Update on Calit2

Briefing to External Relations Staff
UC San Diego
La Jolla, CA
November 8, 2005

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

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Calit2 Has Formed
Two Broadly Based Divisional Councils





UCSD division council members attending their first meeting.



Nancy Allbritton and Goran Matijasevic,
members of the new UCI council



Amelia Regan and
Shellie Nazarenus (UCI division staff member)

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www.calit2.net/people/council.php

Calit2 Communications Group Has Developed Multiple Channels

CALIFORNIA INSTITUTE FOR TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

home about us people research partners education newsroom events

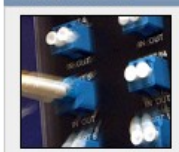
HIGHLIGHT



New Microfluidic Device for Nerve Cells Developed at UCI

11.7.2005 - A new, easily manufactured microfluidic chamber will allow scientists to examine axons in living nerve cells and may lead to a better understanding of neurodegenerative disorders such as Alzheimer's disease and may be used to screen drugs to overcome spinal cord injuries, according to Calit2 affiliated researchers in The Henry Samueli School of Engineering at the University of California, Irvine.
[more]

RECENT NEWS



11.4.2005
OptIPuter Team Uses Glimmerglass Intelligent Optical Switch to Manage Huge Datasets and Real-Time Data Flows
[more][Spanish]

go

UPCOMING EVENTS

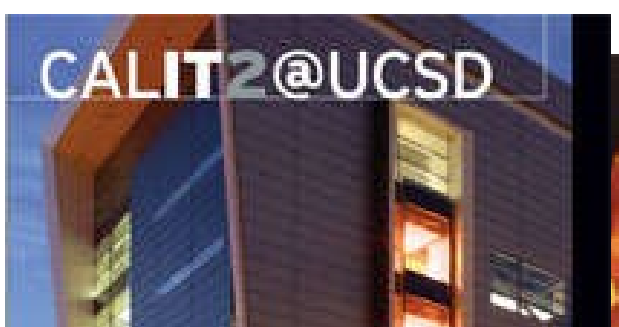
November 17
Spectrally Efficient Wireless Communications
>>

November 19
Invention to Venture
>>

November 20
2005 Center For Earth Observations and Applications Symposium: Science & Technology in Global Earth Observation System of Systems (GEOSS)
>>

May 22
Call for Papers - IEEE International Conference on Intelligence and Security Informatics
>>

Web Site





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Brochures

The New York Times ON THE WEB

Researchers Look to Create a Synthesis of Art and Science for the 21st Century



Sandy Huffaker for The New York Times

Atkinson Hall is the new home of the California Institute for Telecommunications and Information Technology at the University of California, San Diego.

News Generation

Friday, September 30, 2005

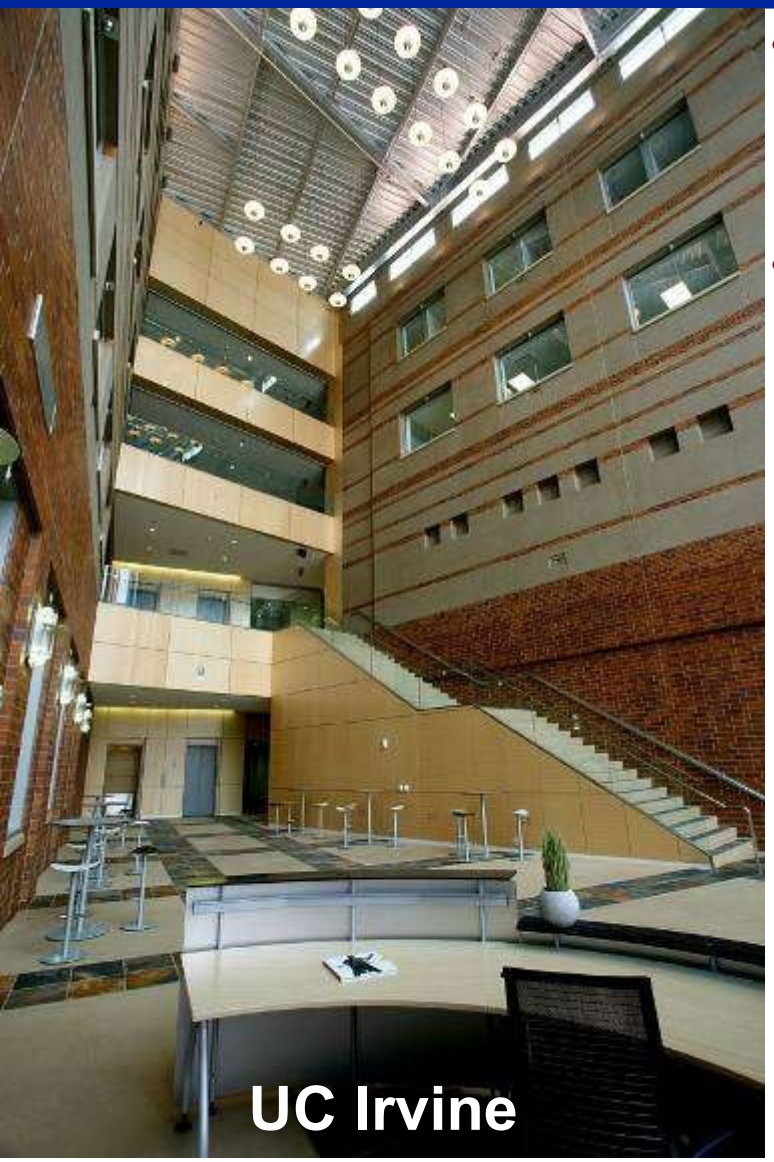
Xeni's report from iGRID2005 optical networks event
For Wired News today, I filed this report on the eye-popping technologies on display at this week's iGRID2005 conference at the California Institute for Telecommunications and Information Technology (Calit2).



boingboing
A DIRECTORY OF WONDERFUL THINGS

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Two New Calit2 Buildings Will Provide Major New Laboratories to Their Campuses



- **New Laboratory Facilities**
  - Nanotech, BioMEMS, Chips, Radio, Photonics, Grid, Data, Applications
  - Virtual Reality, Digital Cinema, HDTV, Synthesis
- **Over 1000 Researchers in Two Buildings**
  - Linked via Dedicated Optical Networks
  - International Conferences and Testbeds

Richard C. Atkinson Hall Dedication Oct. 28, 2005



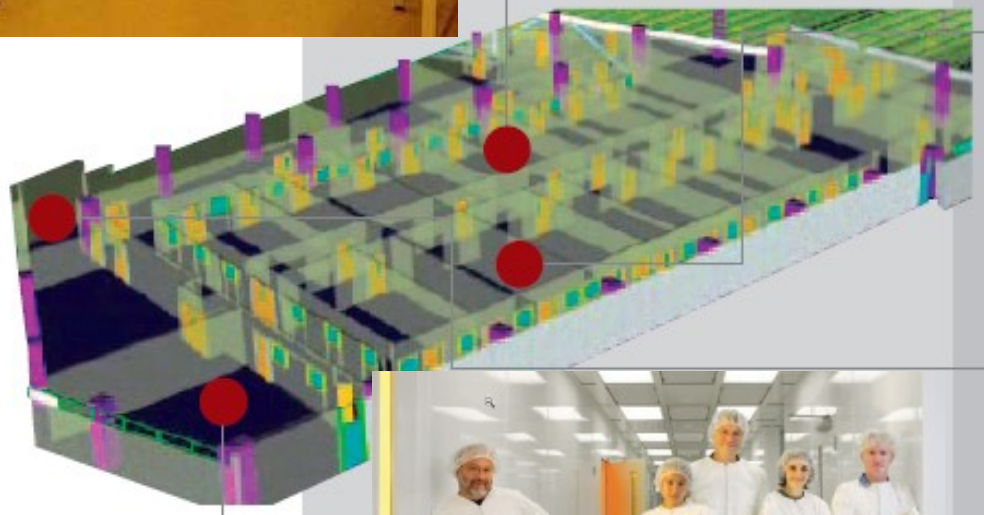
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www.calit2.net

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Calit2@UCSD Creates a Dozen Shared Clean Rooms for Nanoscience, Nanoengineering, Nanomedicine







Class 100 Clean Room Modules: Nano/microlithography

Areas with no more than 100 particles larger than 0.5 microns per cubic foot of air. Facilities include e-beam lithography and photolithography modules.

Class 1000 Clean Room Modules: Nano/microfabrication

No more than 1,000 particles larger than 0.5 microns per cubic foot of air. Areas include metallization/thin film deposition, advanced dry etching, metrology, thermal and back-end processes.

Advanced Structural Characterization

Techniques include scanning electron microscopy (using electrons rather than light to form an image) and scanning probe microscopy. Ultrahigh vacuum surface analysis. Optical characterization.

OTHER FACILITIES INCLUDE:

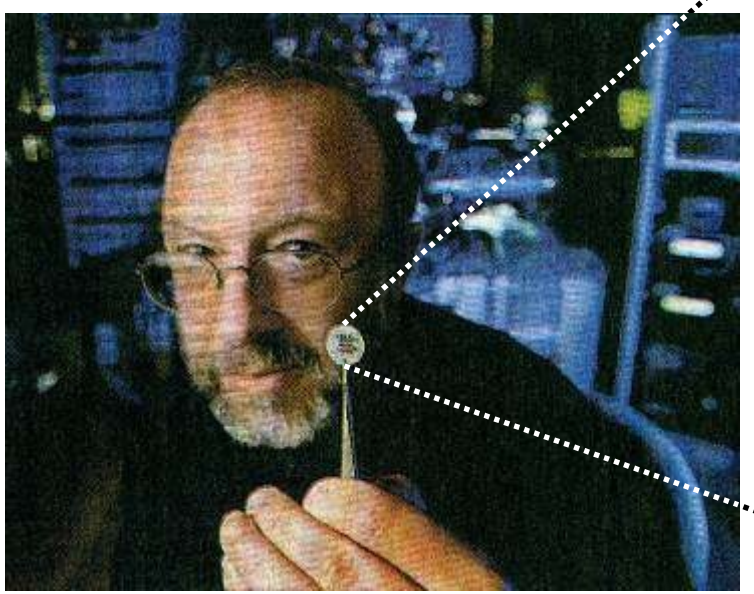
Metal-Organic Chemical Vapor Deposition Facility

MOCVD technique used for thin film growth in advanced, compound semiconductors and nanostructures.

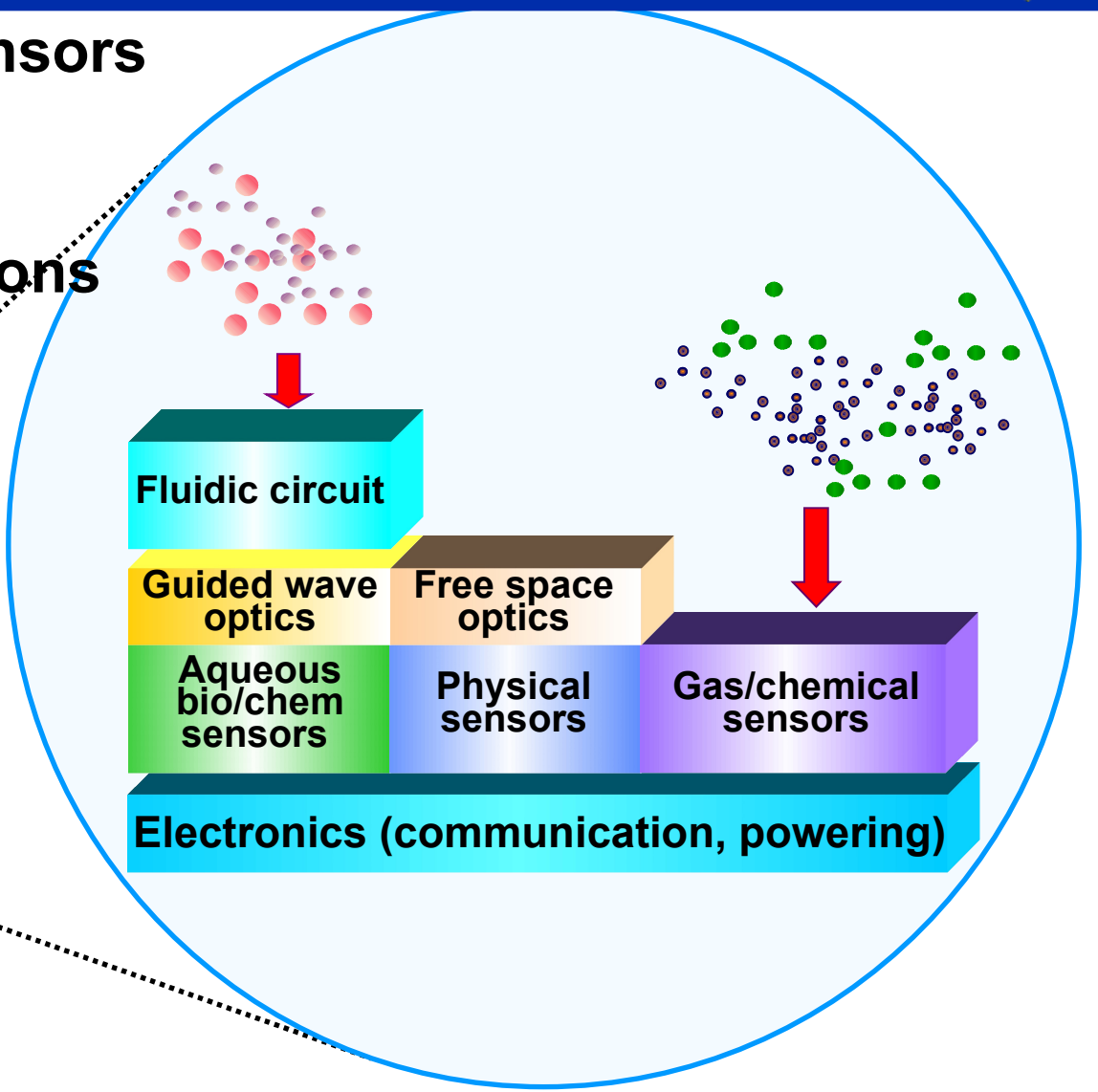
Photo Courtesy of Bernd Fruhberger, Calit2

Integrated Nanosensors—
Collaborative Research Between
Physicists, Chemists, Material Scientists and Engineers

Developing Multiple Nanosensors on a Single Chip, with Local Processing and Wireless Communications



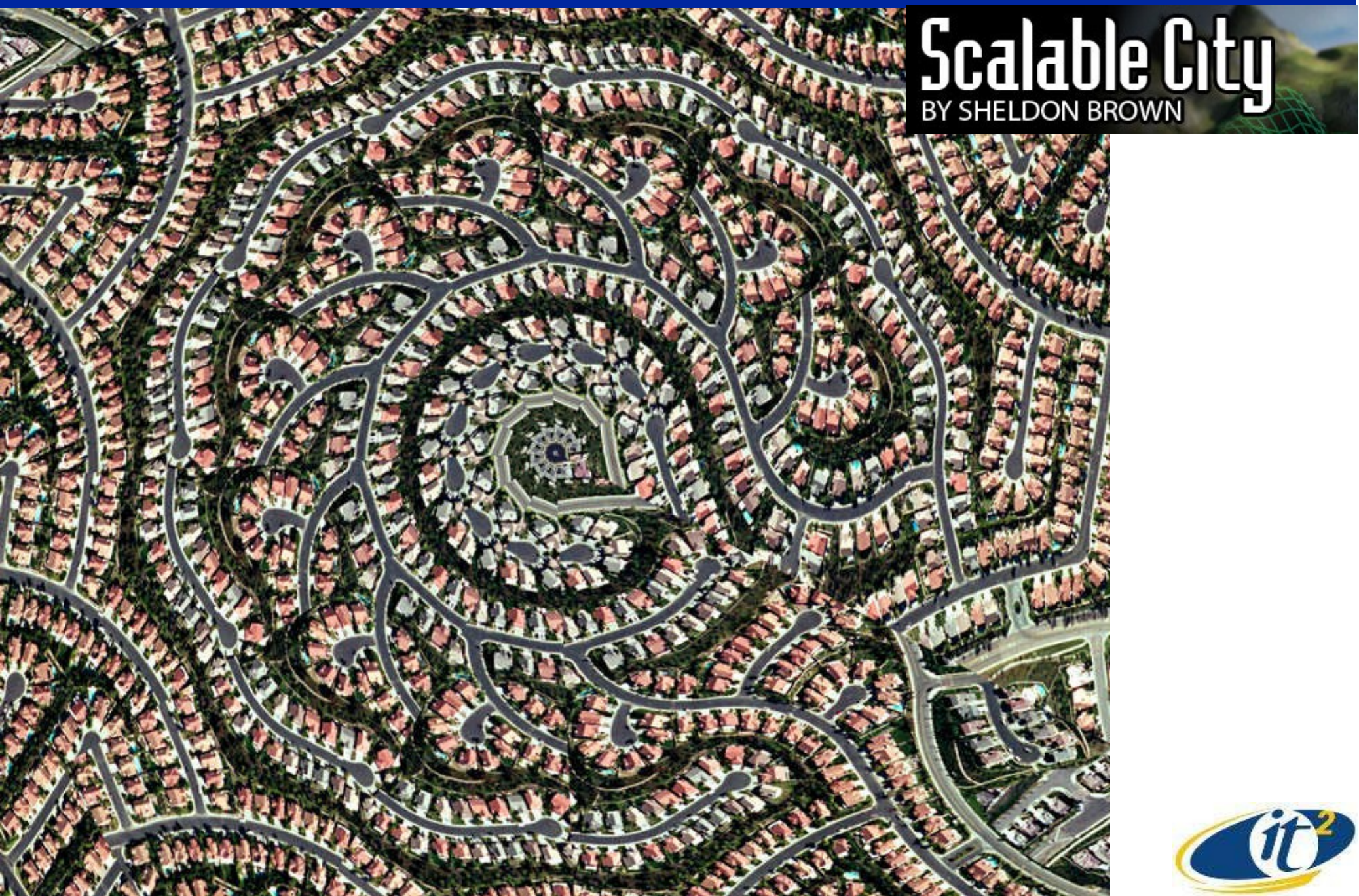
I. K. Schuller holding the first prototype



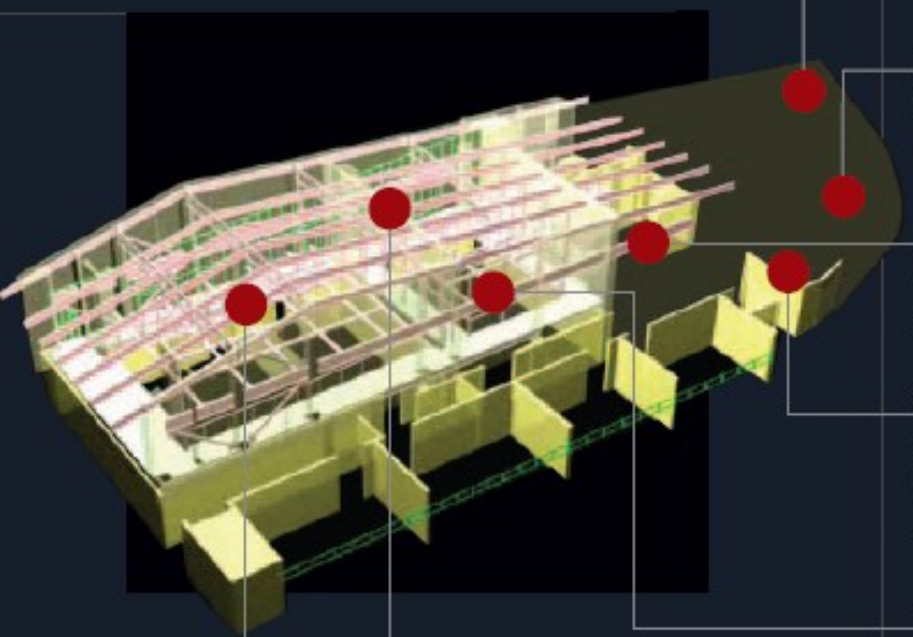
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I. K. Schuller, A. Kummel, M. Sailor, W. Trogler, Y-H Lo

Center for Research in Computing and the Arts (CRCA) Has a New Home in the Calit2@UCSDBuilding



Calt2@ UCSD Has One of the Most Advanced Media Art Complexes in the World



Center for Research in Computing & the Arts
Offices, guest studios and research neighborhood for CRCA and Calit2's New Media Arts activities. Nearby 3D Fabrication Lab.

Audio Spatialization Lab
Dedicated space for development of real-time computer music tools for performance and composition.

Immersive Visualization Lab
Multi-screen, multi-user virtual reality environment with access to large database visualization servers.

Performative Computing Lab
Studio for integrating the human body into digital media with telepresence, computer vision, motion capture and experimental human-computer interfaces.

'Black Box'
2-story, reconfigurable performance space for experiments with an audience's relationship to the physical environment and mediated elements.

Art Gallery
~1,000-square-foot networked exhibition space to showcase world-class experimental art and prototype technology.

Digital Cinema
200-seat theater with ultra-high resolution video, 3D sound, stereo imaging and telepresence conferencing.

Calit2@UCSD Is Connected to the World at 10,000 Mbps

Maxine Brown, Tom DeFanti, Co-Chairs

iGrid 2005

THE GLOBAL LAMBDA INTEGRATED FACILITY

www.igrid2005.org



the UC Discovery Grant

September 26-30, 2005

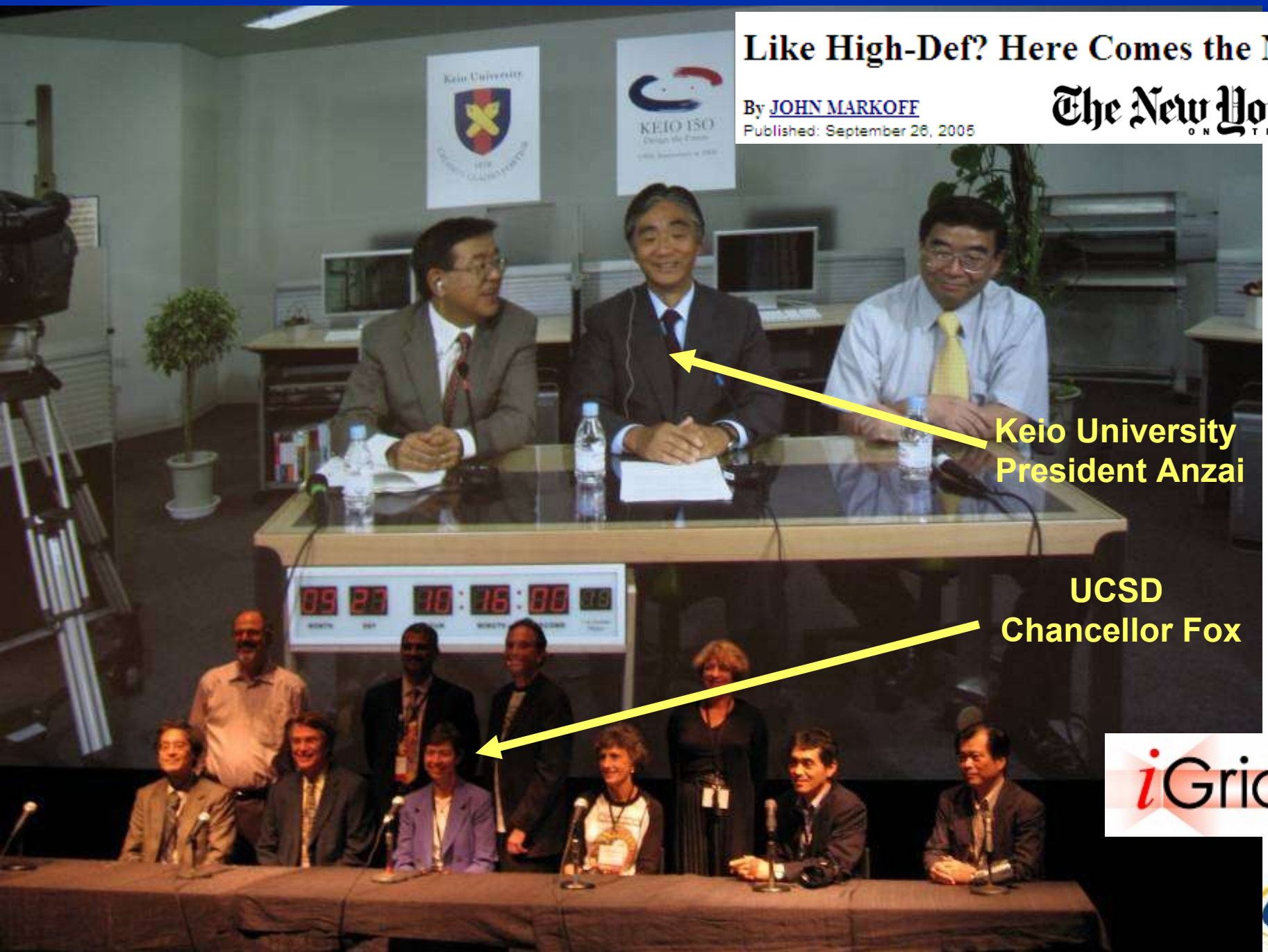
Calit2 @ University of California, San Diego

California Institute for Telecommunications and Information Technology



50 Demonstrations, 20 Counties, 10 Gbps/Demo

First Trans-Pacific Super High Definition Telepresence Meeting in New Calit2 Digital Cinema Auditorium



Like High-Def? Here Comes the Next Level

By JOHN MARKOFF
Published: September 26, 2005

The New York Times ON THE WEB

Keio University President Anzai

UCSD Chancellor Fox

Lays Technical Basis for Global Digital Cinema

Sony
NTT
SGI

iGrid 2005

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Calit2 is Prototyping Ocean Observatories Which Enable High Definition Video Exploration of Deep Sea Vents

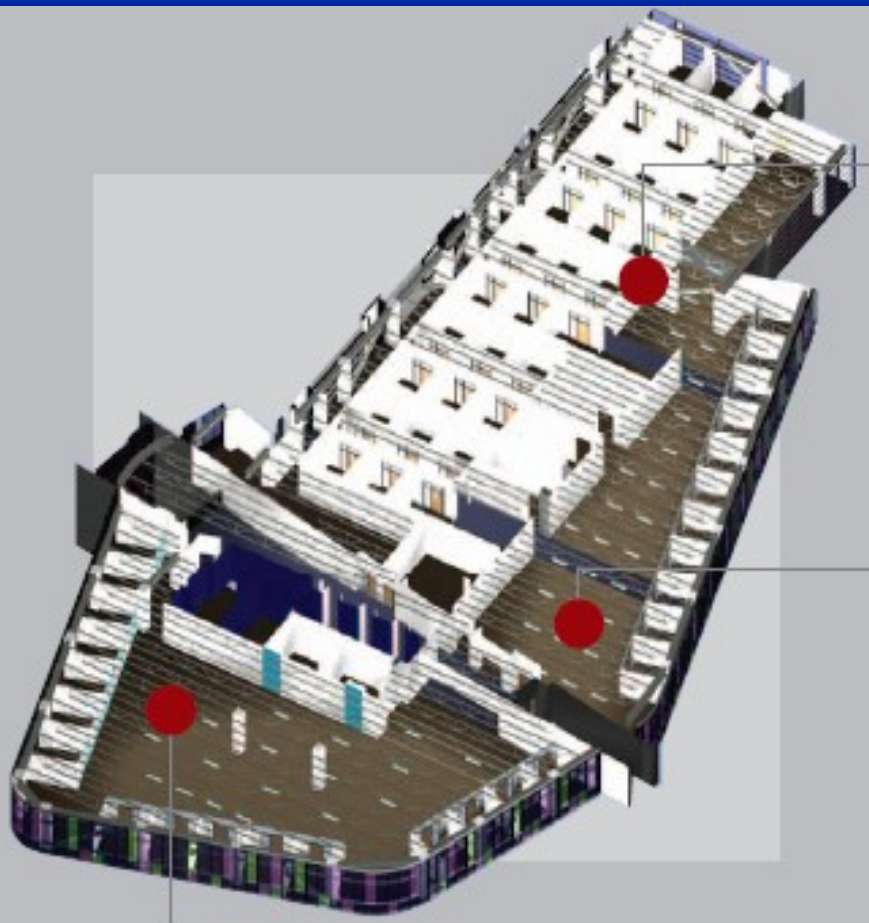


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Source John Delaney & Deborah Kelley, UWash

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Digitally Enabled Genomic Medicine is a Central Focus of Calit2



Bioinformatics, Computational and Systems Biology

Bioengineering professors Trey Ideker and Shankar Subramaniam as well as Computer Science and Engineering professor Eleazar Eskin team with colleagues from SDSC, Jacobs School of Engineering and Department of Chemistry and Biochemistry on emerging areas of research including the genetic basis of human disease and integrative network biology.

Center for Research in Biological Systems

The organized research unit encompasses a number of projects located wholly or in part at Calit2: Joint Center for Structural Genomics; National Biomedical Computation Resource; Biomedical Informatics Research Network; and the Visible Cell project of the National Center for Microscopy and Imaging Research.

San Diego Supercomputer Center

Two large research groups of SDSC will maintain temporary operations on Calit2's floor dedicated to the life sciences, including: Protein Data Bank, the single worldwide repository for the processing and distribution of 3D biological macromolecular structure data; and Bio/Biomed programs led by senior research scientist Lynn TenEyck.

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Calit2 Researcher Eskin Collaborates with Perlegen Sciences on Map of Human Genetic Variation Across Populations



"We have characterized whole-genome patterns of common human DNA variation by genotyping 1,586,383 single-nucleotide polymorphisms (SNPs) in 71 Americans of European, African, and Asian ancestry."

David A. Hinds, Laura L. Stuve, Geoffrey B. Nilsen, Eran Halperin, **Eleazar Eskin**, Dennis G. Ballinger, Kelly A. Frazer, David R. Cox.
"Whole-Genome Patterns of Common DNA Variation in Three Human Populations"
Science 18 February, 2005: 307(5712):1072-1079.

"Although knowledge of a single genetic risk factor can seldom be used to predict the treatment outcome of a common disease, knowledge of a large fraction of all the major genetic risk factors contributing to a treatment response or common disease could have immediate utility, allowing existing treatment options to be matched to individual patients without requiring additional knowledge of the mechanisms by which the genetic differences lead to different outcomes ."

"More detailed haplotype analysis results are available at http://research.calit2.net/hap/wgha/ "

Treatment, Understanding, and Monitoring of Cancer
(UCSD, Burnham Institute, UCSB, UCR, UCI --PI: Sadik Esener)

OBJECTIVE: Use of nanotechnology towards eliminating suffering and death due to cancer

- Detect cancerous tumors at the earliest stage
- Treat cancerous cells selectively and effectively
- Understand their progression
- Monitor and destroy residual cancer cells

APPROACH: Delivery via stealth porous mother ships with multi functional payloads

- smart nano sensors and
- tumor activated nano platforms for therapeutics and imaging

KEY AREAS OF RESEARCH FOCUS

- Avoiding RES and retain particles in circulatory system: stealth mother ships
- Reducing other organ pollution: increase targeting specificity and ability to go in an out of organs
- Penetration of tumors for therapeutics and imaging: release and self-assembly of ultra small payload on specific cues
- Enabling longitudinal studies: novel nano sensors
- Ex vivo genetic analysis enabled by nano-platforms



Porous mother ship In vasculature



Targeting early tumor formations

Release of payload



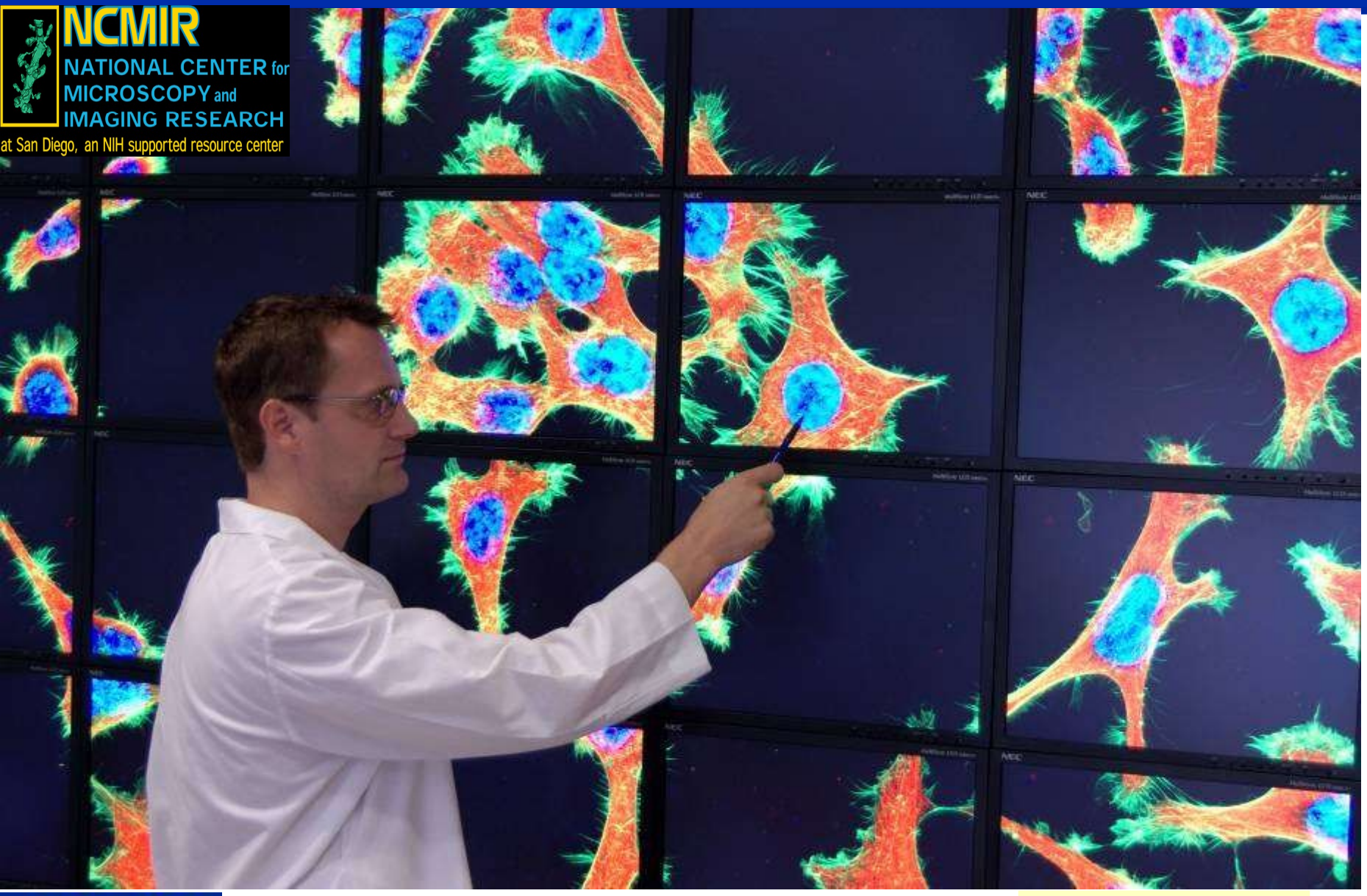
Impact of treatment

NCI Alliance for Nanotechnology in Cancer

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Increasing Data Rate into Lab by 100x, Requires High Resolution Portals to Global Science Data



Source: Mark Ellisman, David Lee, Jason Leigh, Tom Deerinck

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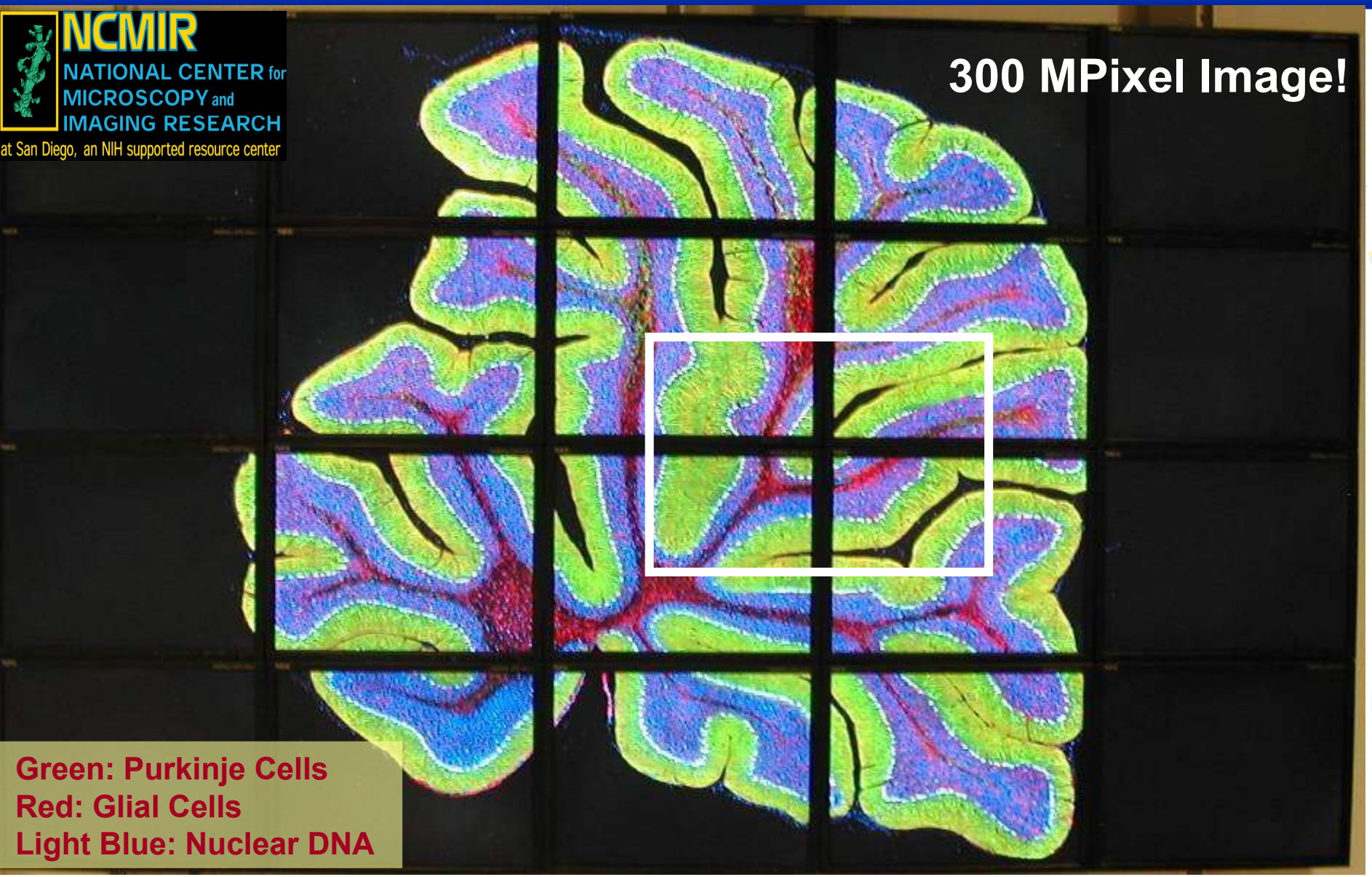
650 Mpixel 2-Photon Microscopy
Montage of HeLa Cultured Cancer Cells

Green: Actin
Red: Microtubles
Light Blue: DNA

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The OptIPuter -- From the Grid to the LambdaGrid: High Resolution Portals to Global Science Data

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



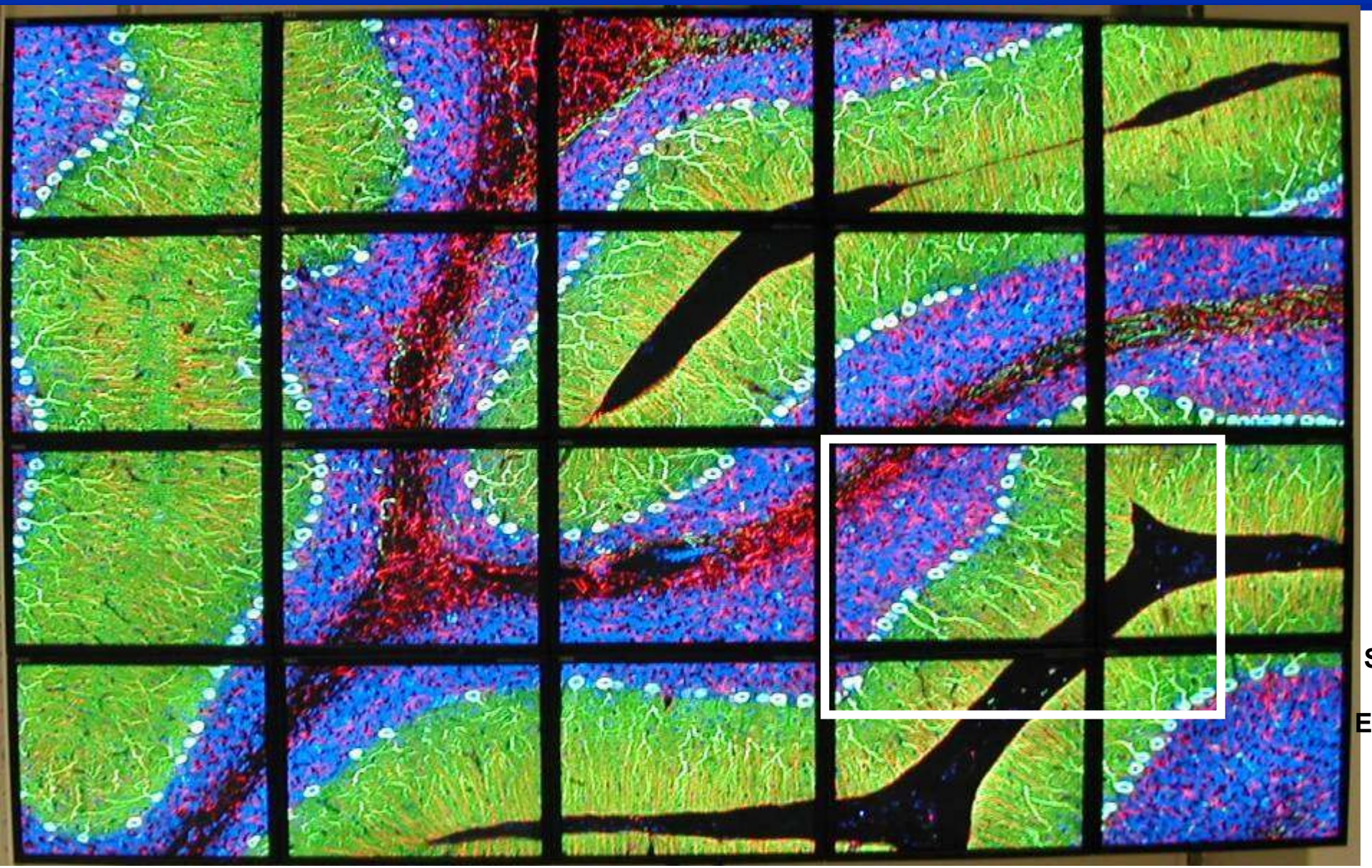
Green: Purkinje Cells
Red: Glial Cells
Light Blue: Nuclear DNA

Source: Mark Ellisman, David Lee, Jason Leigh

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Calit2 (UCSD, UCI) and UIC Lead Campuses—Larry Smarr PI
Partners: SDSC, USC, SDSU, NW, TA&M, UvA, SARA, KISTI, AIST

Scalable Displays Allow Both Global Content and Fine Detail



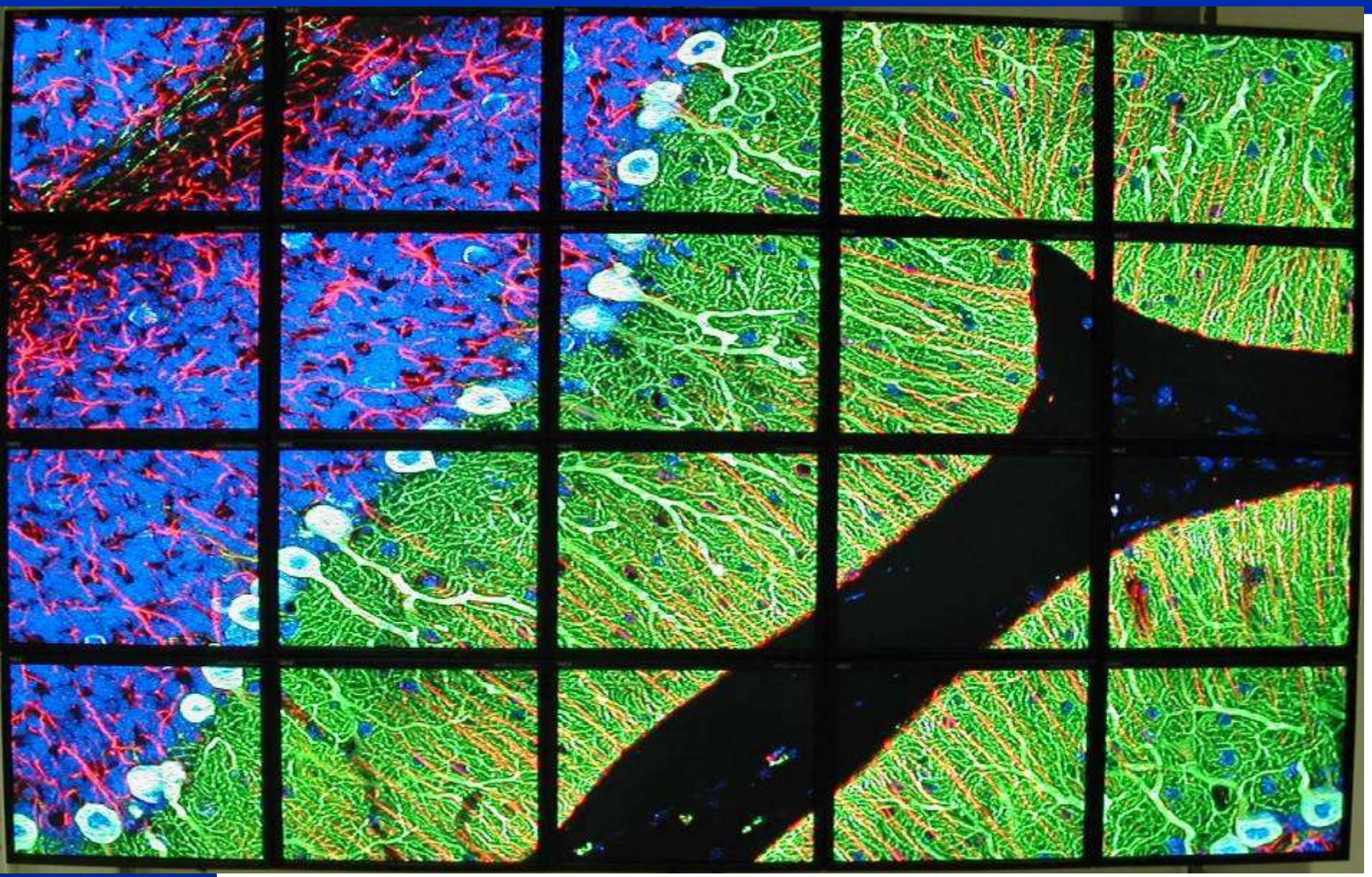
Source: Mark Ellisman, David Lee, Jason Leigh

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30 MPixel SunScreen Display Driven by a 20-node Sun Opteron Visualization Cluster

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Allows for Interactive Zooming from Cerebellum to Individual Neurons

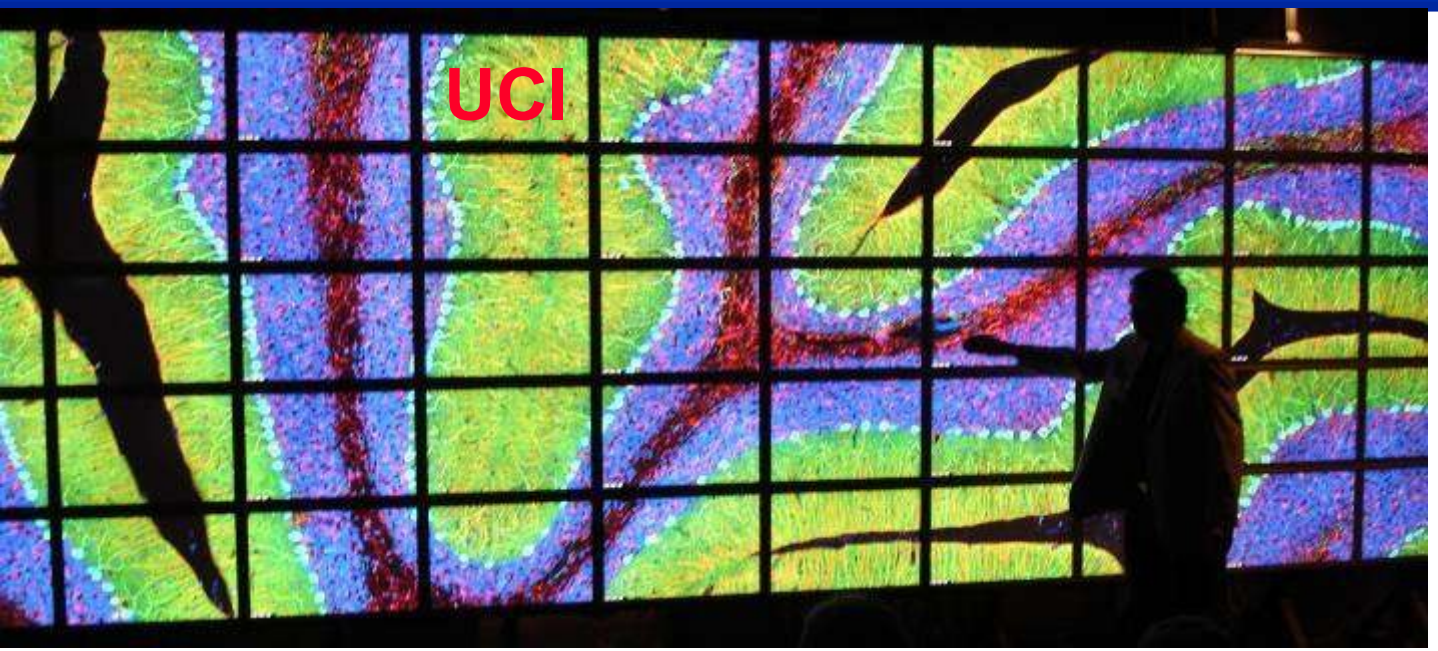


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Source: Mark Ellisman, David Lee, Jason Leigh

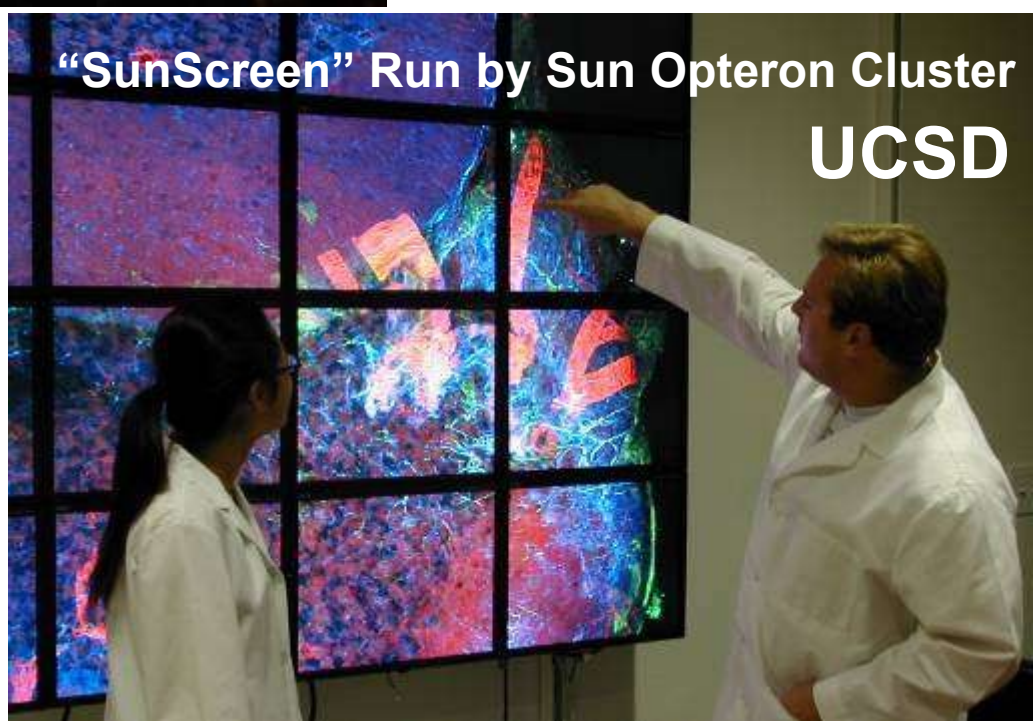
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The OptIPuter Enabled Collaboratory: Remote Researchers Jointly Exploring Complex Data



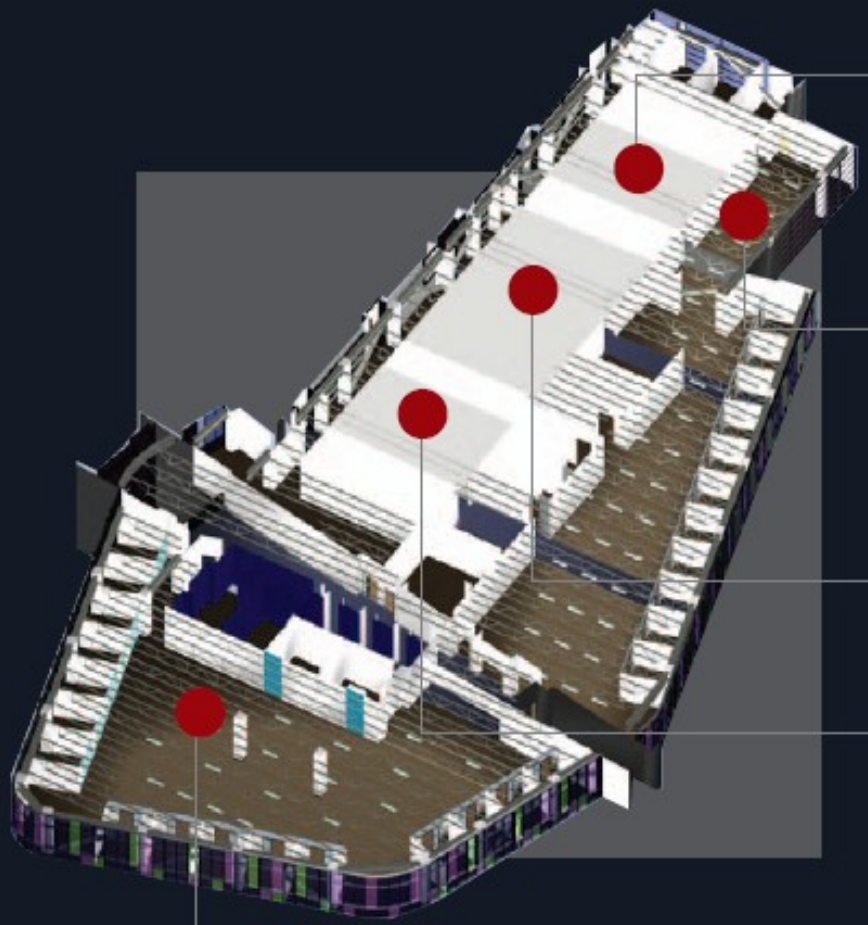
OptIPuter

OptIPuter will Connect
Falko Kuester's
Calit2@UCI
200M-Pixel Wall and
the 30M-Pixel Display
at UCSD Ellisman's
BIRN Laboratories
With Shared Fast Deep Storage



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Wireless SensorNets Driving an Ultra High Bandwidth Fiber Optic Backbone Create a Planetary Scale Computer



Systems-on-Chip Laboratory

SOC lab provides infrastructural support for hardware/software platforms, including CalRadio, and research on networking protocols and embedded processing for mobile applications.

Undergraduate Research Laboratory

This lab supports undergraduate research as part of senior-level, project-based courses as well as the Calit2 Scholars summer research program.

Photonics and OptIPuter Laboratory

Photonics research and OptIPuter network infrastructure development.

Wireless Platforms Laboratory

Current platforms under development and test include portable software defined radio, bench-top software defined radio, wireless pulse oximeter, wireless/paperless patient tag, ground-based wireless mesh network nodes, wireless smart-door control, wireless patient drug dosage monitor, and UAV-based wireless mesh network nodes.

Calit2 Academic Professionals

Calit2 staff researchers range from recent Ph.D. graduates to seasoned engineers from the private sector.

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Calit2 Cybershuttle Operations Base for Disaster Drills With Rapid Setup Wireless Mesh Network





Self Configuring Mesh Network with Multiple Access Points that Aggregate Uplink Bandwidth with Auto-Reconfiguration and Fail-Over

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Wireless Video Transmission Capability
Major Improvement for Hazmat and Medical Units







WISARD

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NSF Infrastructure Grant Establishes Calit2 Project Rescue Testbeds in Irvine & in San Diego

- **Localized Site-Specific Disasters via Crisis Response Drills**
  - Calit2 team Joins Community Drills
- **Large Scale Regional Disasters via Simulations**
  - ImageCat Transportation
- **Gaslamp Quarter, San Diego/UCSD**
  - Ubiquitous Wireless Coverage in Downtown San Diego
  - Test Network Architecture Enhancement and New Applications
- **CAMAS (*Crisis Assessment, Mitigation, And Analysis*) – UCI Campus**
  - Field-Test and Refine Research on Information Collection, Analysis, Sharing, and Dissemination





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bren:school information and computer sciences

PI: Magda El Zarki, ICS, UCI
www.responsphere.org