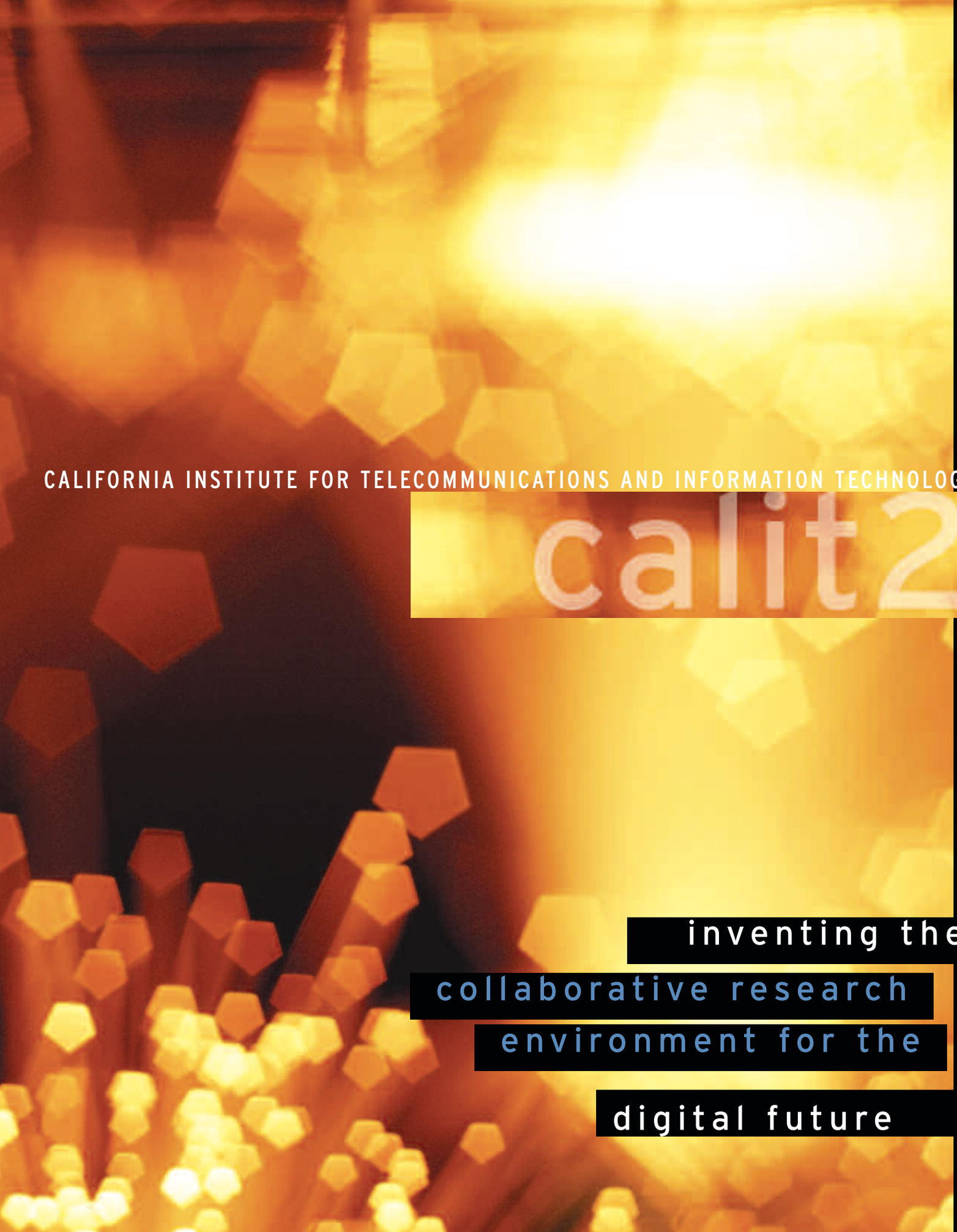
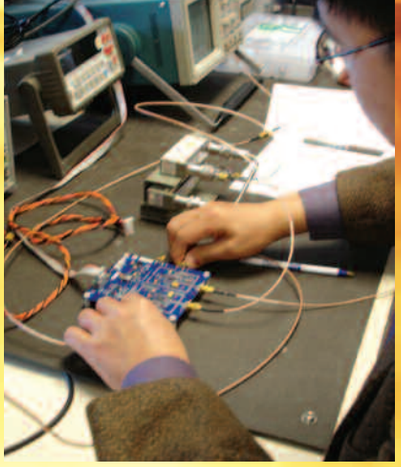


CALIFORNIA INSTITUTE FOR TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

calit2

inventing the collaborative research environment for the digital future

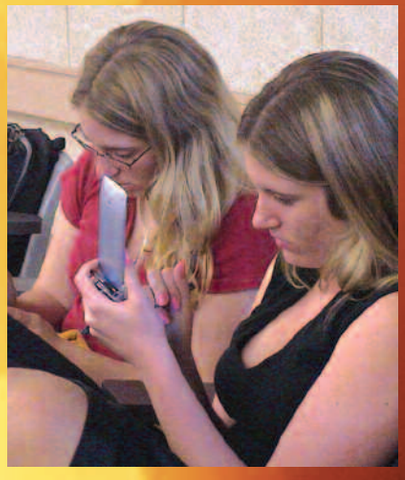
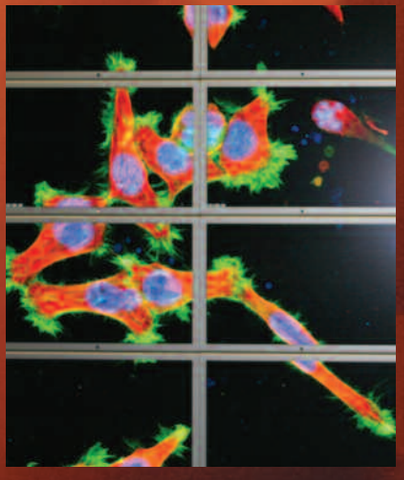
A partnership between UC San Diego and UC Irvine











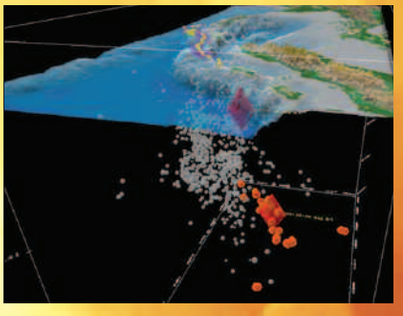


Telecommunications and information technology are having a "flattening" effect on the world, enabling global collaboration on a scale never seen before in history. This ability to collaborate is changing the rules of competitiveness and thereby having an enormous effect on society—not just ours, but other countries around the world.

Which means California and the U.S. can no longer depend on an unquestioned edge in innovation heading into the future...

The University of California anticipated this situation, in 2000, by building on its world renowned research and technical capabilities to create the California Institutes for Science and Innovation to *drive* innovation. That's the context in which Calit2 was formed.

Calit2 is conducting research on the future of telecommunications and information technology and how these technologies will transform a range of applications important to the State of California's economy and its citizens' quality of life.



SOCIETY IS BUILT ON INFRASTRUCTURE

Society is built on the foundation of multiple, interconnected infrastructures that evolve and take hold in all aspects of life—personal relationships, work, recreation, and entertainment.

The last three centuries have been defined by infrastructures related to the transportation of people and goods: The 18th century was dominated by river transportation, the 19th century by the railroad system, and the 20th by the highway and air travel systems.

Late in the 20th century, an "information transportation" infrastructure emerged in parallel with the physical transportation infrastructure. This trend began with the telegraph, followed by the telephone, and in recent years the Internet.

The physical infrastructure that moves people and goods has expanded slowly over time. Railroads and highways gradually began crisscrossing the country, and the speed of airplanes has increased over the last 80 years from 200 to 600 miles per hour—a three-fold increase.

The speed of the Internet, by contrast, has increased exponentially. In fewer than 20 years, Internet delivery of bits has gone from 300-baud modems to 10-gigabit Ethernet, a 30-million-fold increase.

While the Internet has already introduced tremendous change in society, change will continue . . . at an ever-faster rate . . .

. . . because the future evolution of the Internet will not be driven by a single technology or a single discipline. Rather, it will be driven by technologies across a range of disciplines: photonics and wireless communications, information technology, nanotechnology, and biological micro-electro-mechanical systems (MEMS), to name a few.

These disciplines do not act in isolation. In fact, it's the interactions among them that will cause even more radical change.

OUR WORLD WILL BECOME "SMARTER"

Customized medical care will be based on analysis of genetic variation across hundreds of millions of people to identify the patient's genotype, coupled with real-time readouts of his/her vital signs and responses to environmental stresses.

Intelligent transportation systems will make it possible for cars to share their positions and speeds anonymously with all others in a given area, enabling more efficient traffic flow.

Coastal zones will be instrumented with sensors to provide scientific data to support informed decision making about appropriate land use in sensitive ecosystems.

Vast networked gaming environments will support learning, communicating, and interacting with our world—not just for entertainment but for understanding complex scenarios like disaster response.

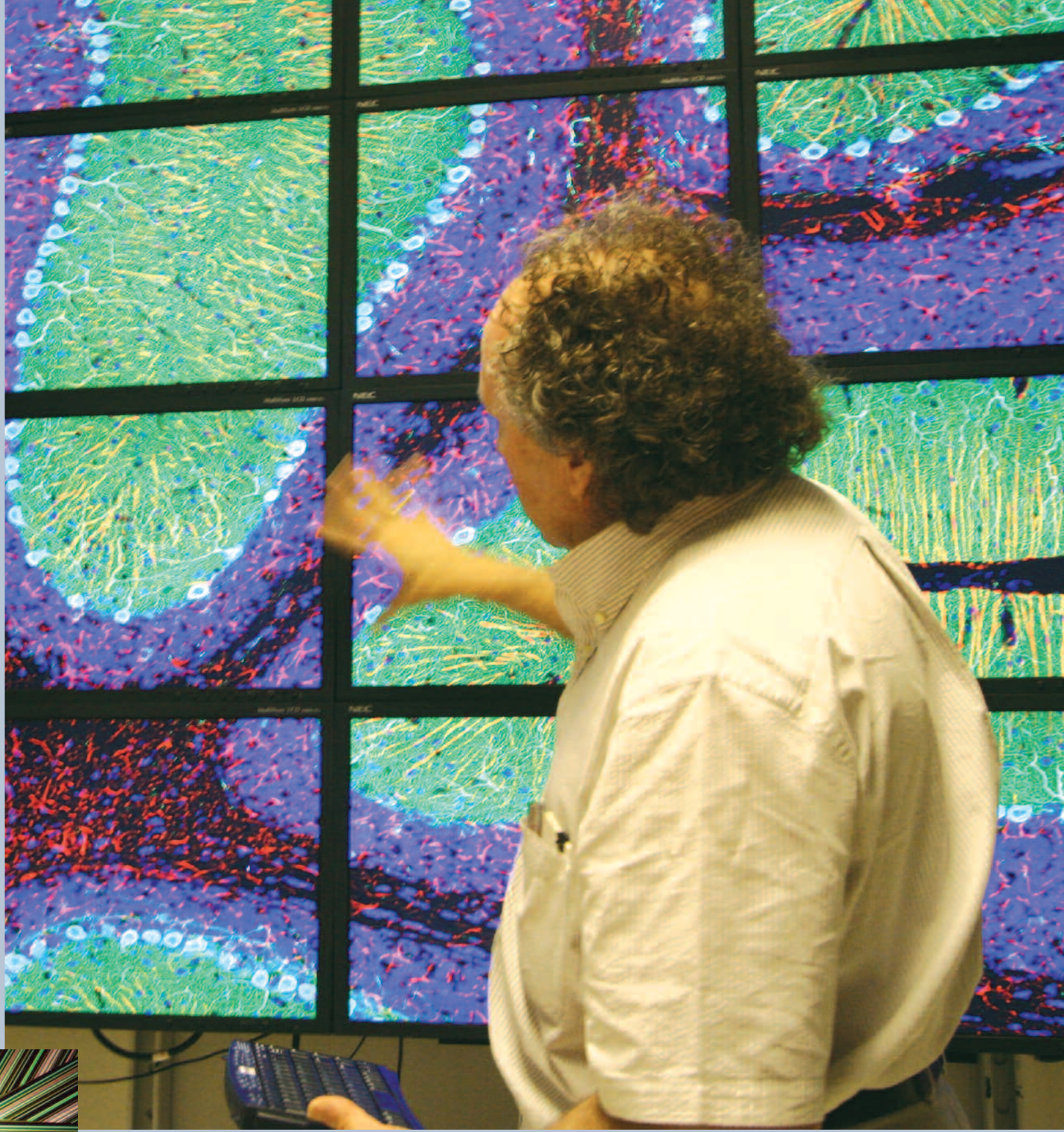
What these scenarios have in common is that they're based on integrated systems of technologies solving real-world problems.

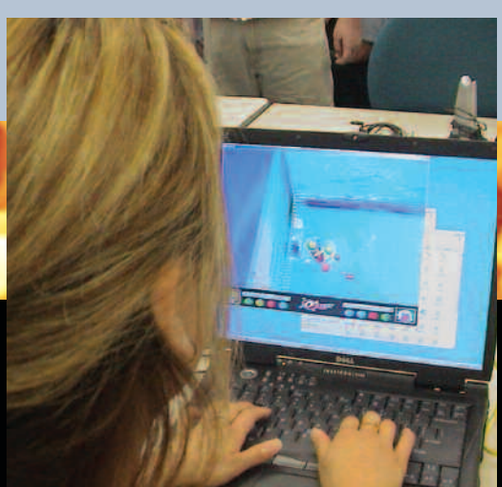
Realizing these scenarios requires a paradigm shift in the way that research is conducted and the very nature of the university system—the traditional home for fundamental research.

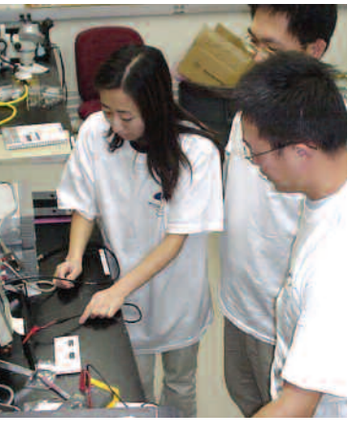
WHAT IS CALIT2?

Calit2 is one of four institutes launched in December 2000 through the California Institutes for Science and Innovation initiative. It is an experiment in inventing the collaborative research environment for the digital future. More specifically, the institute

- Creates research teams consisting of members from multiple academic departments often across multiple campuses. These teams integrate individuals' deep expertise across a broad range of disciplines to enable more comprehensive studies beyond those led by single principal investigators.
- Extends involvement beyond faculty to students, industry, government, and community partners.
- Enables prototyping in Calit2 "living laboratories of the future." These labs make it possible to push projects one step beyond academic theory and peer-reviewed publishing to building and testing integrated systems under real-world conditions.
- Provides technical professionals as the bridge between academia and industry to support activity in the living labs.







NEW FACILITIES SUPPORT CALIT2 GOALS

Calit2's innovative philosophy has created new design principles for the physical space in which we conduct our work. Using $100 million from the State of California, Calit2 designed and constructed two buildings, at UC San Diego and UC Irvine, to realize our technological and social goals.

The buildings themselves are living laboratories. For example, the roof of the UCSD building features an "antenna garden" to support wireless experiments. The UCI building has been instrumented by the U.S. Geological Survey with more than 40 vibration sensors to monitor the building's movements in response to earthquakes and other ground activity.

These buildings also have the following characteristics:

- **UNIQUE CAPABILITIES:** Clean rooms, MEMS labs, immersive virtual reality facilities, and a digital cinema theater are just a few of the specialized facilities in the buildings.
- **SHARED RESOURCES:** Shared laboratory space means multiple investigators can make use of a wide array of specialized equipment. New interdisciplinary collaborations are expected to emerge as faculty and students from diverse disciplines work side by side, becoming acquainted with each other's work, vocabulary, and culture.
- **EXTREME BANDWIDTH:** The UCSD building, for example, boasts nearly two million feet of gigabit Ethernet cable and 150 optical fibers linking the building with UCSD campus networks. This wealth of bandwidth will enable experiments that couldn't have been conducted before.
- **RECONFIGURABLE SPACE:** Large, open areas comprise the majority of the space, and they can be rearranged easily as new projects emerge.

CALIT2: A UCSD/UCI PARTNERSHIP

Southern California provides an ideal setting for Calit2. The region faces a broad set of challenges to the state's economy and quality of life: water and air pollution, increasing traffic congestion, stiff competition for land use, natural hazards (e.g., earthquakes, wildfires, destructive coastal tides), insufficient natural water supply, and lack of health care coverage for the poor.

Given the finite resources available, these pressures underscore the important role that telecommunications and information technology can play in effective resource management.

Calit2 is focusing its research and development agenda on five areas critically important to California: environment and civil infrastructure, intelligent transportation, digitally enabled genomic medicine, new media arts, and disaster response. These are areas in which UCSD and UCI have deep academic expertise.

The business environments surrounding both campuses also support these areas of endeavor. San Diego is an important international center of the telecommunications and biotech industries. Irvine has long been a hotbed for automobile design and biomedical instrumentation. And the computer gaming industry, building on the new media arts, counts some 70 companies between Los Angeles and San Diego.

While the heart of Calit2 is located in southern California, the institute also reaches out nationally and internationally to draw in the world's finest researchers with expertise needed in large-scale projects.

COME JOIN OUR ADVENTURE

We encourage interested faculty, students, and members of industry and the community to explore specific areas of engagement with Calit2. Below are a few examples of ways to engage with the institute. Specifics should be discussed with the Calit2 UCSD and UCI division directors.

FACULTY INVOLVEMENT

RESEARCH: Calit2 is a proactive and neutral clearinghouse for forming interdisciplinary research teams and securing funding for larger projects. Through Calit2, faculty members can find needed expertise for their projects; gain access to core, shared facilities in the Calit2 buildings; prototype infrastructure on each campus and across the two campuses; and work with Calit2 industry and community partners.

PROPOSALS: Faculty participants can access pre- and post-award support, and request letters of support from Calit2 leaders for grant proposals.

PUBLICITY: The Calit2 communications team (in tandem with relevant UCSD and UCI communications officers) can help promote faculty and student research activities and accomplishments.

EVENTS: Faculty participants receive invitations to Calit2 special events and seminars (many of which are webcast) and team with Calit2 to co-sponsor conferences and seminars consistent with Calit2's mission.

STUDENT INVOLVEMENT

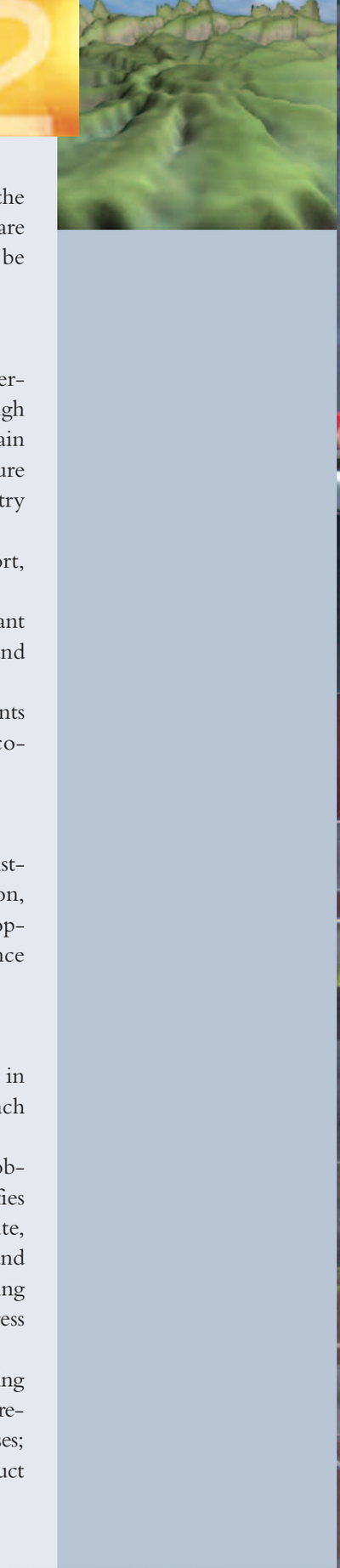
Calit2 supports graduate student fellowships, graduate student research assistantships, and summer undergraduate research scholarships. In addition, students can gain hands-on experience working on Calit2 research, development, and prototyping projects, which provides especially valuable experience that appeals to potential employers.

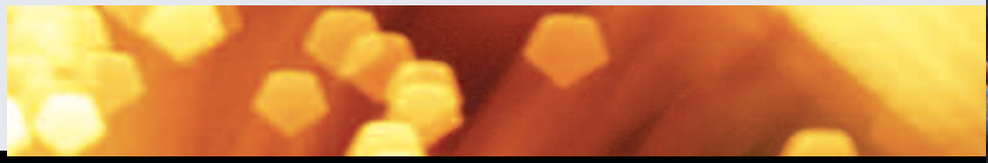
INDUSTRY INVOLVEMENT

Calit2 works with industry partners from start-up to large companies in a variety of industry niches. Calit2 customizes the partnership with each company; the ideas below are representative arrangements.

With respect to research, partners typically pose longer-term research problems that they don't have the resources to address in house. Calit2 identifies the necessary expertise across the range of disciplines involved in the institute, forms a team that typically includes industrial representatives themselves, and applies that team to the problem. Faculty working in Calit2 focus on solving complex problems with integrated systems, an approach that tends to address industry's needs in a meaningful way.

Partnerships with Calit2 also enable industry to learn how students are using and developing technologies to identify emerging markets; prototype and test pre-commercial products and systems in the real-world settings of the two campuses; evaluate the possibility of teaming with other Calit2 partners on joint product lines; and evaluate students for summer internships and career employment.



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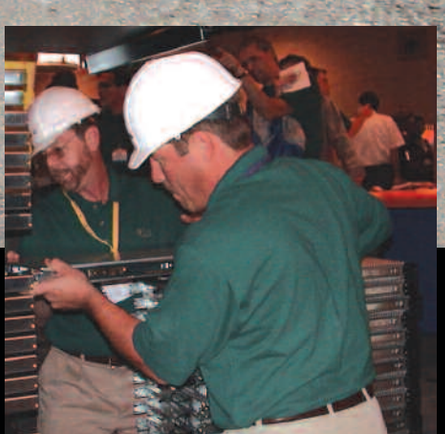

calit2

leadership

Calit2 is organized into three units: an institute-wide unit and two campus "division" units focusing on research, education, operational, and other activities specific to their campuses. Calit2 director Smarr is advised by chief scientist Ron Graham.

Larry Smarr
DIRECTOR

All directors work closely with the Governing Board, made up of UCSD and UCI senior administrators, and the Advisory Board, consisting of nationally recognized academic and industrial leaders in disciplinary areas of importance to Calit2's mission.

Governing Board

- **Nicolaos Alexopoulos** — CO-CHAIR, UCI
- **Frieder Seible** — CHAIR, UCSD

Advisory Board

- **Phil Smith and Forest Baskett** — CO-CHAIRS

Ron Graham
CHIEF SCIENTIST

Stephanie Sides
DIRECTOR OF COMMUNICATIONS

Ramesh Rao
DIRECTOR, UCSD DIVISION

UCSD Division Council

Albert Yee
DIRECTOR, UCI DIVISION

UCI Division Council

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Revision: September 2005