



# Aims & Needs Committee Draft Report

December 8, 2008

# Aims & Needs Committee Draft Report

- Charge from President Jean-Lou Chameau
- Committee
- Background
- Recommendations
- Discussion

# 2008 Aims & Needs Committee Strategic Questions

March 3, 2008

## Jean-Lou Chameau

- (1) Are we as good as we say we are? If no, what should we do about it?
- (2) Is our academic structure agile enough? Great successes at Caltech seem to have often resulted by bold moves led by a few individuals.
- (3) Is our environment conducive to interdisciplinary research and education? Are we more centralized and less flexible than others?
- (4) The smallness or size question remains of interest. Shouldn't we be driven more by excellence and commitment to the Caltech culture, rather than smallness per se?
- (5) Emerging trends and issues that Caltech should consider/leverage.
- (6) What are the positive aspects of Caltech and the Caltech life?
- (7) Should we do better at increased investment from industry in basic Research and Development at universities?
- (8) Diversity - - - are we still lagging with respect to our peers?
- (9) Internationalization. We have not responded in significant ways strategically.
- (10) In a competitive environment, brand name seems to matter more. Caltech has a great reputation among scientific circles, but does not have the same level of recognition among corporate, political and opinion leaders, nor the public.

# Aims & Needs Committee

February 15, 2008

<b>Jess Adkins</b>	Geological & Planetary Sciences
<b>Paul Asimow</b>	Geological & Planetary Sciences
<b>John Brady</b>	Chemistry & Chemical Engineering
<b>Warren Brown</b>	Humanities & Social Sciences
<b>Peter Dervan (Chair)</b>	Chemistry & Chemical Engineering
<b>Ray Deshaies</b>	Biology
<b>Michelle Effros</b>	Engineering & Applied Science
<b>Jean Ensminger</b>	Humanities & Social Sciences
<b>Shri Kulkarni</b>	Physics, Mathematics & Astronomy
<b>John Preskill</b>	Physics, Mathematics & Astronomy
<b>Axel Scherer</b>	Engineering & Applied Science
<b>Brian Stoltz</b>	Chemistry & Chemical Engineering
<b>Barbara Wold</b>	Biology

# 2008 Aims & Needs Committee Meetings

Thursday, April 10, 2008

Tuesday, April 22, 2008

Thursday, May 8, 2008

Tuesday, May 20, 2008

Tuesday, June 3, 2008

Monday, July 14, 2008

Monday, September 8, 2008

Thursday September 25, 2008

Tuesday, November 11, 2008

Tuesday, November 18, 2008

Thursday, November 20, 2008 (WASU)

Tuesday, December 2, 2008

Monday, January 5, 2009

# Mission Statement



The mission of the California Institute of Technology is to expand human knowledge and benefit society through research integrated with education. We investigate the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of society.

# Principles for Success (R. Murray, 2005)

- **Visible impact, out of proportion to size**
  - amplify the efforts of individual faculty.
  - make careful choices - - - must reflect the **needs of society** and require the type of **fundamental** research at which Caltech excels.
- **Best faculty attracted to Caltech**
  - risk takers, hire selectively and create resources for success
- **Best students enrolled at Caltech**
- **Unique approach**
  - Focus on areas that call for **fundamental advances** and that will be the starting point for new fields and disciplines.

# Aims & Needs Initiatives Draft Report

December 8, 2008

- **Institute of Sustainability**
- **Life Sciences**
- **Caltech Graduate and Postdoctoral Fellows**
- **Undergraduate Education**
- **K-12 Education in Pasadena**
- **Information Science and Technology (IST) Division**

# Institute of Sustainability

- The topic of **sustainability (energy, environment, socio-economic)** will be critical to the future and will drive many aspects of science and technology in coming decades. The world needs a credible source for science and technology in this field. Caltech should position itself as a leader in this field.
- We should create an institute with a faculty chair and fifteen endowed professorships that would have funds to support **interdisciplinary efforts between all divisions**. It could be the focus of an endowment campaign/fundraising effort. A new sustainability initiative is envisioned to impact all six of Caltech's academic divisions. We are well-positioned to build on existing strengths in climate and energy research.

# Life Sciences Initiative

- The biological sciences are in the midst of a revolution, a period of accelerated discovery. Over the next generation, we can expect a dramatic understanding of how living things evolve, develop and function. Because discovery in the life sciences is increasingly emerging from the **interfaces of Biology with Chemistry, Engineering, Applied Physics and Computer Science**, there is an opportunity for Caltech because we excel in all these areas. We propose that Caltech launch a cross-divisional cross-disciplinary initiative to expand research that invents and employs methods, approaches and concepts from the physical, chemical, computational and engineering sciences to advance our understanding of living systems.
- An emerging broadly-distributed group of Caltech faculty with interests in **translational efforts in medicine** would benefit by deepening our existing relationship with regional medical centers.

# Caltech Graduate and Postdoctoral Fellows

Many of us are spending an ever growing fraction of our time struggling to secure increasingly scarce federal grants. Furthermore, grants are more and more narrowly targeted, encouraging us to build incrementally on our past achievements rather than gambling on exciting new directions. We fear that these disturbing trends will only accelerate in the future. We believe that the research universities that most effectively reduce their reliance on federal support will be poised to become the dominant leaders in science and technology.

- **Therefore, we urge the administration to launch a new initiative with the goal of dramatically expanding Caltech's supply of endowed Graduate and Postdoctoral Fellowships.**
- Caltech Graduate Fellows will have the stable support they need to complete ambitious long term projects, unfettered by the vicissitudes of external funding agencies.
- Caltech Postdoctoral Fellows, free to build bridges between existing research groups, will spark path-breaking interdisciplinary discoveries. A Caltech Fellows program will enhance our ability to recruit top faculty candidates, and to retain our best faculty despite the blandishments of well-endowed competing institutions.

# Undergraduate Education

The Committee identified undergraduate education as a high priority area whose needs cut across divisional boundaries. Maintaining an innovative and inspiring approach to undergraduate education is critical to attracting the best students, meeting the needs of a changing student population in a changing world, feeding our students' passion for science and engineering, and producing leaders who will have the greatest possible impact on society.

- **Consistently promote high quality teaching of undergraduates across all divisions.**
- **Create opportunities for freshmen and sophomores to integrate research into the academic year.**
- **Move back to a system of face-to-face advising.**
- **Widen types of available support for extraordinary innovation in undergraduate education.**
- **Encourage and promote breadth in course offerings on our campus and through complementary offerings from one or two strategically chosen partner institutions.**

# Undergraduate Education

## The Caltech Scholar Program

- The committee proposes an experimental initiative for exploring new ways to teach the Core that integrate the core's material, increase student-faculty interaction, and incorporate research into the freshman year. We call this program the **Caltech Scholars Program** and envision a program size of 15-20 students and 4-5 faculty. The central ideas behind the proposed program are as follows.
- **Integrated core.** Freshmen enrolled in the Caltech Scholars Program will satisfy their core requirement by taking a single integrated course.
- **Group research project.** The group research project will tackle a "grand challenge" motivated by the underlying theme and using material covered in the integrated core.
- **Enrichment activities.** Possible activities might include meetings with policy makers, industry leaders, and researchers whose activities are related to topic of interest.

# Caltech's Role in K-12 Education in Pasadena

- There are several compelling reasons, both practical and intangible, for Caltech to consider pre-college education in the Pasadena area to be a high priority. It is clearly in our self-interest to have quality public schools available to Caltech families, and it is a matter of moral leadership in the community that Caltech help improve secondary education locally, regionally and nationally. We could imagine several ways to pursue this interest, including for example the founding of a charter school, but the quickest, easiest, and broadest impact would be achieved through an expanded and **improved partnership with the Pasadena Unified School District (PUSD)**.
- The Committee identified our ability to **recruit the best faculty** and to retain them throughout their peak research career as a key metric of Caltech's overall excellence.
- From both self-interest and public interest, **Caltech needs to consider its place in the city and community of Pasadena.**
- **Connecting with PUSD is just the right thing to do.**
- Caltech's first step should be to **listen and gather information** from a variety of PUSD stakeholders.

# Division of Information Science and Technology

- We urge the administration to pursue a campus-wide discussion about creating a new **Division of Information Science and Technology (IST)**. Information is becoming one of major themes of 21st century thought, forging deep connections with some of the most exciting and important problems in physical science, biological science, social science and engineering.
- Caltech's IST Division would be founded on a broader and more compelling vision: that information science and technology, like mathematics, physics, and chemistry, is now an essential part of the foundation of all science and engineering disciplines.
- We estimate that at least 40 members of our current faculty passionately embrace this vision and are eager to engage in.
- Founding the IST Division will send a strong message to the world that Caltech is vigorously committed to a highly innovative research and education program based on a broad interdisciplinary view of information science and technology.

# Thank you

Provost's Office

- Jean Grinols
- Stacey Scoville
- Karen Kerbs