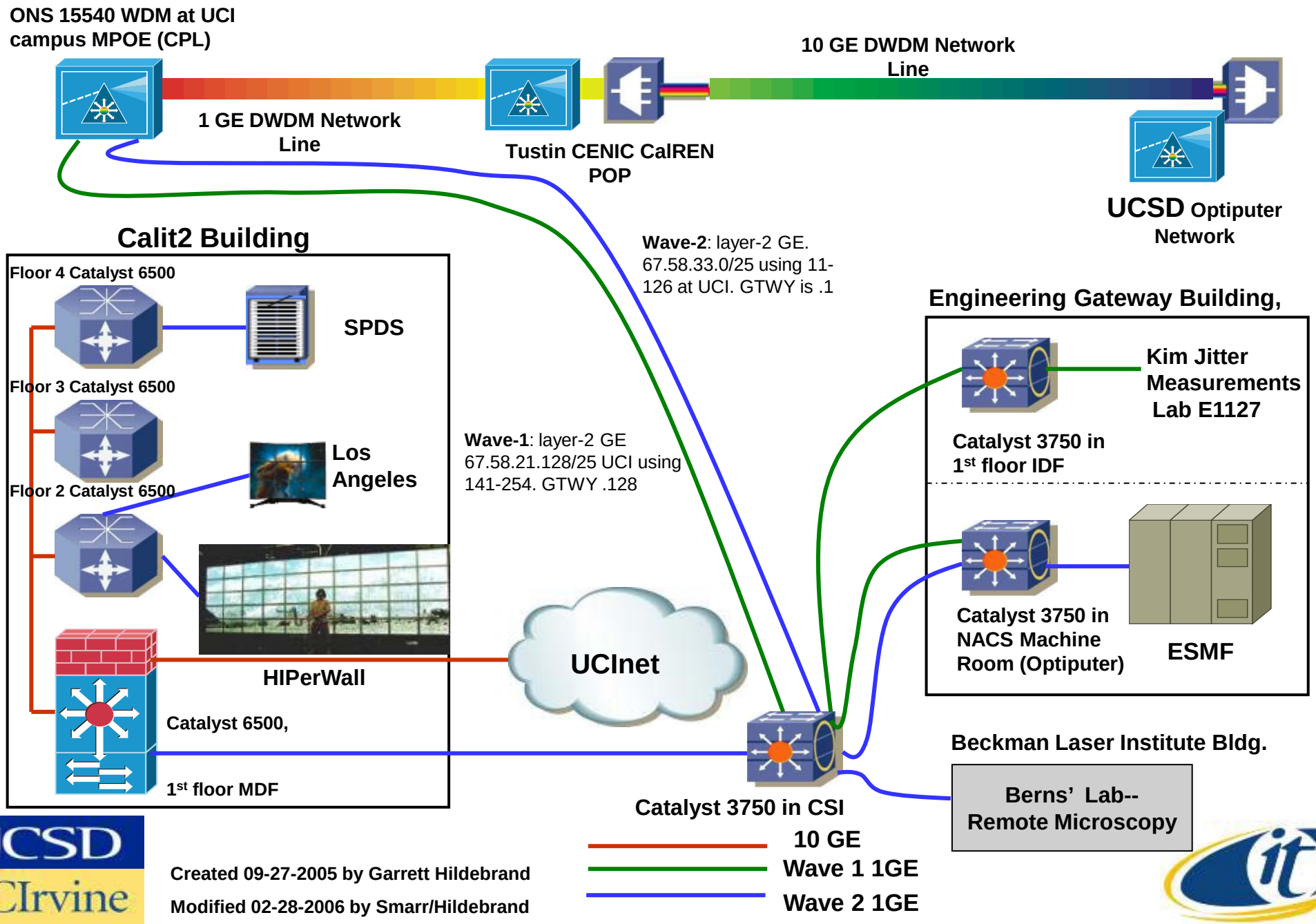
OptIPuter Persistent Global Backplane
...y Expan...d Enabling Applications



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Source:Brian Dunne, Calit2@UCSD

Calit2 at UCI and UCSD Are Prototyping Gigabit Applications— Today 2 Gbps Paths are Used



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Created 09-27-2005 by Garrett Hildebrand

Modified 02-28-2006 by Smarr/Hildebrand

The Calit2 OptIPortals at UCSD and UCI Are Now a Gbit/s HD Collaboratory



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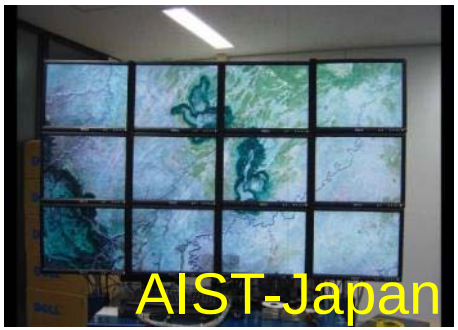
EVL's SAGE VisualCasting Multi-Site OptIPuter Collaboratory

CENIC CalREN-XD Workshop Sept. 15, 2008



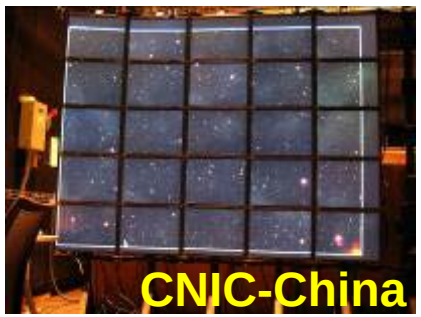
Source: Jason Leigh, Luc Renambot, EVL, UI Chicago

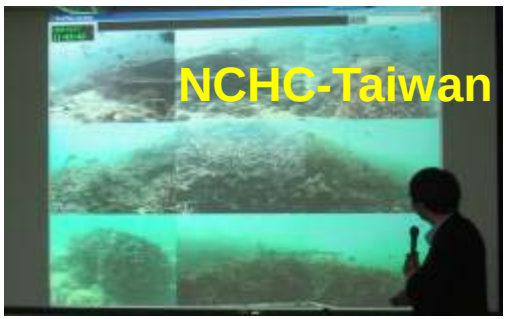
OptIPortals
Are Being Adopted Globally























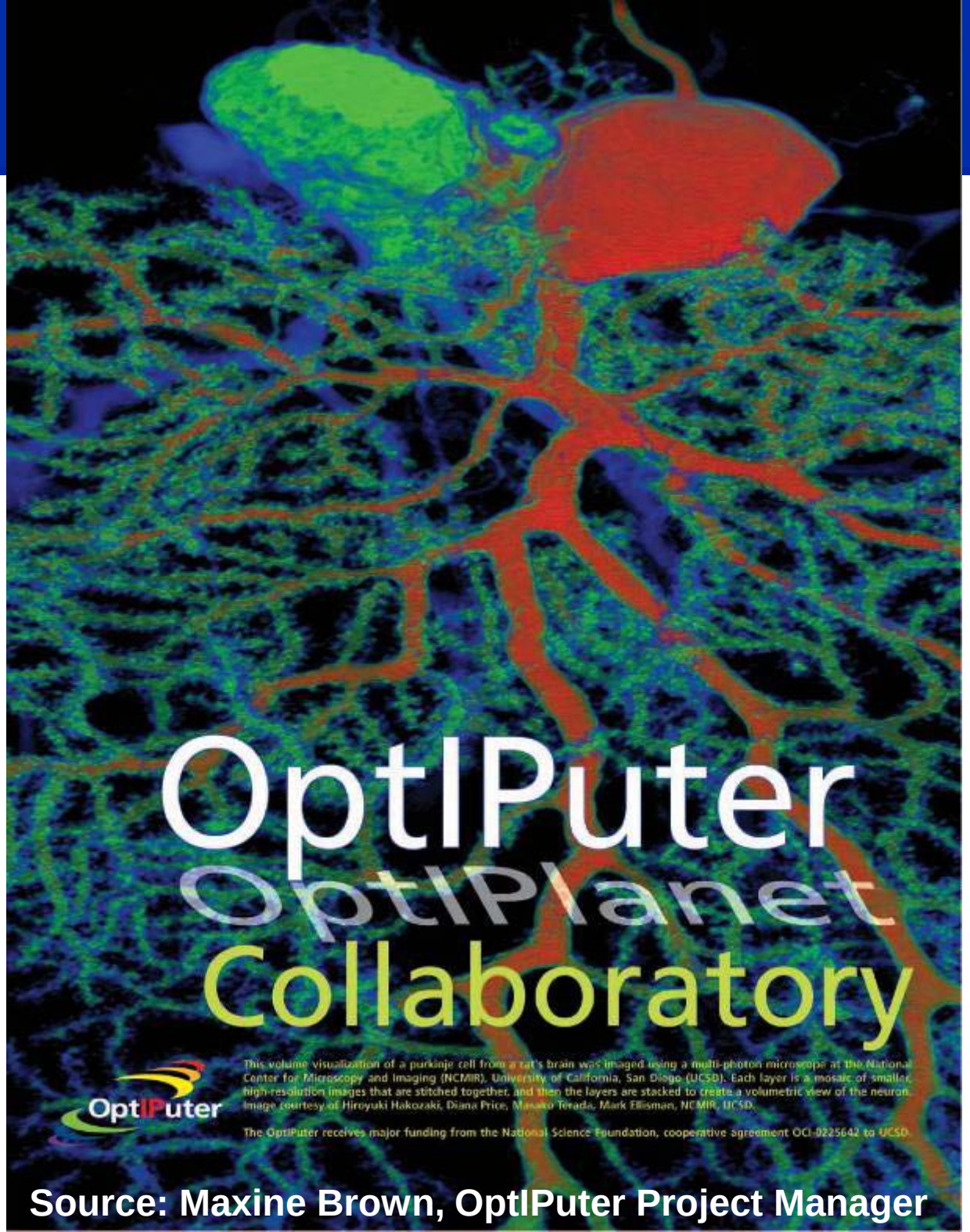


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Powered by Rocks ROCKS

evl electronic visualization laboratory

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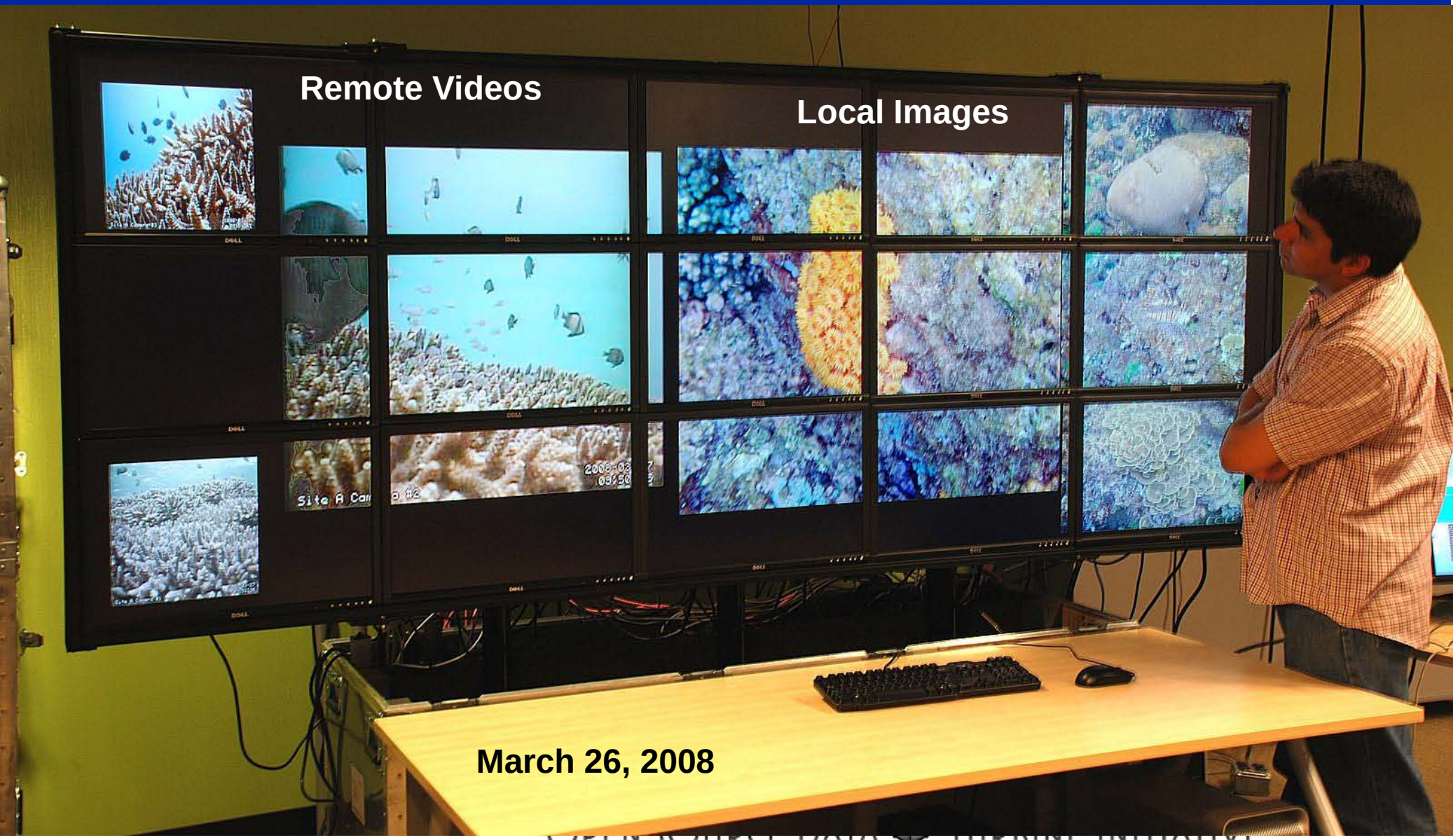
Source: Maxine Brown, OptIPuter Project Manager

Green Initiative:

Can Optical Fiber Replace Airline Travel for Continuing Collaborations ?

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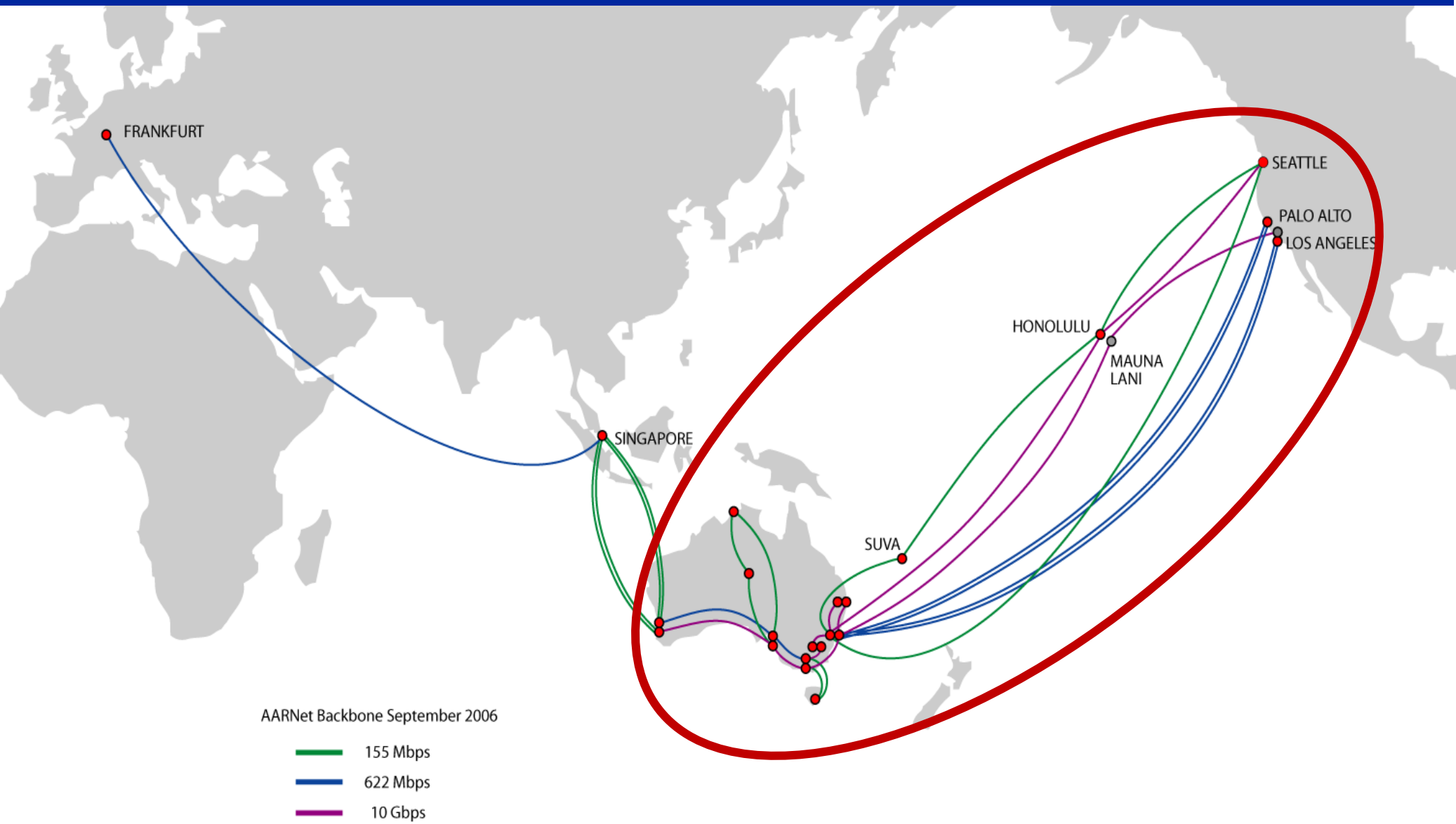
New Year's Challenge: Streaming Underwater Video From Taiwan's Kenting Reef to Calit2's OptIPortal



Empowering the Scientific Community with Streaming Data Middleware

UCSD: Rajvikram Singh, Sameer Tilak, Jurgen Schulze, Tony Fountain, Peter Arzberger
NCHC : Ebbe Strandell, Sun-In Lin, Yao-Tsung Wang, Fang-Pang Lin

Coupling CENIC/PW to AARNet International Network: The Core of the OptIPlanet Collaboratory



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Launch of the 100 Megapixel OzIPortal Over Qvidium Compressed HD on 1 Gbps CENIC/PW/AARNet Fiber



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Covise, Phil Weber, Jurgen Schulze, Calit2
CGLX, Kai-Uwe Doerr , Calit2
www.calit2.net/newsroom/release.php?id=1219

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“Using the Link to Build the Link”
Calit2 and Univ. Melbourne Technology Teams



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No Calit2 Person Physically Flew to Australia to Bring This Up!

www.calit2.net/newsroom/release.php?id=1219

Victoria Premier and Australian Deputy Prime Minister Asking Questions



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www.calit2.net/newsroom/release.php?id=1219

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University of Melbourne Vice Chancellor Glyn Davis in Calit2 Replies to Question from Australia



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OptIPuterizing Australian Universities in 2008: CENIC Coupling to AARNet



UMelbourne/Calit2 Telepresence Session May 21, 2008

Augmented by Many Physical Visits This Year
Culminating in Two Week Lecture Tour
of Australian Research Universities
by Larry Smarr October 2008

Phil Scanlan
Founder-
Australian American
Leadership Dialogue
www.aald.org

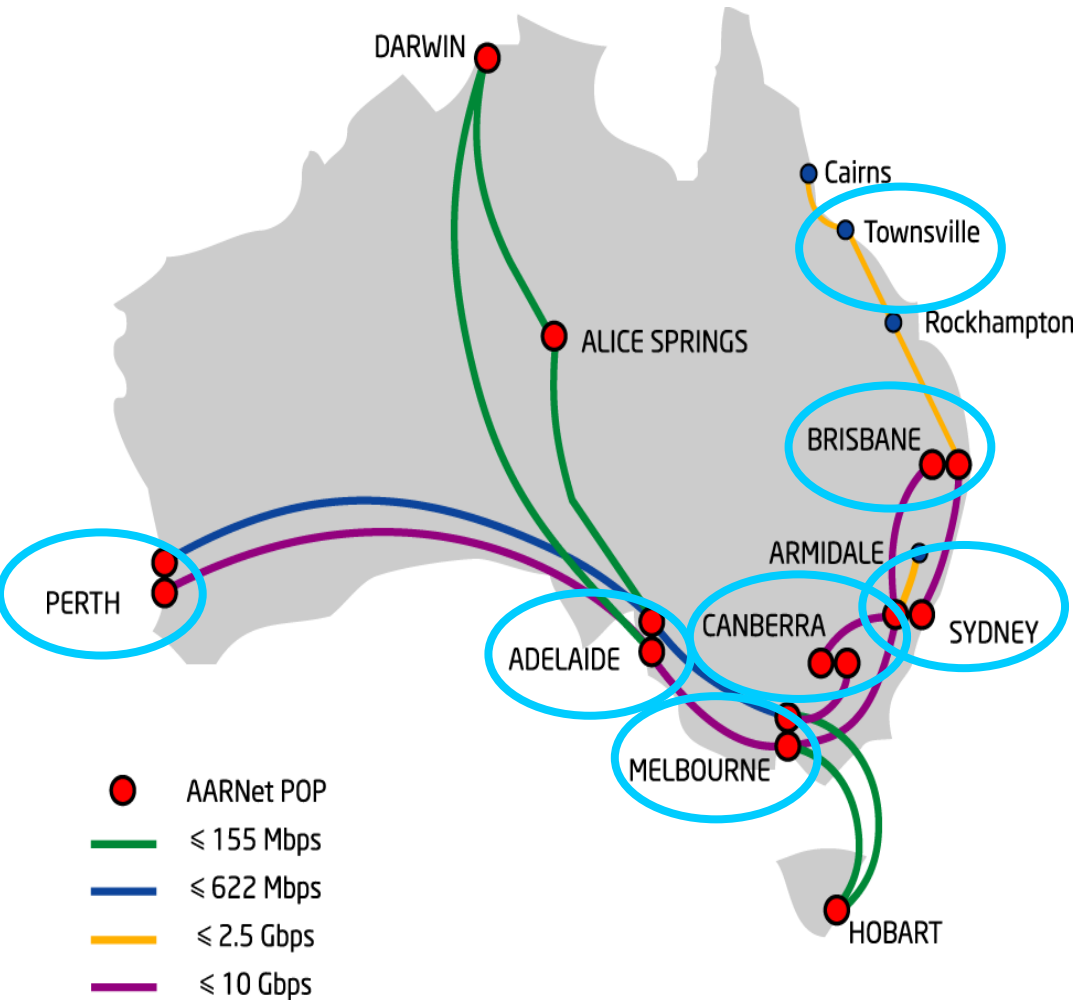


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Smarr American Australian Leadership Dialogue OptIPlanet Collaboratory Lecture Tour October 2008

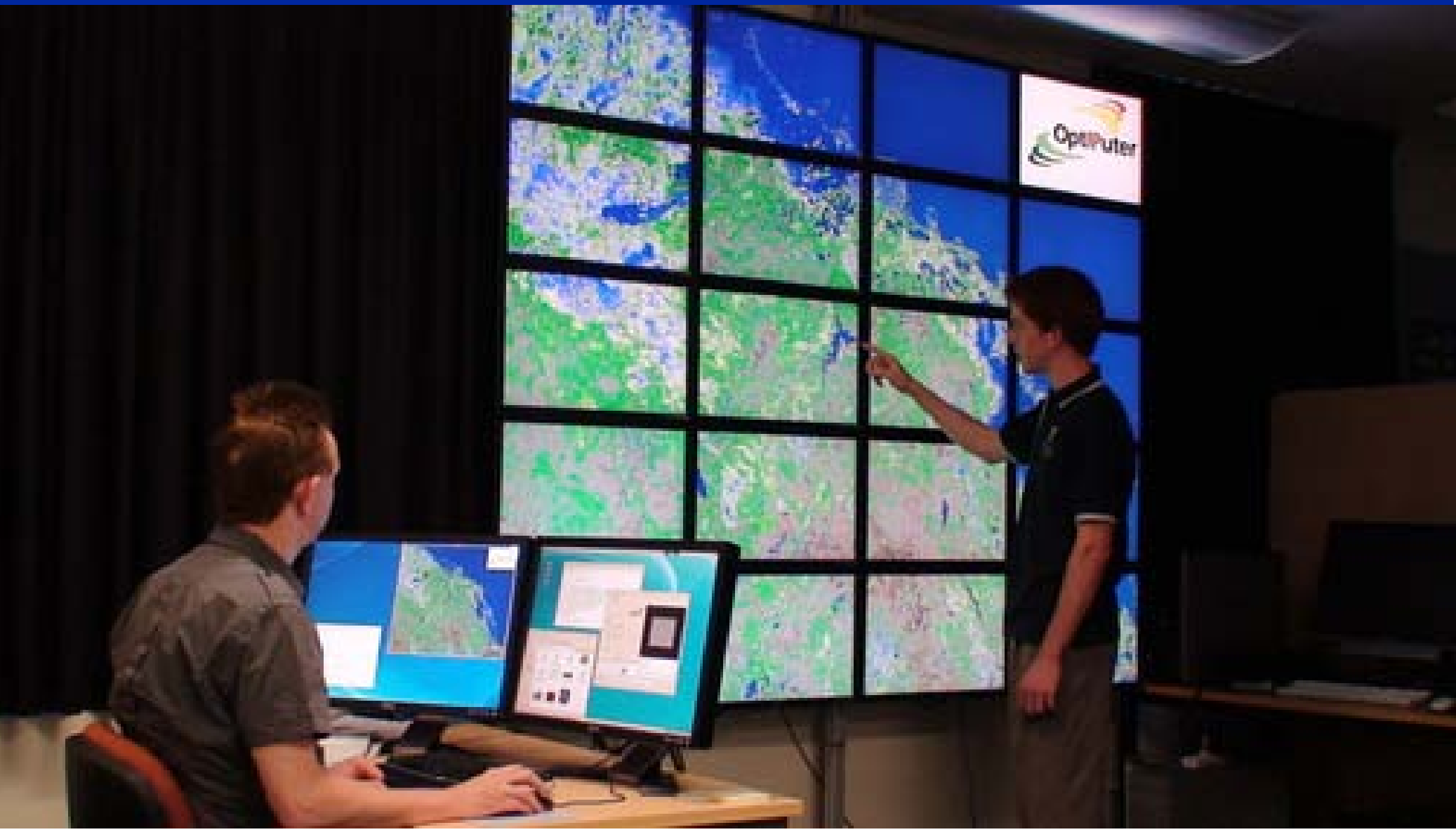
AARNet National Network



- Oct 2—University of Adelaide
- Oct 6—Univ of Western Australia
- Oct 8—Monash Univ.; Swinburne Univ.
- Oct 9—Univ. of Melbourne
- Oct 10—Univ. of Queensland
- Oct 11—AIMS, James Cook Univ., Townsville
- Oct 13—Univ. of Technology, Sydney
- Oct 14—Univ. of New South Wales
- Oct 15—Leadership Dialogue Scholar Oration, Canberra
- Oct 16—CSIRO OptIPortal Dedication; ANU; AARNet
- Oct 16—Sydney Univ.

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University of Queensland OptIPortal

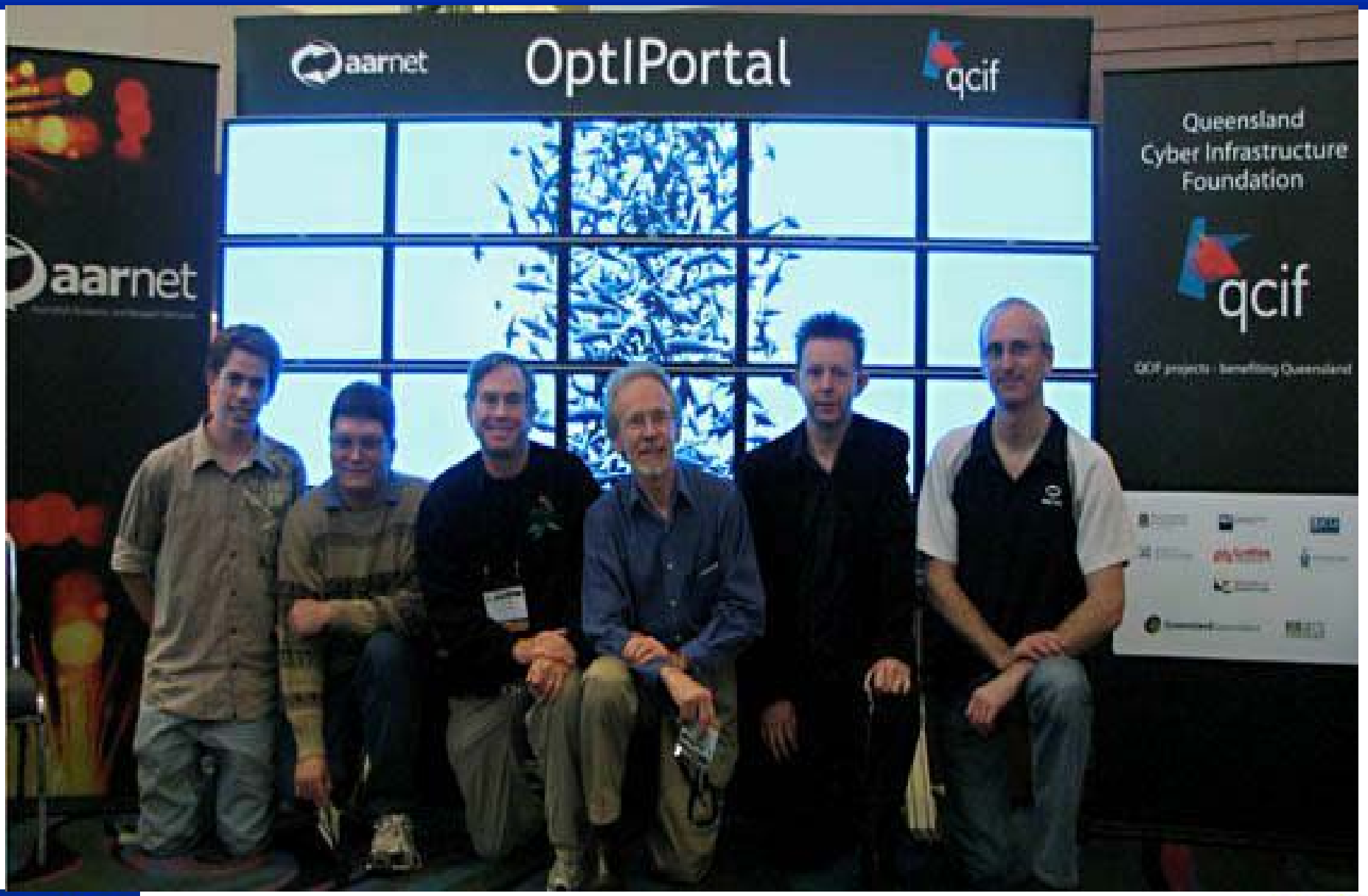


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B. Pailthorpe, Univ. Queensland, April '08
www.vislab.uq.edu.au/research/optiputer/

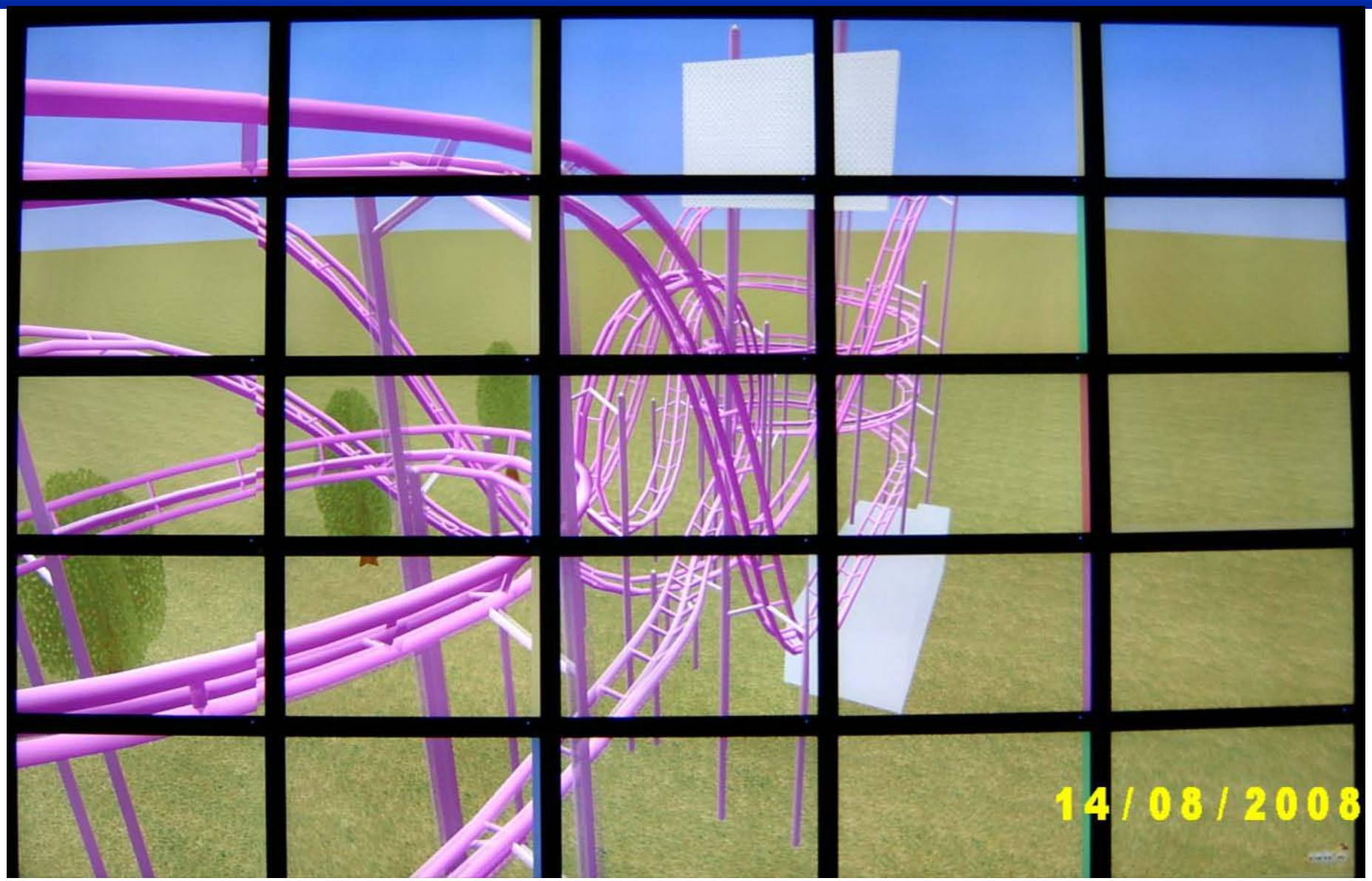
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OptIPortable - at QuestNet-08 too!



B. Pailthorpe, QciF at QuestNet, July'08

OptIPortal in Canberra Discovery Center



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Source: Dave Smith, CSIRO ICT Centre

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HD Talk to Monash University from Calit2



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AARNet 10Gbps Access Product is Here!!!

- **HD and Other High Bandwidth Applications Combined with “Big Research” Pushing Large Data Sets Means 1 Gbps is No Longer Adequate for All Users**

- **Will Permit Rresearchers to Exchange Large Amounts of Data within Australia, and Internationally via SXTransPORT**





Slide From Chris Hancock, CEO AARNet