Calit2 – The First Five Years and the Future

Presentation
UCOP Five Year Review of Calit2
University of California, San Diego
October 2, 2006

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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Calit2 Continues to Pursue Its Initial Mission:

Envisioning How the Extension of Innovative Telecommunications and Information Technologies Throughout the Physical World will Transform Critical Applications Important to the California Economy and its Citizens' Quality Of Life.

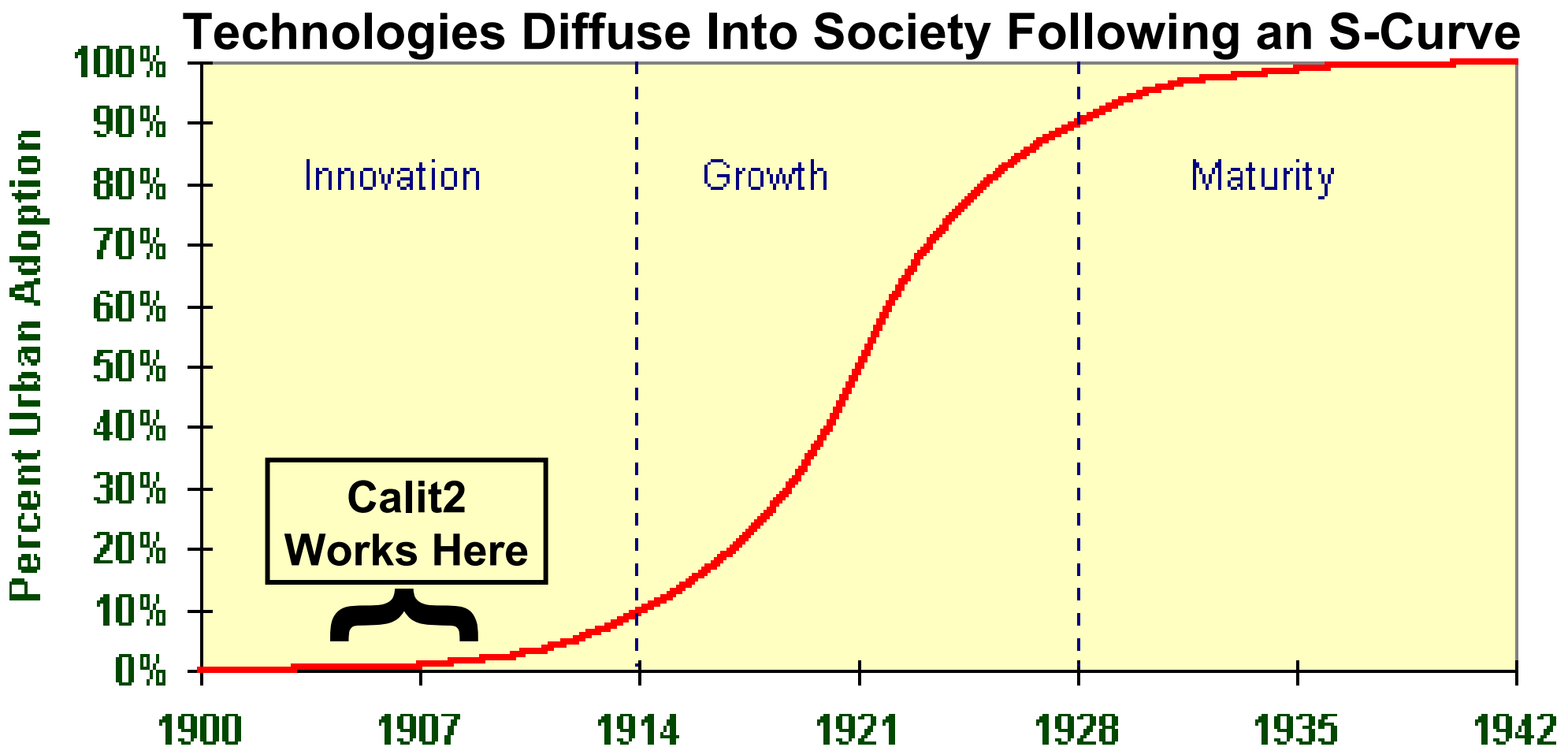
Calit2 is a University of California "Institutional Innovation" Experiment on How to Invent a Persistent Collaborative Research and Education Environment that Provides Insight into How the UC, a Major Research University, Might Evolve in the Future.

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Calit2 "Lives in the Future" By Building Systems of Emerging Disruptive Technologies

Co-Evolution of Personal Automobile and Highway/Petroleum Infrastructure



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Source: Harry Dent, The Great Boom Ahead

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Calit2's Vision and Tactics

- **Calit2 "Lives in the Future" by:**
  - **Building Systems of Emerging Disruptive Technologies**
  - **Integrating Technology Consumers and Producers**
- **Calit2 Organizational Tactics:**
  - **Catalyzing Multidisciplinary Team Building**
  - **Designing Shared Unique Facilities into our Buildings**
  - **Involving Industry and Community with our Projects**
  - **Deploying Novel Infrastructure into Living Labs**
  - **Partnering with National and International Researchers**

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Calit2--A Systems Approach to the Future of the Internet and its Transformation of Our Society

Calit2 Has Assembled a Complex Social Network of Over 350 UC San Diego & UC Irvine Faculty Working in Multidisciplinary Teams With Staff, Students, Industry, and the Community



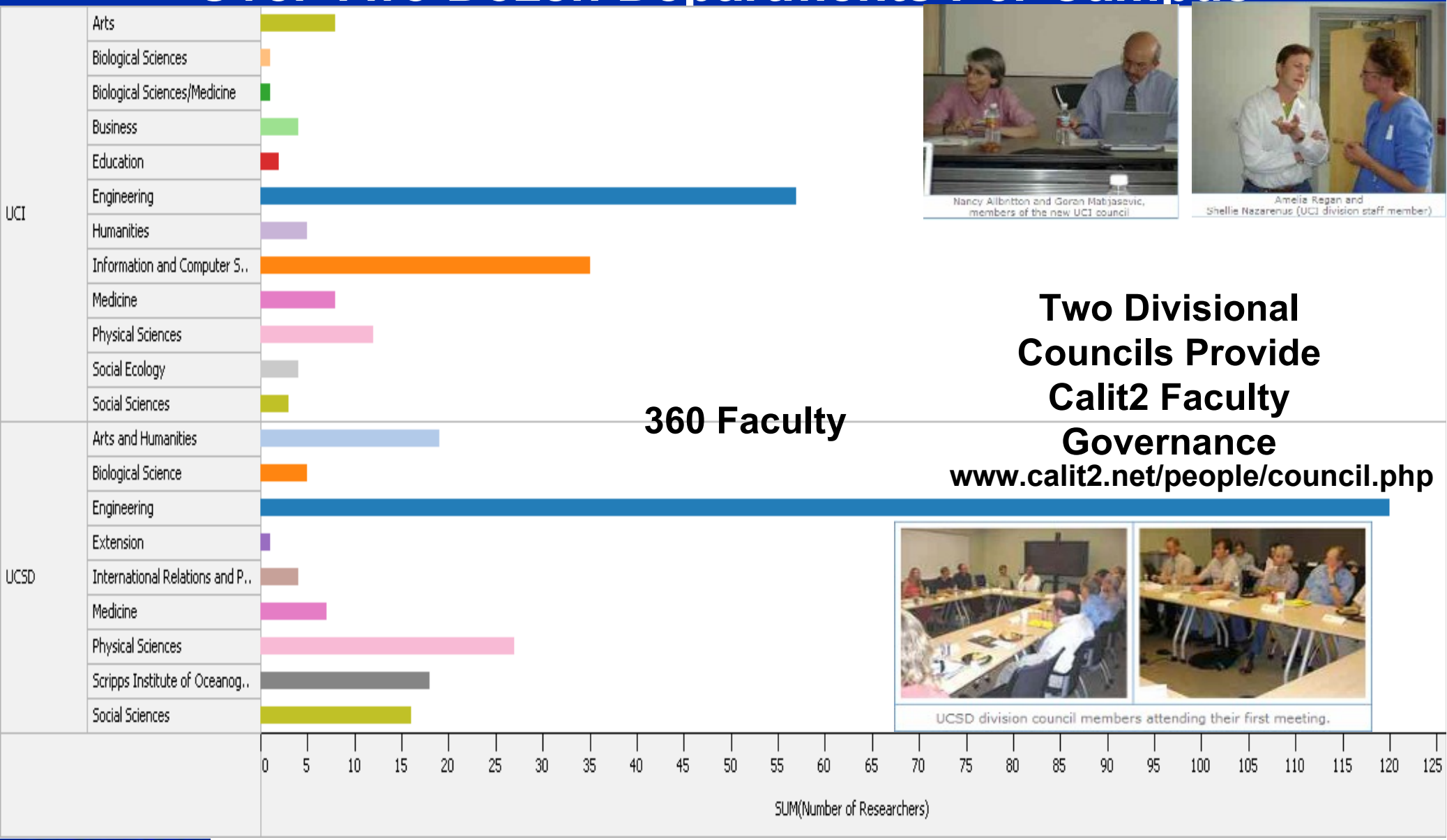
Integrating Technology Consumers and Producers Into "Living Laboratories"

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www.calit2.net

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Calit2 Has Attracted a Very Broad Range of Faculty From Over Two Dozen Departments Per Campus



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

Amelia Regan and Shellie Nazarenus (UCI division staff member)

360 Faculty

Two Divisional Councils Provide Calit2 Faculty Governance

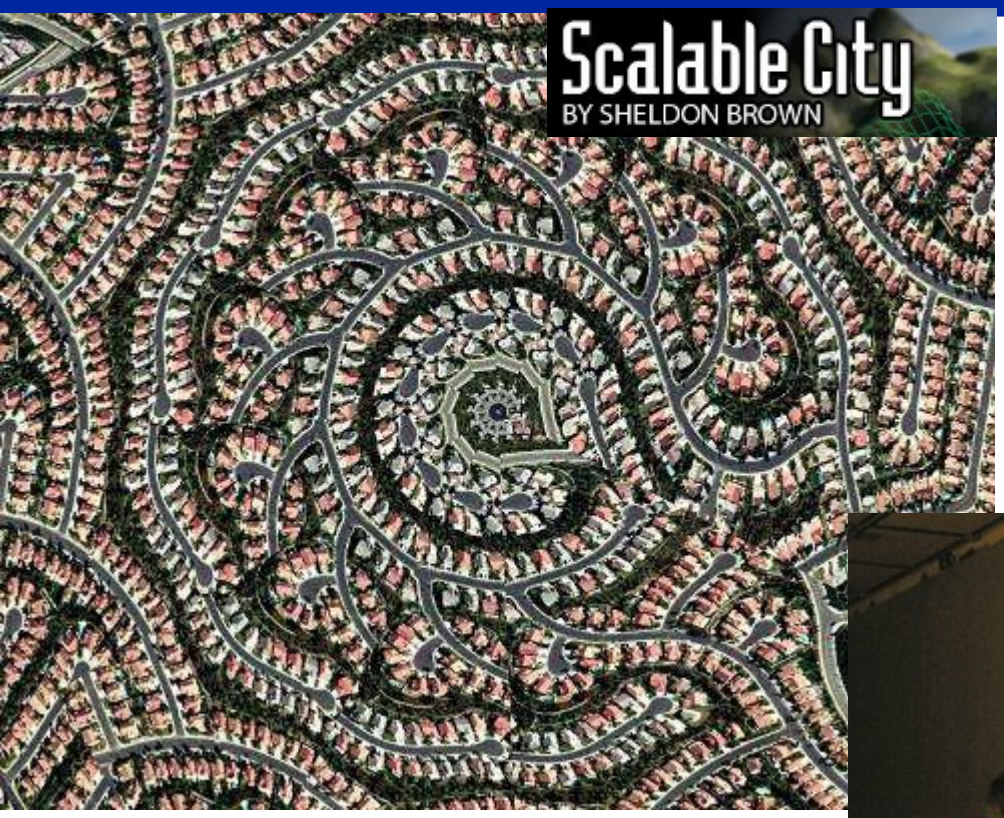
www.calit2.net/people/council.php

UCSD division council members attending their first meeting.

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Calit2 Review Report: p.50

Calit2 Has Facilitated Deep Interactions With the Digital Arts on Both Campuses



Bill Tomlinson, Lynn Carpenter UCI "EcoRaft"



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

By John Markoff
NYTimes November 5, 2005



Ruth West, UCSD "Ecce Homology"

Calit2 Has Developed Undergrad Research Summer Research Programs on Both Campuses

Over 150 Students In Six Years

Calit2@UCSD
UGRAD RESEARCH SCHOLARSHIP
FEB. 27th DEADLINE



SURF-IT
CALIT2 IRVINE





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Bioengineering, Chemistry, Chemical Eng., Cog Sci, CSE, ECE, IR/PS, Music, Physics, SIO, Visual Arts

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Calit2 Phase I: 2001-2005
~8,000 GSF, ~25 People, and No Facilities



Room 416 Engineering Tower
Calit2@UCI Division

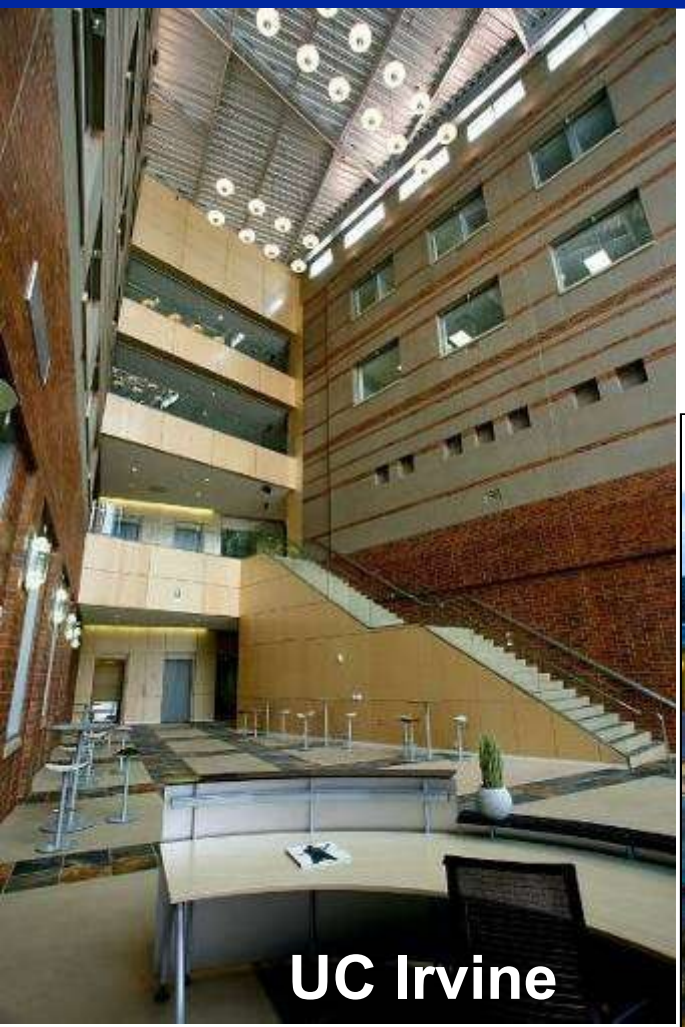


Triple Wide Trailer
Calit2@UCSD Division

From Incubation to Full Scale Operations
2005-2006

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Phase II:Two New Calit2 Buildings Provide ~340,000 GSF and New Laboratories for "Living in the Future"



- Over 1000 Researchers in Two Buildings
  - Linked via Dedicated Optical Networks
  - International Conferences and Testbeds
- New Laboratories
  - Nanotechnology
  - Virtual Reality, Digital Cinema



Preparing for a World in Which Distance is Eliminated…

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Operating Budget Now Critical!

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Calit2 Materials and Devices Laboratory: "Nano3"–NanoScience, NanoEngineering, NanoMedicine

10,000 sq. feet State-of-the-Art Materials and Devices Laboratory



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Similar Clean Rooms at UCI

Source: Bernd Fruhberger, Calit2

The World's Largest Tiled Display Wall—Calit2@UCI's HIPerWall



Calit2@UCI Apple Tiled Display Wall
Driven by 25 Dual-Processor G5s
50 Apple 30" Cinema Displays
200 Million Pixels of Viewing Real Estate!

Zeiss Scanning Electron Microscope Center of Excellence in Calit2@UCI
Albert Yee, PI



it² Center of GRAVITY
Center of Graphics, Visualization and Imaging Technology

Falko Kuester and Steve Jenks, PIs Featured in Apple Computer's "Hot News"

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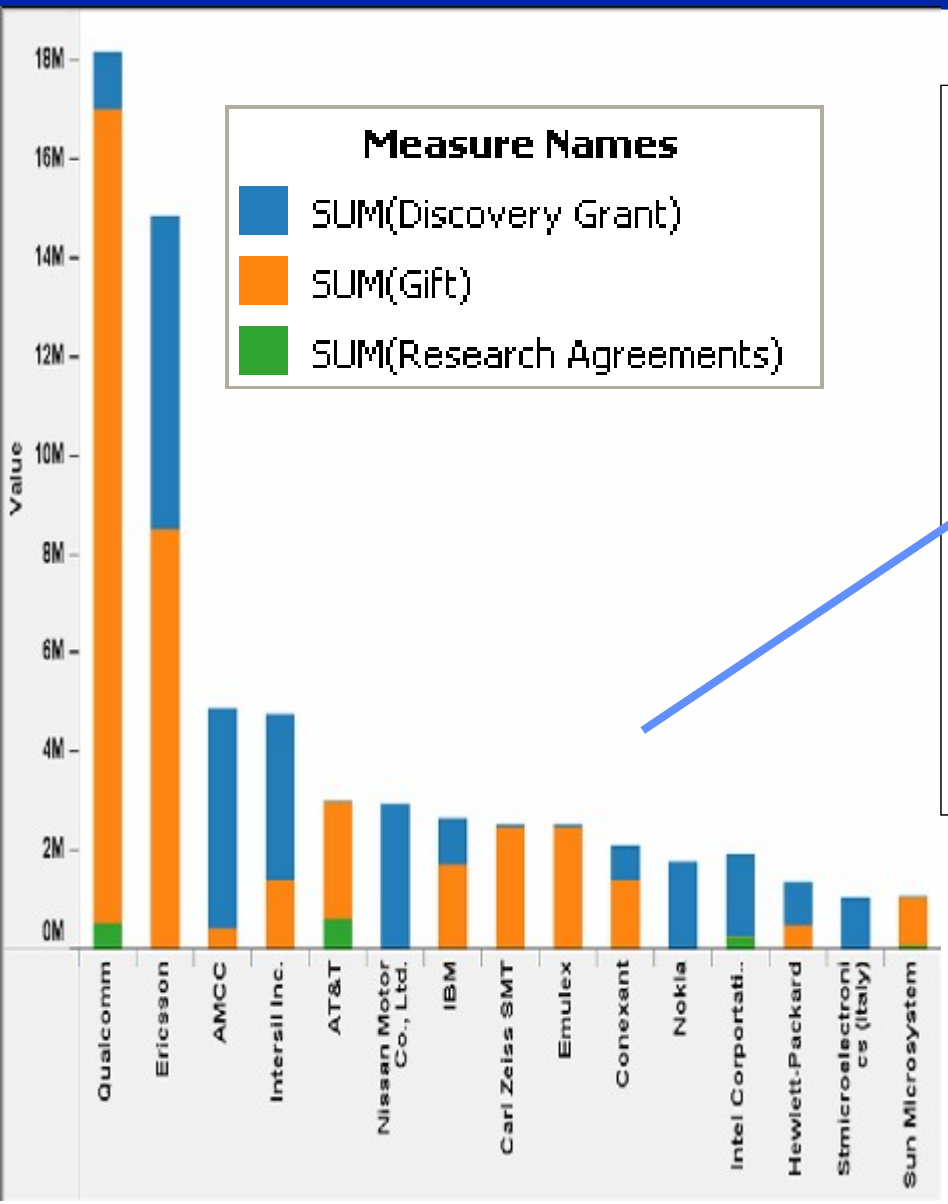
The Unexpected Challenge in Creating Industrial Partnerships



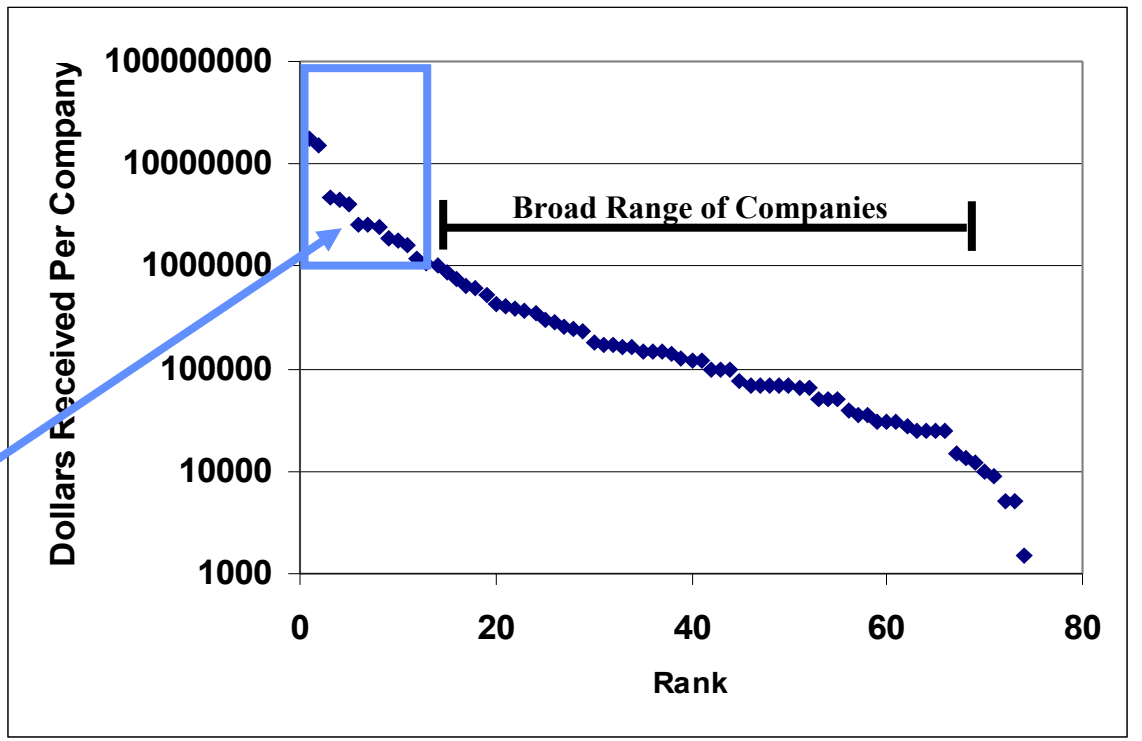
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In Spite of the Bubble Bursting, Calit2 Has Partnered with over 130 Companies



More Than 80 Have Provided Funds or In-kind



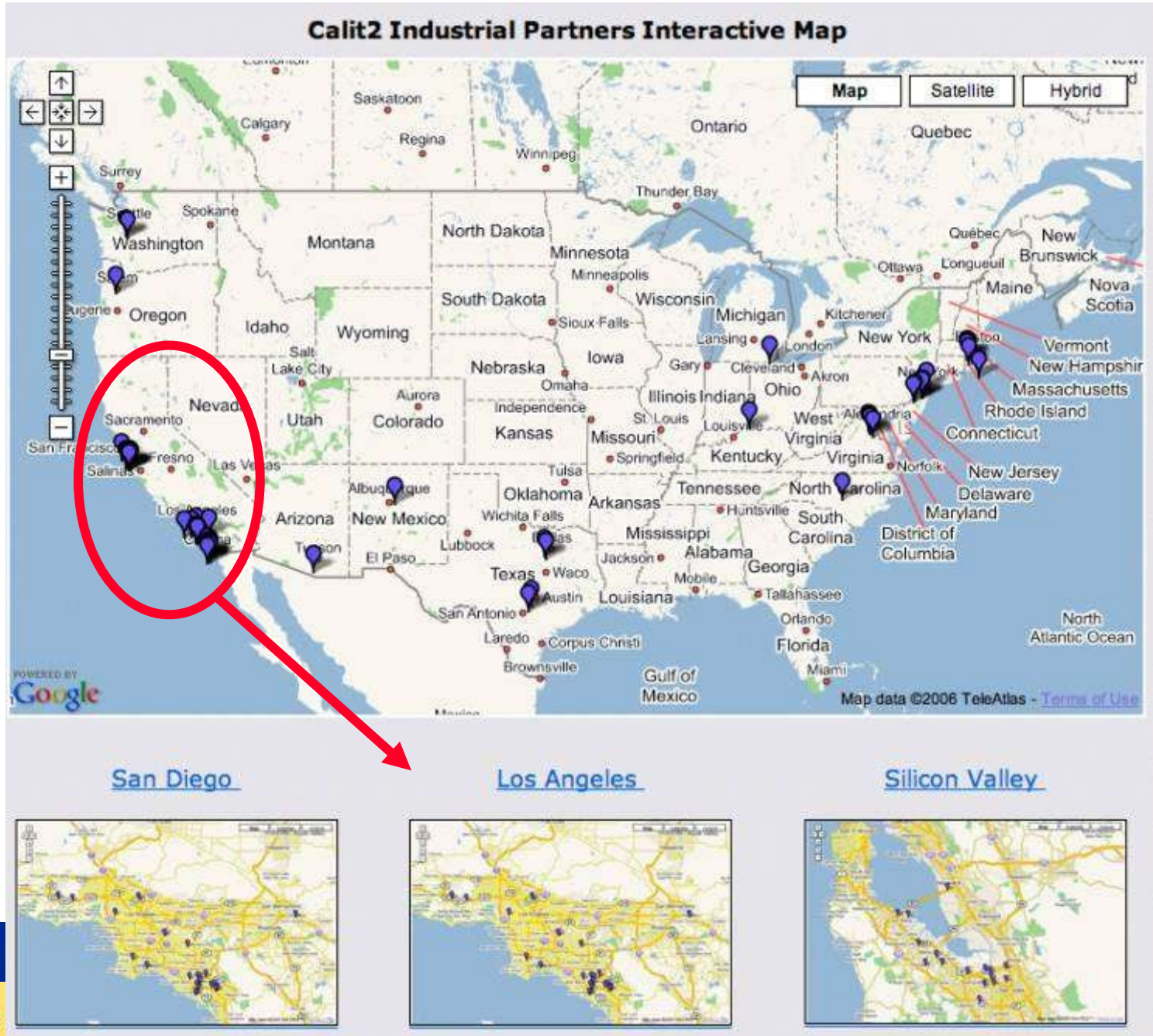
$78 Million From Industry So Far

Industrial Partners > $1 Million

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Calit2 Industry Partners: Driving Public-Private Innovation Throughout The U.S.

Our Focus is on California Based Companies



Calit2 Review Report: p.33

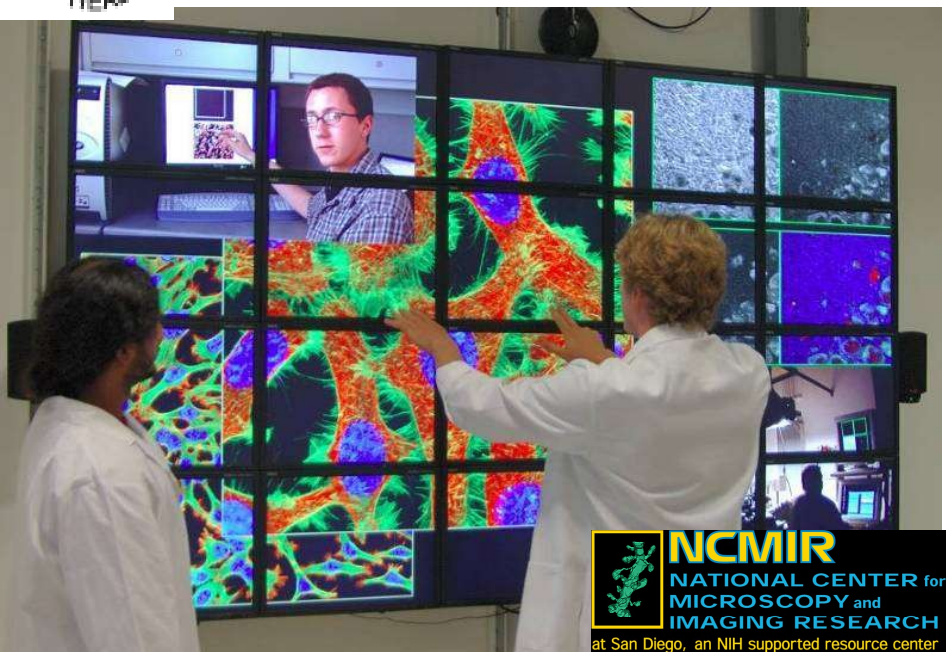
Developing SW Tools to Manage Portfolio

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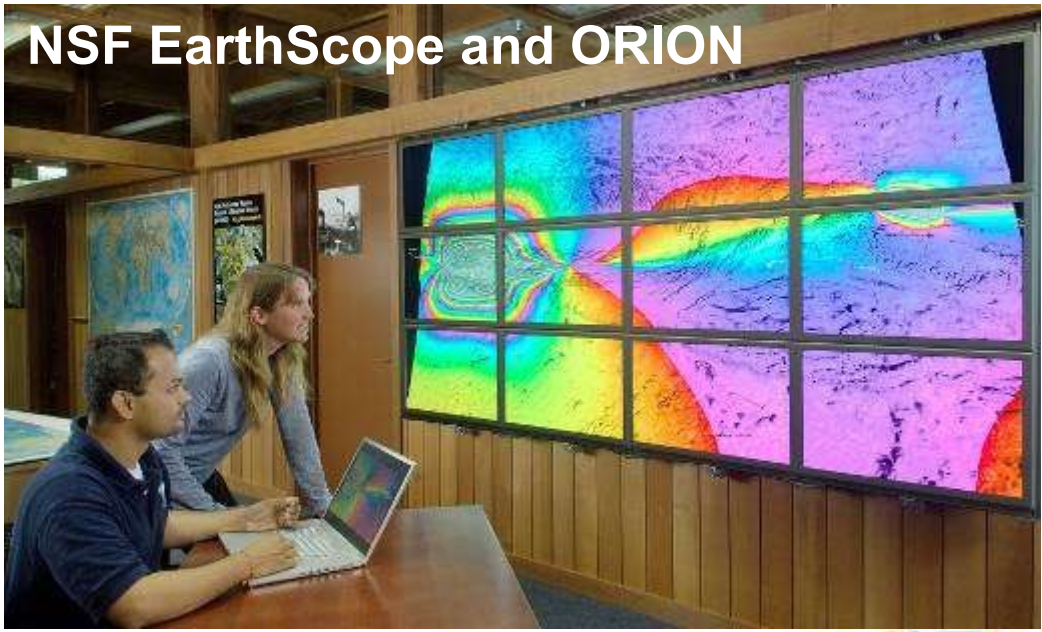
One Major Industrial Attractor Has Been Partnering on Innovative Federal Grants

- **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 Fifth Year**

NIH Biomedical Informatics Research Network

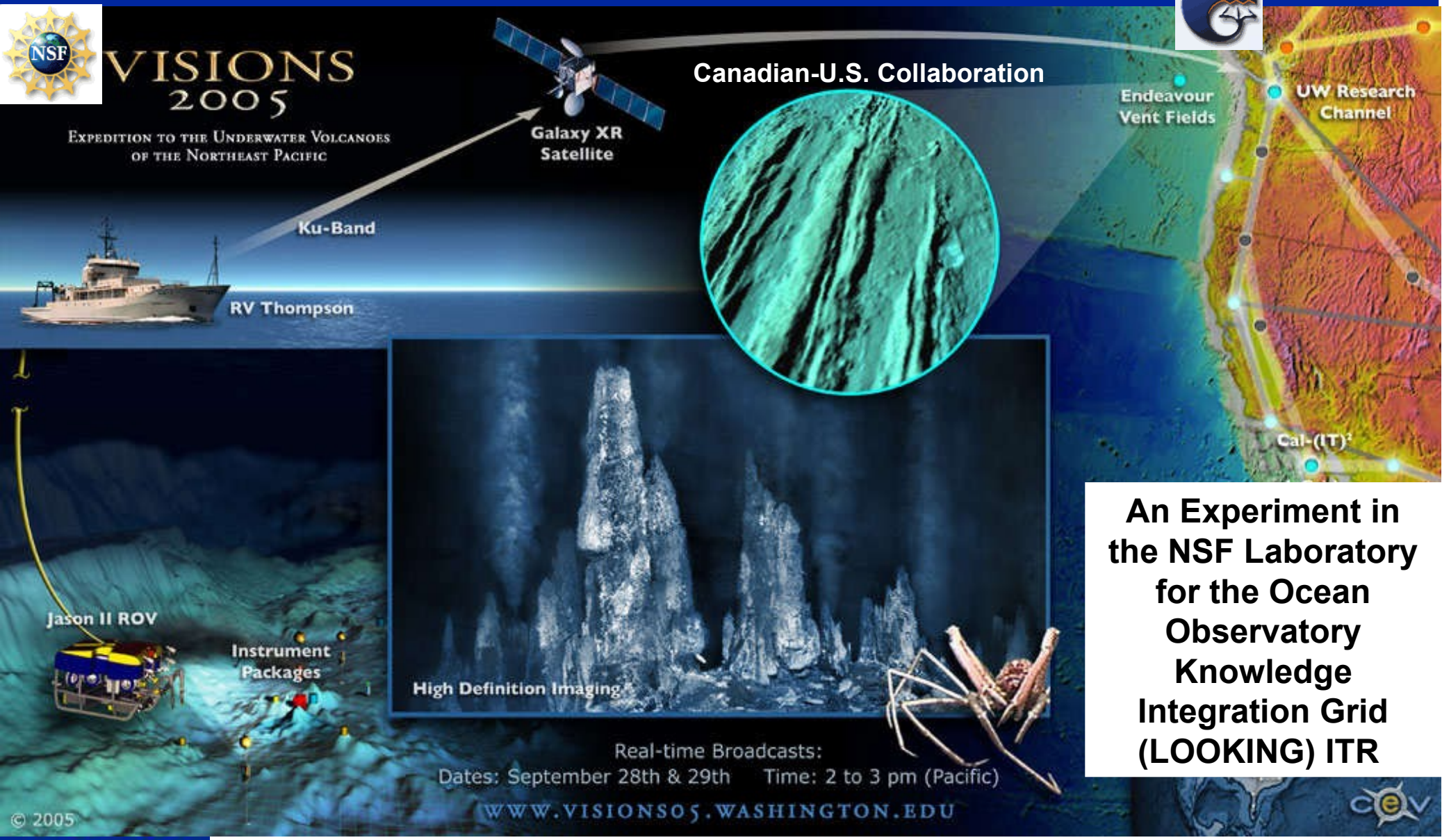


NSF EarthScope and ORION



SCRIPPS INSTITUTION OF OCEANOGRAPHY

Deploying Novel Infrastructure Enables New Science: Gigabit Fibers on the Ocean Floor



An Experiment in the NSF Laboratory for the Ocean Observatory Knowledge Integration Grid (LOOKING) ITR

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Prototype of CI for NSF's ORION

Source: John Delaney & Deborah Kelley, UWash

Calit2 Has Introduced Innovative Wireless Systems to Support SoCal First Responders









Aug. 22, 2006 MMST Disaster Drill at Calit2@UCSD Involved Over 200 First Responders













Community Integration into Calit2 Projects: RESCUE Community Advisory Board

Ellis Stanley – Chair
General Manager, City of Los Angeles
Emergency Preparedness Department

Jim Watkins (retired)
Governor's Office
Emergency Services

Bob Garrott
Los Angeles County
Office of Emergency Mgmt.

Paulette Murphy
Space and Naval Warfare
Systems Command
(SPAWAR)

Dawna Finley
Tom Hume
Eileen Salmon
City of Irvine

Karen Butler
Program Manager
Communications Division
San Diego Police Department

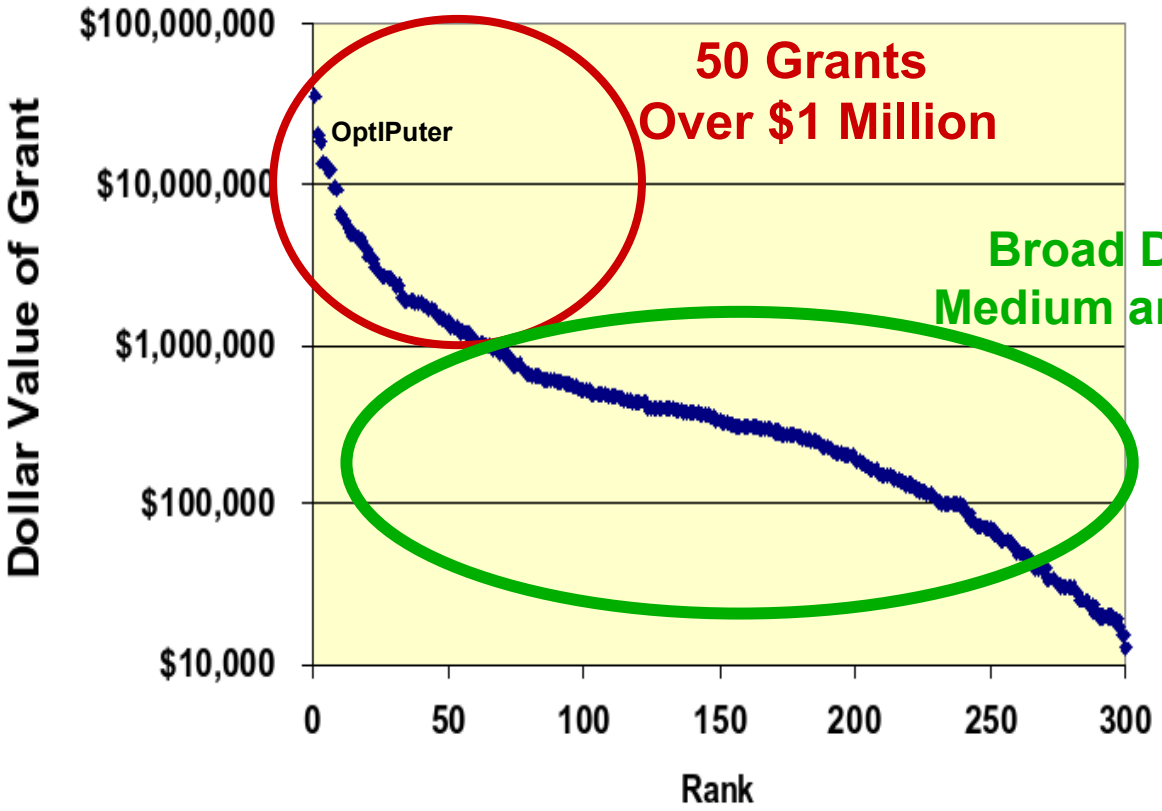
William Maheu
Assistant Chief of Police
City of San Diego

David Rose
Lieutenant Officer
UC San Diego Police Department

Linda Bogue
Emergency Mgmt. Coordinator
Environmental Health and Safety

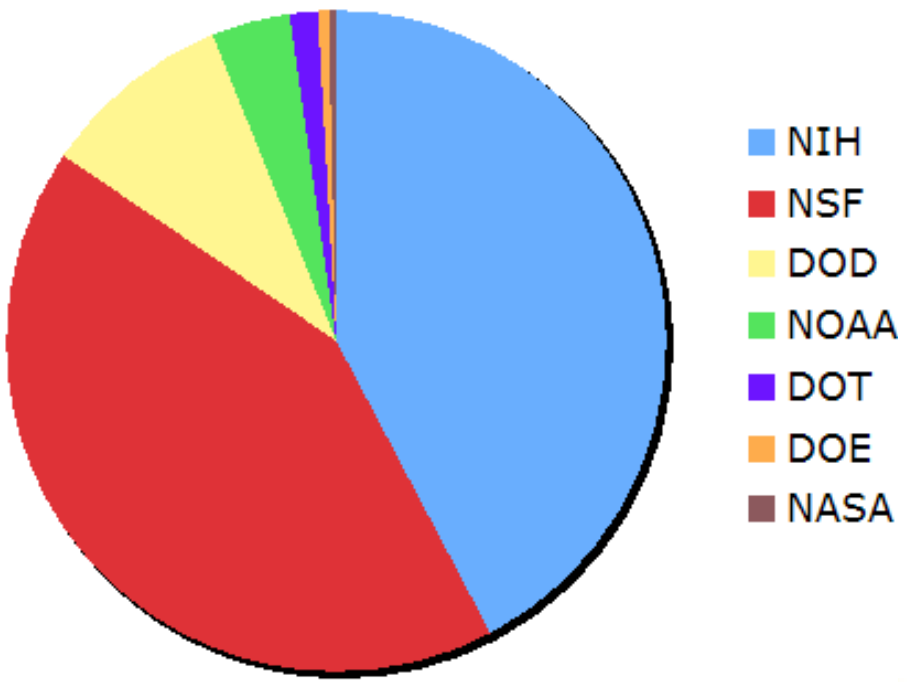


Federal Agencies Have Funded $350 Million to Over 300 Calit2 Affiliated Grants



Developing SW Tools to Manage Portfolio

Creating a Rich Ecology of Basic Research



Federal Agency Source of Funds

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Calit2 Review Report p.4,21

CAMERA: Community Cyberinfrastructure for Advanced Marine Microbial Ecology Research and Analysis



Paul Gilna Ex. Dir.

National LambdaRail Direct Connect Computation and Storage Complex

PI Larry Smarr

Funded by: Gordon and Betty Moore Foundation

Joint Partnership of:

Calit2 is Now Attracting Private Foundation Grants
Announced January 17, 2006--$24.5M Over Seven Years

Building On Centers of Excellence and Achievement









Powered by Rocks









The Scripps Genome Center

Supported by:











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Second Generation Grant --
Would Have Been Impossible Five Years Ago



Calit2 Has Developed Research Partnerships with California's Major Trading Partners

- **International Commerce Drives 25% Of California's Economy**
- **Largest Export Market is Computers and Electronic Products**
- **Top Five Export Markets for California:**
  - Mexico
  - Japan
  - Canada
  - China
  - South Kc
- **India is a Critical Growth Market for California**
  - California is the Top State Exporting to India
  - Exports Between California and India Increased ~30% from 2004 and 2005
- **India and US Have an Action Plan to Double Bilateral Trade in 3 Years**

CICESE



Canada - California Strategic Innovation Partnership Summit



PACIFIC RIM APPLICATIONS AND GRID MIDDLEWARE ASSEMBLY
PRAGMA

U.S.-INDIA SUMMIT

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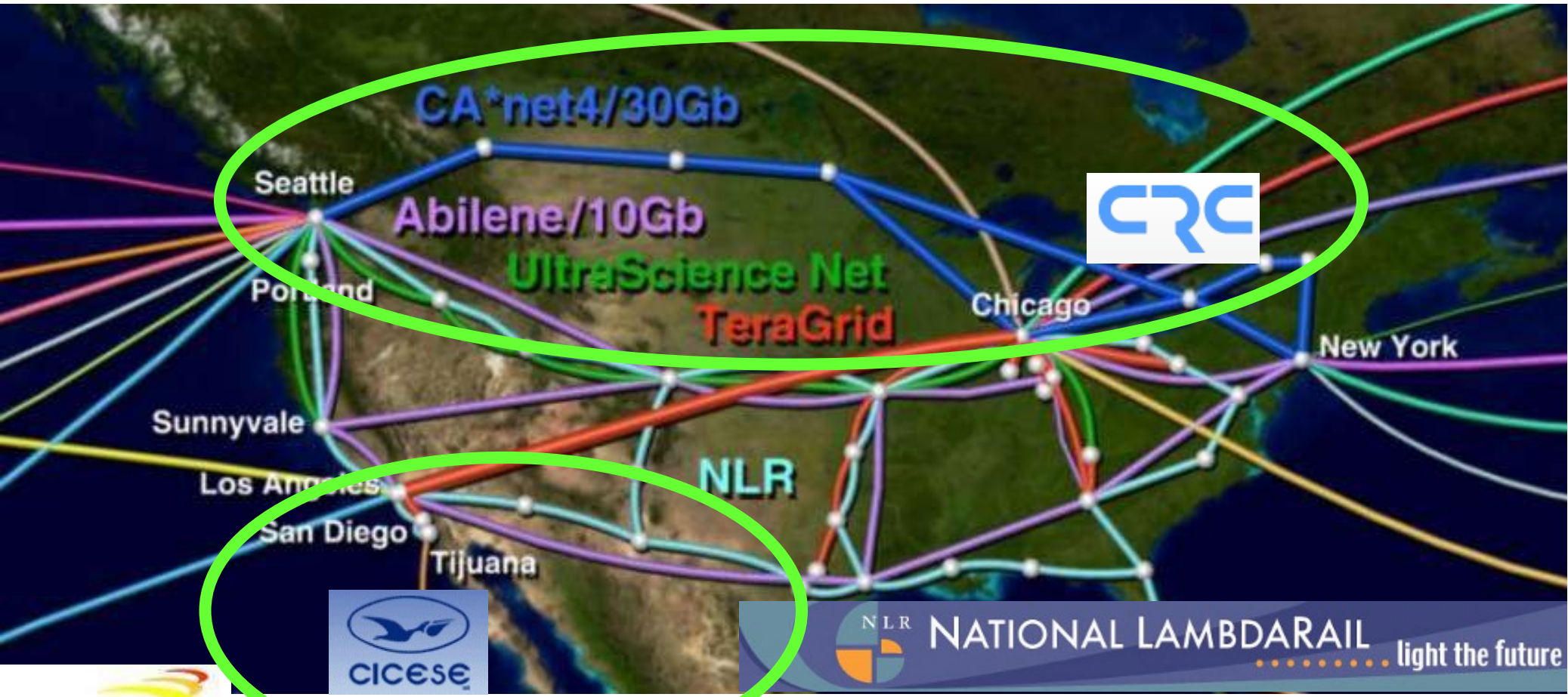
OSAKA UNIVERSITY

iGrid 2005

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Creating a North American Superhighway for High Performance Collaboration

Canada's CRC was Connected via CANARIE to Calit2 in June 2006
Next Step is Connecting Mexico's CICESE to Calit2 within Six Months



OptIPuter

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cudi

cenic
Corporation for Education Network Initiatives in California

CANARIE

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Calit2 Has Become a Global Hub for Optical Connections

Between University Research Centers at 10Gbps

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



21 Countries Driving 50 Demonstrations

1 or 10Gbps to Calit2@UCSD Building

Sept 2005

Is Calit2 Sustainable?

- "Hang Ten" on Bio-Nano-IT-Telecom Exponentials
- University Faculty Research Creates New Knowledge
- Fueled by New Students Every Year
- California Economy Depends on Creation of New Companies
- Leveraging Federal and State Investments
- Globalization Requires New International Partnerships
- California Will Be Facing Increasing Crises
- *Assuming* the Required Financial Structure
  - Capital Budget for Buildings
  - Operating Budget for People
  - Equipment Budget plus Annual Refresh

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