This year, we decided to do something different with Caltech’s Financial/Annual Report: not print it. For the first time, the report is exclusively an online publication. There are a number of reasons behind this decision, including our sustainability goals for the campus. In a simple way, it illustrates how these goals have multiple bottom-line effects. Doing business in a more environmentally conscious way is more than a worthy endeavor in and of itself: it often makes good business sense. It demonstrates our commitment to being wise stewards of our capital resources, whether financial, human, natural, or technological.

Over the past year, we engaged the campus community in discussions that will guide the strategic direction of Caltech. The Institute-wide Aims and Needs Committee focused on sustaining our high level of excellence in research and education and Caltech’s contribution to improving the quality of life for our nation and the world. Faculty members in a variety of research programs have set a direction for future enhancements in key issues facing society: global environmental science, energy, and medical applications of science and technology. And we have a new campuswide Sustainability Council, composed of staff and students, bringing state-of-the-art practices to the design and operation of our facilities. In today’s competitive environment, we know it’s important to “walk the talk.”
The Caltech community continues to advance the frontiers of science and technology. It goes without saying that every one of our faculty members is likely one of the best in the world in her or his field. While most campuses feel fortunate to have a few “stars,” we have a galaxy. The significance of their achievements can be measured in part by the array of awards and recognition garnered by Caltech researchers in the past year alone. Among them:

- **Maarten Schmidt**, the Moseley Professor of Astronomy, Emeritus, was one of the first seven recipients of the $1 million Kavli Prize for his contributions to the field of astrophysics.

- Four of the “Best Brains in Science 2008” highlighted in the December issue of *Discover* magazine belong to biologist/applied physicist **Michael Elowitz**; environmental scientist **Tapio Schneider**; biologist **Sarkis Mazmanian**; and electrical/bioengineer **Changhuei Yang**.

- **Alexei Kitaev**, professor of theoretical physics and computer science, was awarded a MacArthur Foundation “genius” grant to pursue his interest in using quantum physics to perform computation.

- **Julia Greer**, assistant professor of materials science, was recognized by *Technology Review* magazine as one of the world’s top innovators under the age of 35 for her work with materials on a nanoscale level.

- *Popular Science* magazine named Caltech bioengineer **John Dabiri** one of its “Brilliant 10” in its seventh annual listing of “the country’s top young scientists to watch.” Dabiri is described as a scientist who is “poised to change the world.”

- U.S. News Media Group, in association with the Center for Public Leadership at Harvard’s John F. Kennedy School of Government, named Nobel Prize–winning biologist (and Caltech president emeritus) **David Baltimore** and astronomer **Fiona Harrison** to their list of “America’s Best Leaders” for 2008.

- Four of Caltech’s 11-member chemical engineering faculty—**Frances Arnold, Mark Davis, Julia Kornfield**, and **John Seinfeld**—were included on the American Institute of Chemical Engineers’ list of “100 Chemical Engineers of the Modern Era.”

- And, finally, in a survey conducted by the journal *The Scientist*, respondents named the Institute the best place to work in academia in the United States.
Our undergraduate and graduate students are definitely a cut above, too:

- Twenty-seven of them won prestigious National Science Foundation Fellowships in 2008—14 recent graduates, 6 graduate students, and 7 seniors.
- Five seniors, four graduate students, and six recent graduates were awarded highly competitive National Defense Science and Engineering Graduate Fellowships.
- Caltech students also received Churchill, Hertz, Rhodes, Strauss and Watson fellowships and scholarships.
- CURJ, the Caltech Undergraduate Research Journal, was awarded the Magazine Pacemaker award from the Associated Collegiate Press for the second year in a row.
- A team of five undergraduates placed third in a field of 85 teams from around the world in the 2008 Genetically Engineered Machines competition at MIT.

For our staff members, working with faculty and students of this caliber offers lots of pluses—but also a few challenges. In light of the dedication and commitment shown by so many of our staff, Caltech awards the Thomas W. Schmitt Annual Staff Prize every June. The 2008 recipients of the Schmitt Prize were Lock Shop Supervisor Teesa Chmielewski and Chemistry Librarian Dana Roth.

The past year also saw significant advances in our research programs in energy and environmental science. These efforts are the foundation for future program developments:

- Biochemist Frances Arnold is developing a process to engineer microorganisms capable of converting lignocellulosic biomass produced by plants into liquid fuels that would provide a direct replacement for petroleum-based fuels.
- Applied physicist Harry Atwater is investigating renewable energy sources, particularly thin-film photovoltaic materials.
- Chemist Nate Lewis is studying how to convert sunlight into stored electrical energy and/or chemical fuels. He and fellow chemist Harry Gray were recently awarded a $20 million grant by the National Science Foundation to pursue their “Powering the Planet” solar-energy initiative.
Materials scientist **Sossina Haile** is focused on developing fuel cells that do not require hydrogen as an input.

Other topics under study include the turbulent fluxes of heat, mass, and water vapor that maintain Earth’s climate; the atmospheric chemical and physical processes that govern the dynamics and distribution of gases and particles from urban regions to the global atmosphere; and how the chemistry of the atmosphere is influenced by, and in turn influences, the biosphere.

And on campus we’re walking the talk. We’ve shown leadership in the academic community and in our home town of Pasadena. The Sustainability Council, staffed by Sustainability Manager John Onderdonk and Energy Manager Matt Berbee, is developing and implementing a systematic roadmap for improving our resource effectiveness, covering everything from material, energy, and water efficiency to paperless communication processes. Our Associate Vice President for Facilities, Jim Cowell, likes to say, “The money is in the buildings.” So we’re using LEED (U.S. Green Building Council’s Leadership in Energy and Environmental Design) criteria to guide the construction and renovation of our buildings.

- LEED Gold certification will be achieved for our three new campus structures, the Cahill Center for Astronomy and Astrophysics (just completed), the Schlinger Laboratory for Chemistry and Chemical Engineering, and the Annenberg Center for Information Science and Technology.

- We are pushing the envelope for LEED certification at the Platinum level for renovation of the Linde + Robinson Laboratory, future home of the Ron and Maxine Linde Center for Global Environmental Science. This will be accomplished through aggressive energy design, integration of historically significant architecture, and innovation in laboratory equipment.

- We are leveraging investment opportunities in solar energy by pursuing such projects as the installation of Pasadena’s largest solar array atop our Holliston parking structure.
Our sustainability efforts have benefited from the talents of every segment of the Caltech community, including our students. For example, this past summer, undergrads worked with mechanical engineering professor and Vice Provost Melany Hunt and the campus sustainability staff to examine energy usage at Caltech. They studied such things as improving the energy efficiency of computer server rooms, understanding the energy impact of fume-hood usage, and measuring Caltech’s carbon footprint.

Last year was also an eventful one for the Jet Propulsion Laboratory, which Caltech manages for NASA.

- The Phoenix spacecraft landed successfully on the north polar plain of Mars on May 25, 2008, and began acquiring images, analyzing soil samples, and taking meteorological measurements. In the course of its investigations, Phoenix confirmed the presence of water ice; showed the diversity of the Martian environment by finding soil that is “basic,” in contrast to the acidic conditions observed by the two Mars rovers; and detected a substance that may be perchlorate.

- As the year came to a close, the Mars Exploration Rovers were still hard at work, more than four and one-half years after landing on the red planet. Opportunity had climbed out of Victoria crater, which it had been examining from the inside for the previous two years.

As the Rovers continue their trek across the Mars landscape, JPL engineers are building their successor, the Mars Science Laboratory (MSL). It was announced in December that the launch of MSL, originally planned for fall 2009, had been rescheduled for fall 2011, the next time Earth and Mars will be in the correct relative positions. MSL, which JPL Director Charles Elachi believes will be “NASA’s flagship mission at the beginning of the next decade,” is the most difficult and challenging mission JPL has ever undertaken. It is, in effect, three spacecraft in one, with a cruise stage, a descent stage, and the largest rover yet sent to Mars. The extra time before launch is needed to be certain the spacecraft meets JPL’s stringent standards for testing and risk mitigation.

As of the end of 2008, JPL was operating 19 spacecraft and seven instruments daily.
On the educational side, the WASC Visiting Team came to Caltech November 19–21, 2008. This visit was conducted as partial fulfillment of the requirements for reaffirmation of the Institute’s accreditation in 2010. The visiting team reviewed three self-study themes we had identified in our Capacity and Preparatory Review Report of August 25, 2008: the core curriculum, undergraduate research, and the honor code. The team made recommendations for how we might address particular issues in each of these categories; it also found that the Institute “has the resources necessary to fulfill its mission . . . is planning carefully to weather the current financial crisis . . . [and] appears to have a sustainable strategy and clear processes to sustain the quality and effectiveness of its physical plant.” Over the next 18 months, we will be documenting our formal planning and assessment activities, and mapping them as thoroughly as possible onto the WASC Educational Effectiveness framework.

On the financial side, the year began with a notable success, as we concluded our $1.4 billion fund-raising campaign—no small feat for a small school. However, as the year came to a close, we had to acknowledge that Caltech, like every other university in the country, will not escape the effects of the unsettled global economy. Our revenues will be lower than originally projected for the next several years.

For 2009 and 2010, we are in the process of implementing cost-cutting measures to reduce the total campus operating budget (excluding JPL) by about 5 percent. Our plan—which is based on targeted reductions rather than across-the-board cuts—includes reorganizations, delaying or cancelling projects, and staff reductions in some units. We are planning to continue faculty hiring, albeit at a reduced rate, and to maintain financial aid at a healthy level. All segments of the community have been asked to closely monitor spending and staffing. We expect these measures to be satisfactory for 2009 and 2010. The ultimate impact of the recession, including impact on endowment income and giving, will be not fully felt until later years, especially 2011–12. As this situation evolves, we will remain guided by strategies that will both protect the outstanding quality of our core educational and research activities and position us to be stronger when economic conditions improve.
Challenging times, yes. But the news is not all bad. The Institute has a solid financial foundation. Our faculty compete exceptionally well for research funds. We have a loyal group of trustees, alumni, and friends who understand and support our mission, and fund-raising has been going well in recent years. We have a talented, creative student body and outstanding support staff. Historically, the best institutions get through tough economic times in the best shape, and I am confident that Caltech will emerge from this current turmoil still at the pinnacle of the scientific and technological world.

Jean-Lou Chameau
President