OptIPlanet Collaboratory

Invited Talk

7th Annual ON*VECTOR International Photonics Workshop

Calit2@UCSD

February 20, 2008

Dr. Larry Smarr

Director, California Institute for Telecommunications and Information Technology

Harry E. Gruber Professor,

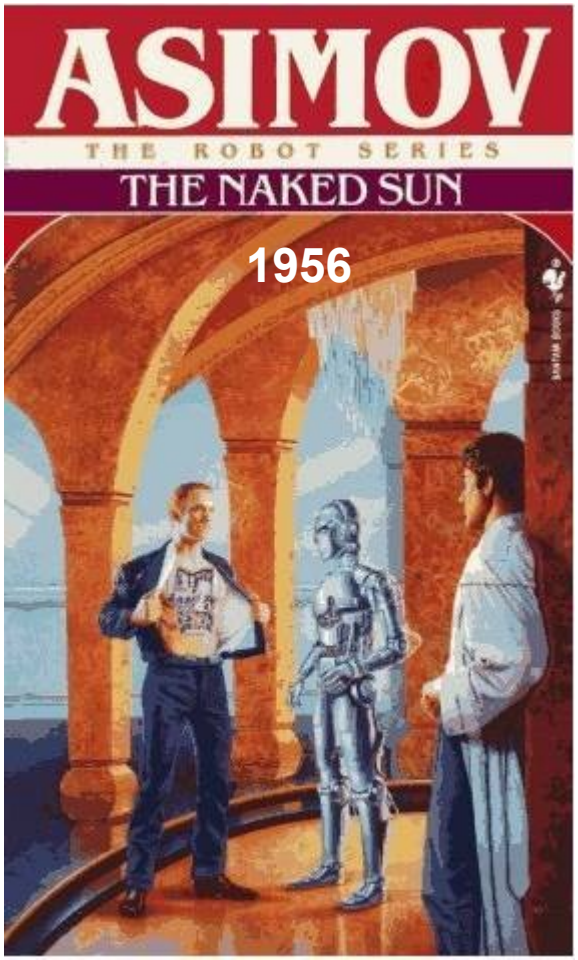
Dept. of Computer Science and Engineering

Jacobs School of Engineering, UCSD

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Fifty Years Ago, Asimov Described a World of Telepresence



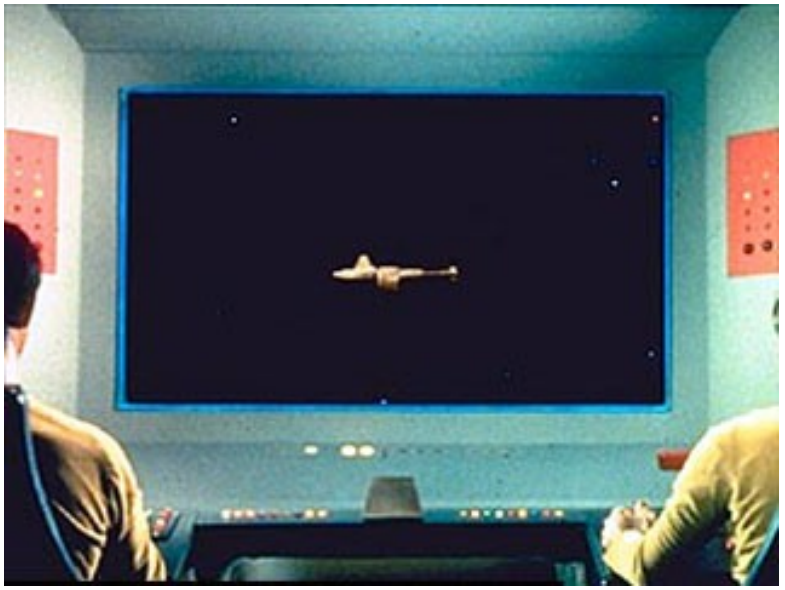
A policeman from Earth, where the population all lives underground in close quarters, is called in to investigate a murder on a distant world. This world is populated by very few humans, rarely if ever, coming into physical proximity of each other. Instead the people "View" each other with trimensional “holographic” images.

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TV and Movies of 40 Years Ago Envisioned Telepresence Displays









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Source: Star Trek 1966-68; Barbarella 1968

it²

The Beginnings of Commercialization: PicturePhone Introduced 40 Years Ago



NEW LOOK PICTUREPHONE

Now you can *see* as well as talk The Picturephone has Touch-Tone controls to make calls and control the television screen so you can see the person you're talking to, be seen yourself, or have a darkened screen. Attended service between New York, Washington and Chicago began in 1964.

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www.bellsystemmemorial.com/telephones-picturephone.html

it²

The Bellcore VideoWindow -- A Working Telepresence Experiment



(1989)

"Imagine sitting in your work place lounge having coffee with some colleagues. Now imagine that you and your colleagues are still in the same room, but are separated by a large sheet of glass that does not interfere with your ability to carry on a clear, two-way conversation. Finally, imagine that you have split the room into two parts and moved one part 50 miles down the road, without impairing the quality of your interaction with your friends."

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Source: Fish, Kraut, and Chalfonte-CSCW 1990 Proceedings

it²

A Simulation of Telepresence
Using Analog Communications to Prototype the Digital 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

- **Televisualization:**
  - **Telepresence**
  - **Remote Interactive Visual Supercomputing**
  - **Multi-disciplinary Scientific Visualization**





ATT & Sun



"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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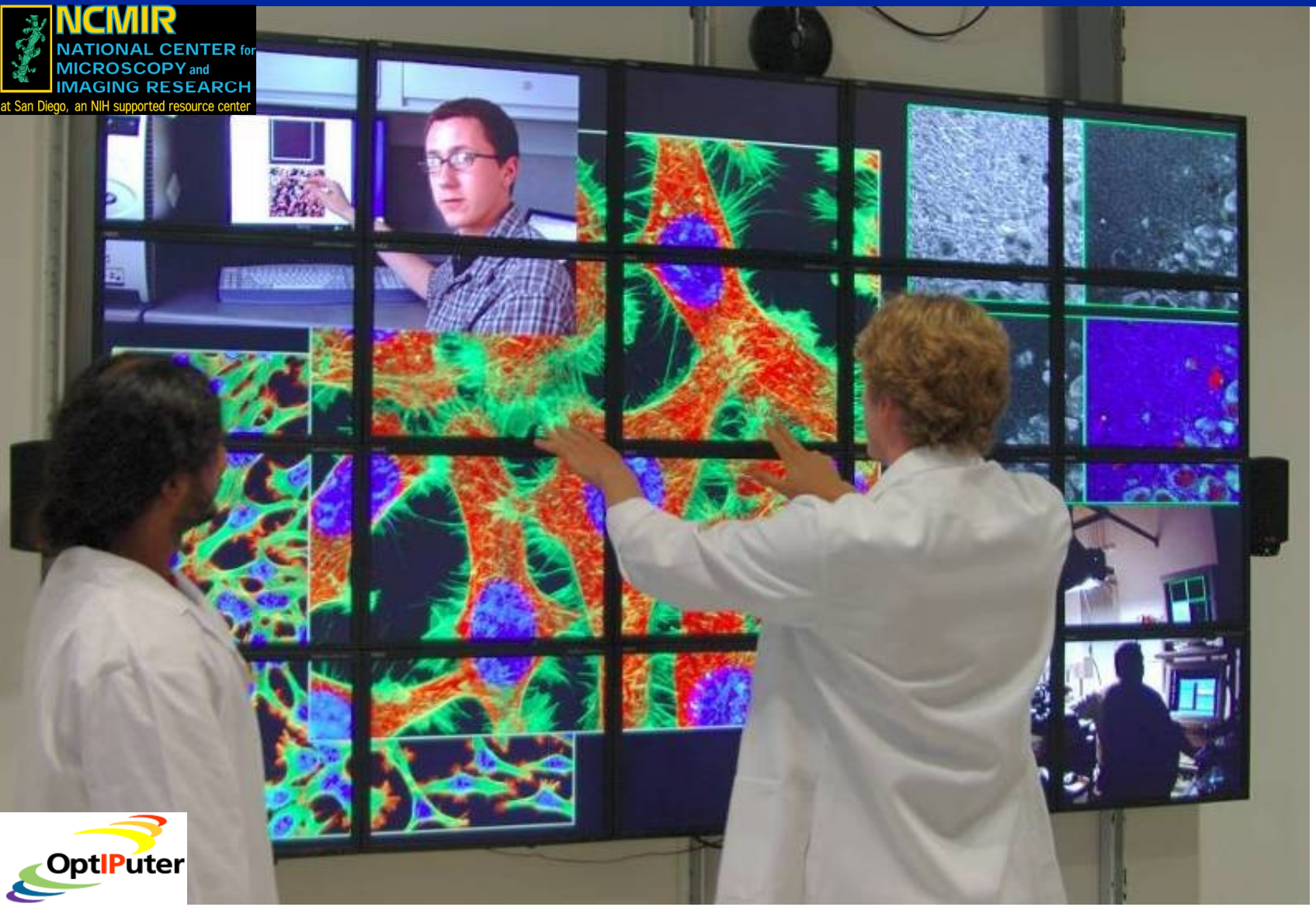
SIGGRAPH 1989

NCSA™

it²

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

NCMIR
NATIONAL CENTER for MICROSCOPY and IMAGING RESEARCH
at San Diego, an NIH supported resource center



Scalable Adaptive Graphics Environment (SAGE)

evl electronic visualization laboratory

NSF

Now in Sixth and Final Year

Picture Source: Mark Ellisman, David Lee, Jason Leigh

OptIPuter

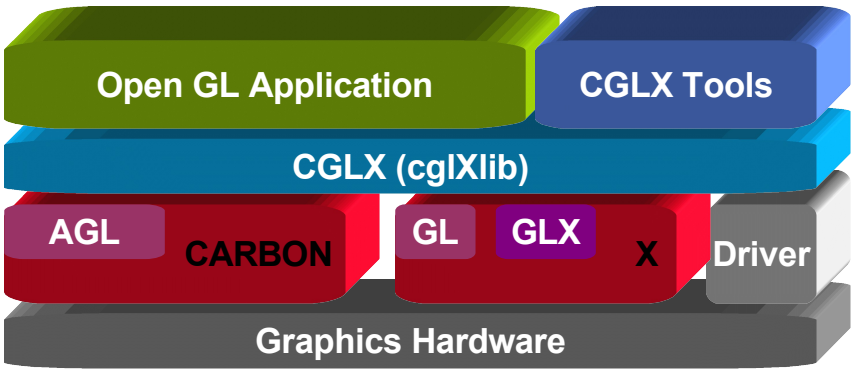
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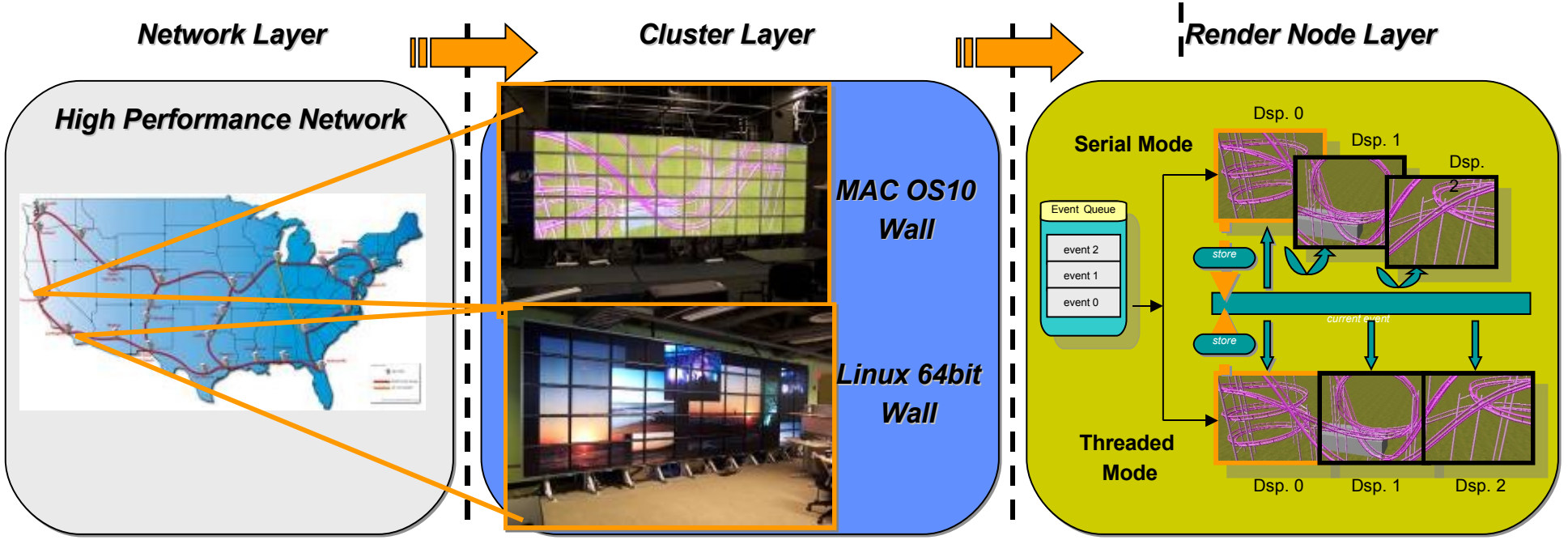
Calit2 (UCSD, UCI) and UIC Lead Campuses—Larry Smarr PI
Univ. Partners: SDSC, USC, SDSU, NW, TA&M, UvA, SARA, KISTI, AIST
Industry: IBM, Sun, Telcordia, Chiaro, Calient, Glimmerglass, Lucent

it²

Rocks/CGLX OptIPortal Uses OpenGL Hardware Accelerated

- **CGLX features:**
  - Cross-Platform Hardware Accelerated Rendering
  - Synchronized Multi-Layer OpenGL Context Support
  - Distributed Event Management
  - Scalable Multi Display Support





Source: Kai-Uwe Doerr, Falko Kuester, Calit2

The OptIPuter Enabled Collaboratory: Remote Researchers Jointly Exploring Complex Data



Falko Kuester, UCSD;
Steven Jenks, UCI

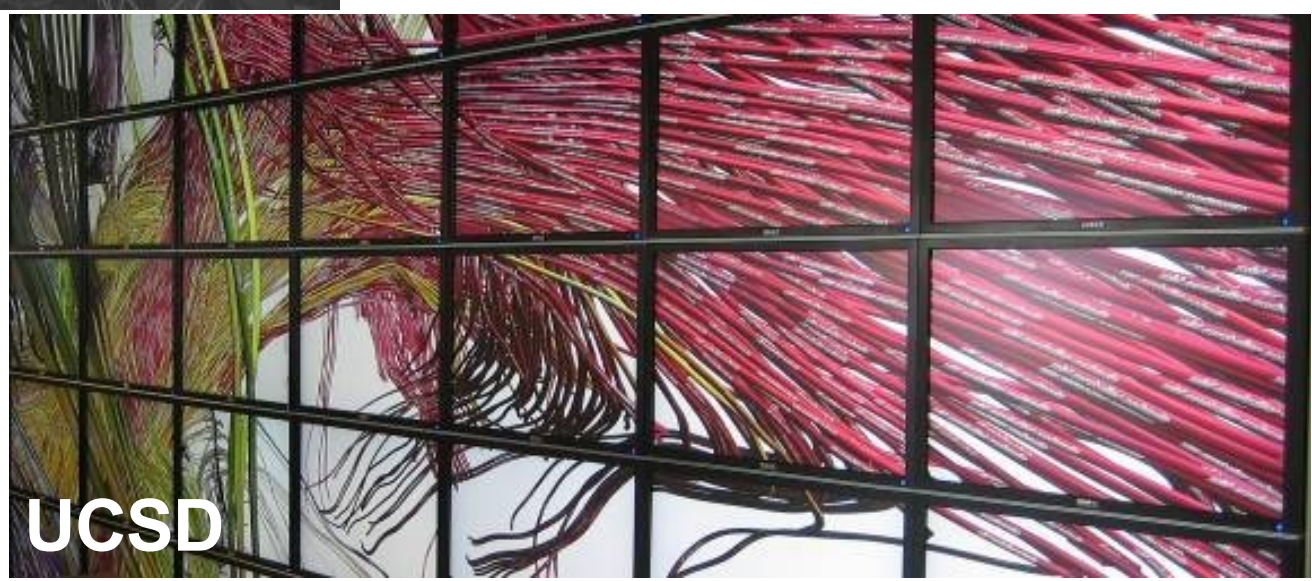
OptIPuter

2,000 Mbps

CGLX

80 NVIDIA Quadro FX 5600 GPUs

OptIPuter Connects the Calit2@UCI 200M-Pixel Wall to the 220M-Pixel Display at Calit2@UCSD With Shared Fast Deep Storage and High Definition Video

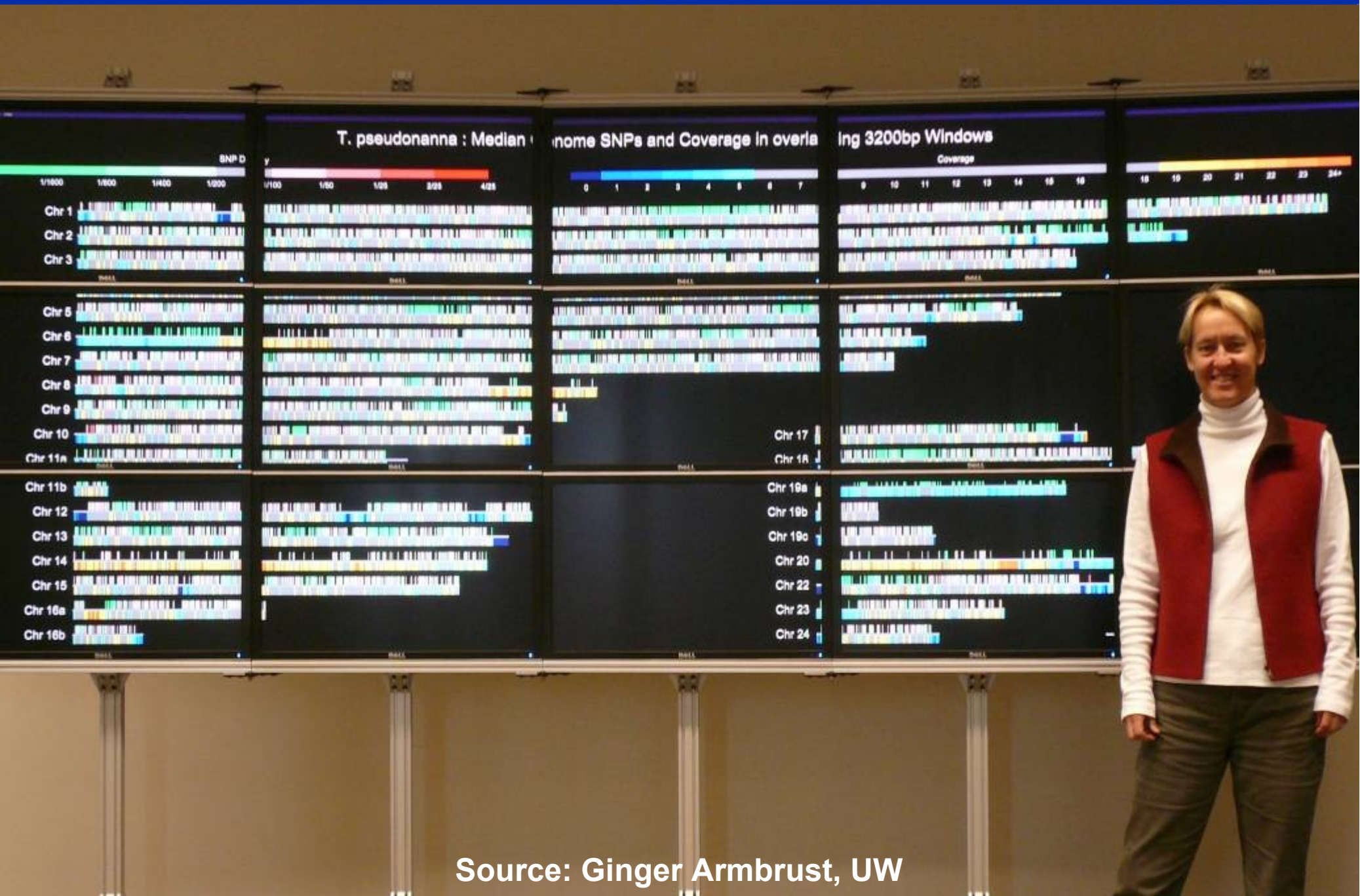


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Brain Circuitry Modeling and Visualization
In Collaboration with the
Transdisciplinary Imaging Genetics Center (TIGC) at UCI

it²

New Genome Wall at UWashington
Chromosomes of Marine Diatom Thallasiosira Pseudonanna



Source: Ginger Armbrust, UW

Embedded iHDTV in an OptIPortal Enables Collaboration Over 10G Pacific Wave Link



Larry Smarr in Reno

Source: Michael Wellings
Research Channel
Univ. Washington

Ginger Armbrust in Seattle

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SC07 is the International Conference for High Performance Computing, Networking, Storage and Analysis



it²

An Emerging High Performance Collaboratory for Microbial Metagenomics

camera
Marine Microbial Ecology

OptIPortals

NLR

UW

UC Davis

UCI

SIO

UCSD

SDSU

CICESE

UIC EVL

UMich

MIT

JCVI

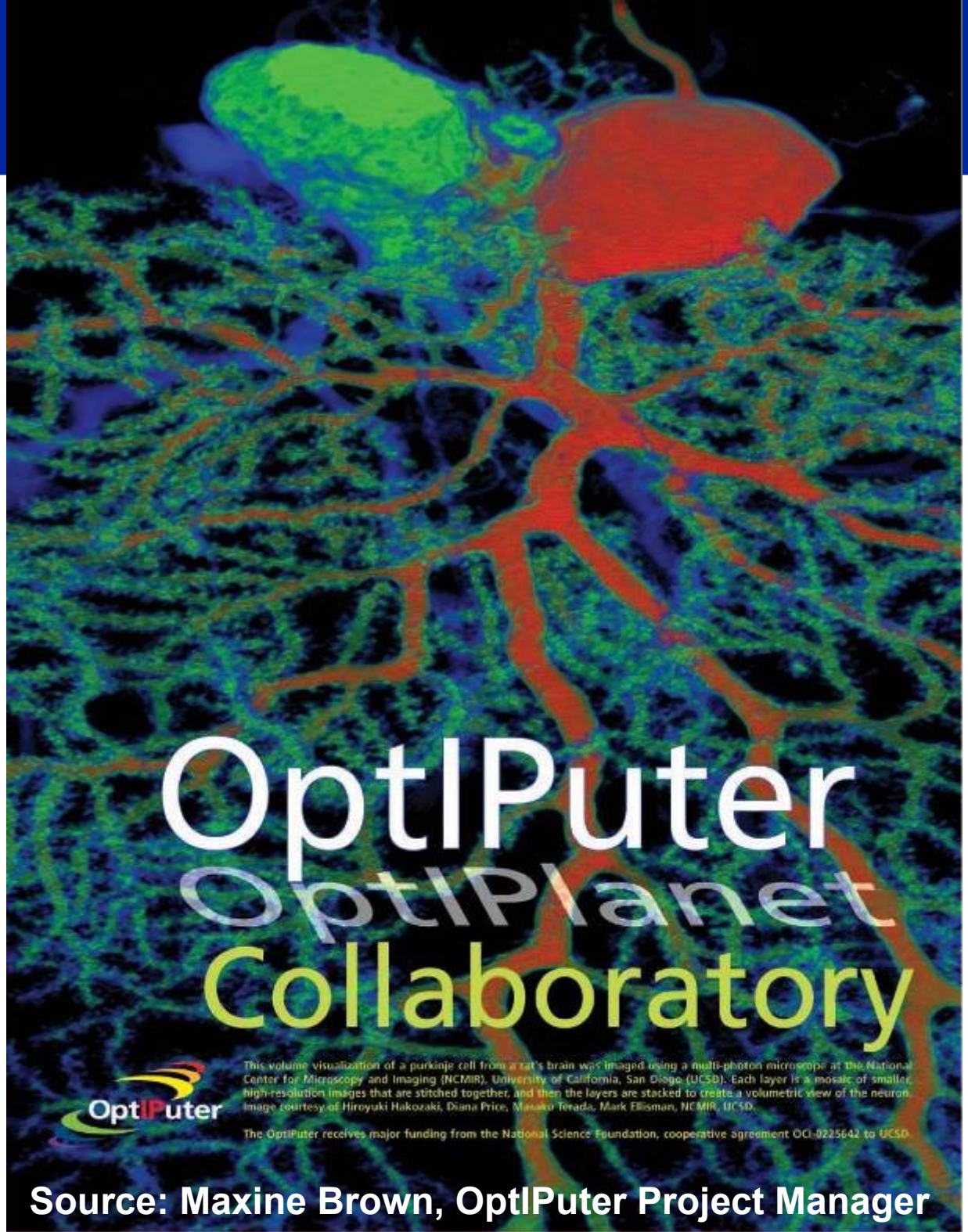
J. Craig Venter INSTITUTE





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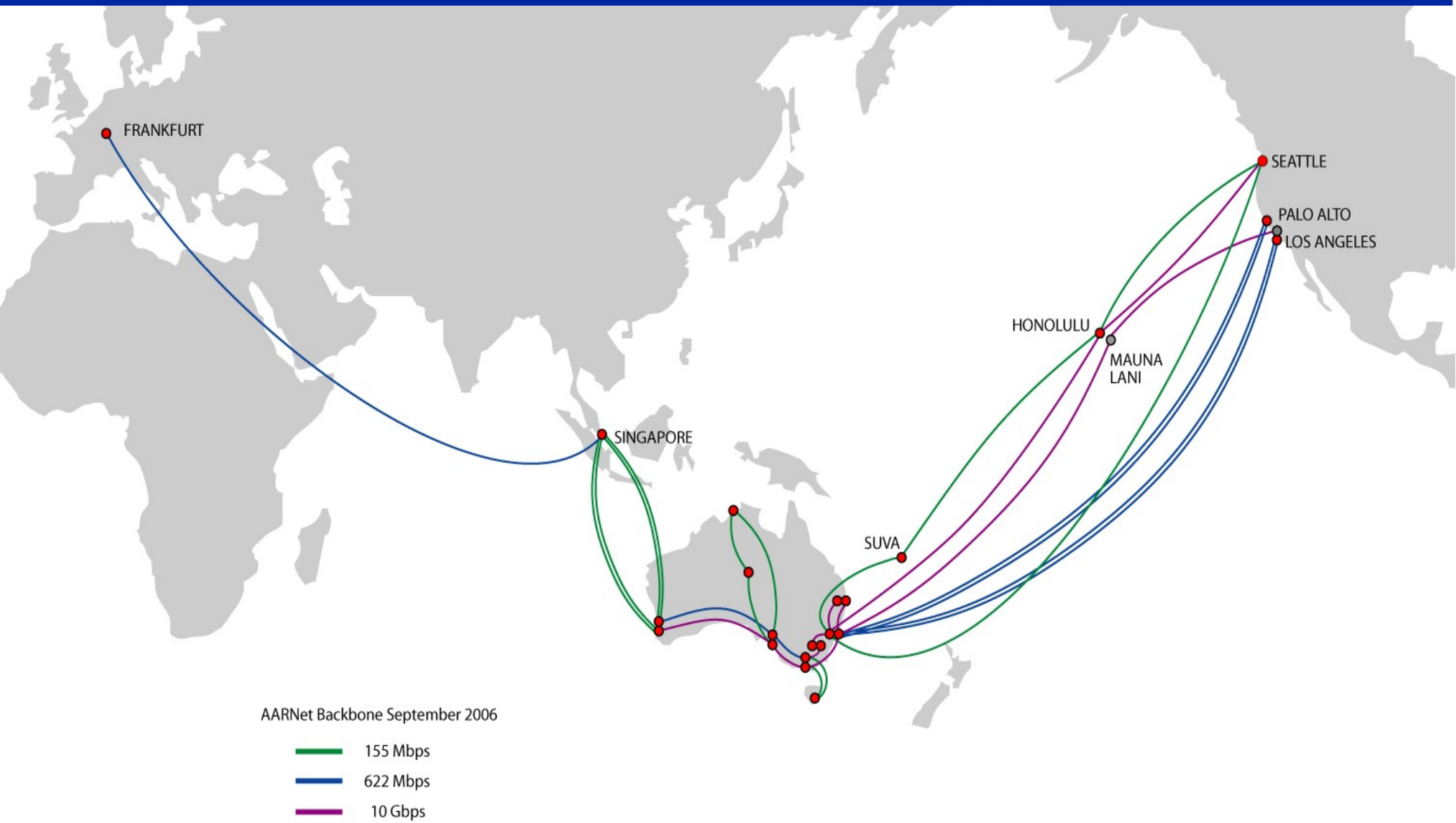
Source: Maxine Brown, OptIPuter Project Manager

Green Initiative:

Can Optical Fiber Replace Airline Travel for Continuing Collaborations ?

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AARNet International Network



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

it²

“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

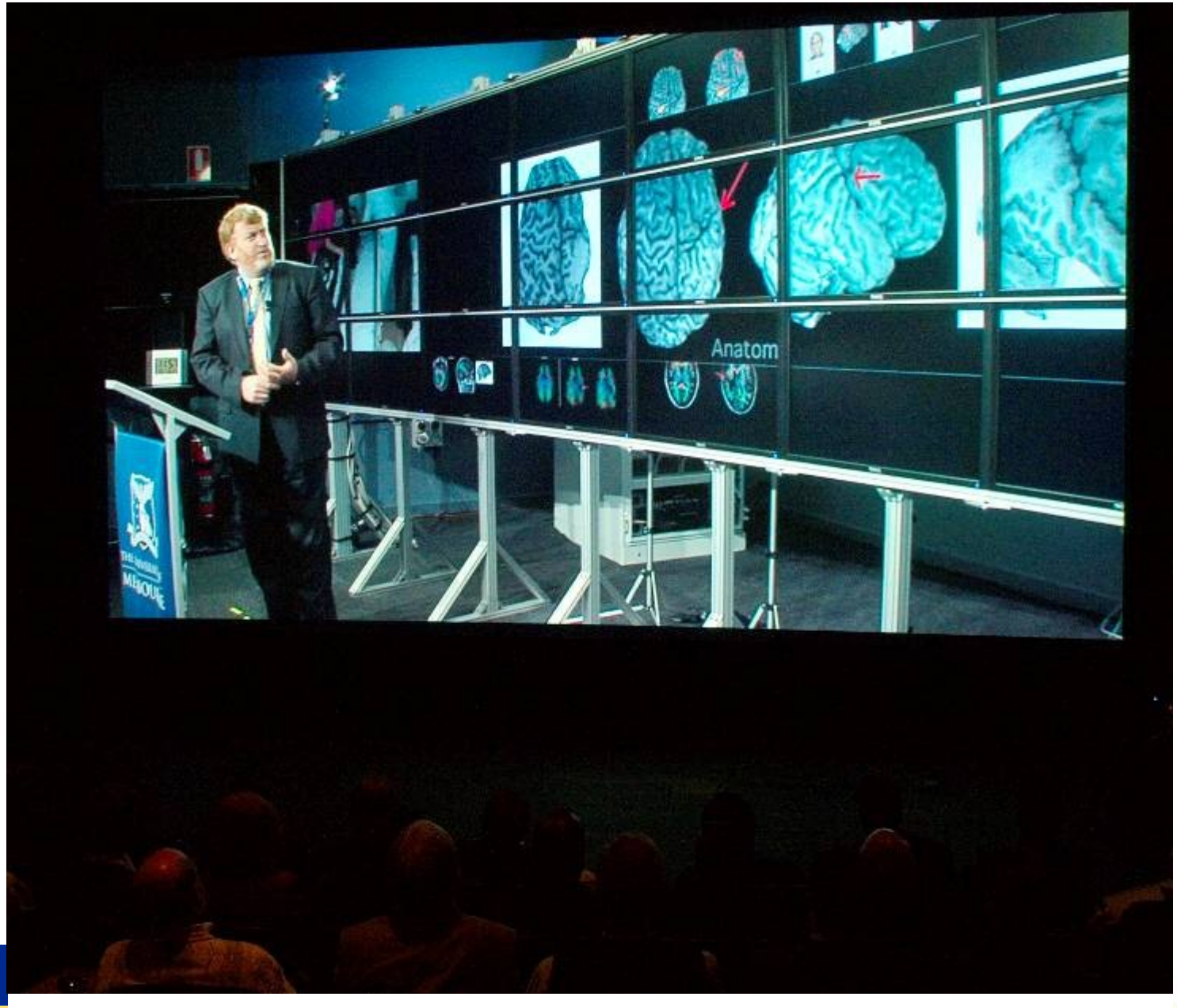
Protein Visualizations on OzIPortal
Created with Covise Software Displayed with CGLX



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

UM Professor Graeme Jackson Planning Brain Surgery for Severe Epilepsy



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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

it²

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



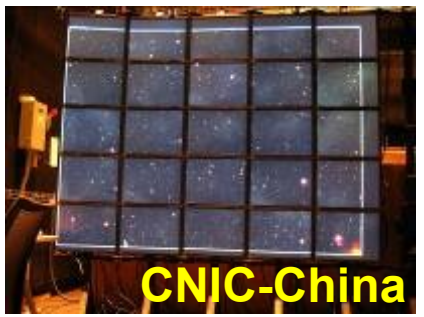
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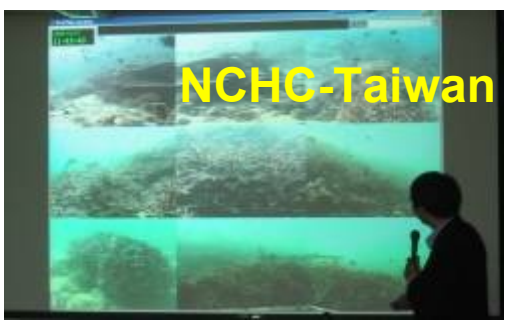
OptIPortals
Are Being Adopted Globally


AIST-Japan


Osaka U-Japan


KISTI-Korea


CNIC-China


NCHC-Taiwan


UZurich


SARA- Netherlands


Brno-Czech Republic


EVL@UIC


Calit2@UCSD


Calit2@UCI

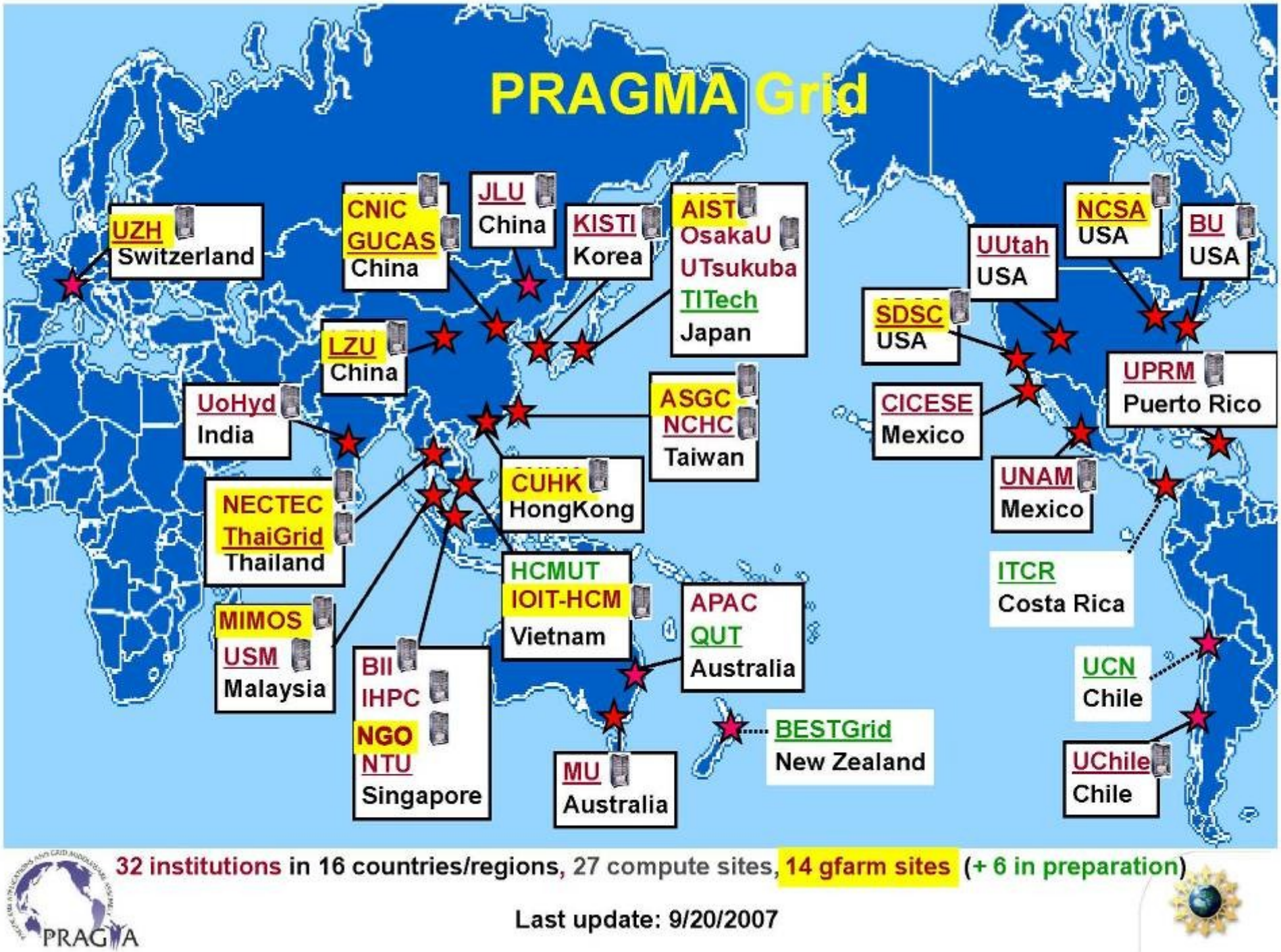

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Powered by Rocks ROCKS

evl electronic visualization laboratory

it2



Source: Cindy Zheng