

## Special Faculty Meeting

Monday, January 12, 2009

**MINUTES**

The Special Faculty meeting was held on Monday, January 12 2009, in the Hall of Associates, Athenaeum, California Institute of Technology, California 91125.

**Faculty Chair Judith Campbell presiding.**

**1. Call to Order**

Chair Campbell called the meeting to order at 3:05 pm.

**2. Approval of Minutes**

Motion was made to approve the Faculty Meeting minutes, November 24, 2008. Moved, seconded and approved.

**3. Announcements**

Chair Campbell announced that Prof. Wallace Sargent is this year's Nominating Committee Chair. She introduced Prof. Peter Dervan, who would present the Draft of the Aims and Needs Committee's Report.

**4. Aims and Needs Committee Draft Report**

(On December 8, 2008, this Draft committee report was presented to both the IAC (Institute Administrative Committee) and the Faculty Board.)

In 1969, Professor Dervan began, an Aims and Needs Committee was constituted and asked to give an institute-wide overview of Caltech; another such report was made in 1988. Now, in 2008, as the Division Chairs are bringing their strategic plans to the President and Provost, it is time for the Aims and Needs Committee to look at the aims and needs of the Institute over the next twenty years.

No-one, said Prof. Dervan, could have anticipated the recent catastrophic destruction of wealth around the world; as Yogi Berra noted, it's tough to make predictions, especially about the future. The Aims and Needs Committee was doing its work before the financial crisis; this should be kept in mind.

The committee began by looking at previous reports on the state of Caltech. It then considered its charge:

Charge from President 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 from 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. What emerging trends and issues should Caltech consider and/or leverage?
6. What are the positive aspects of Caltech and the Caltech life?
7. Should we do better in soliciting investment from industry in basic Research and Development?
8. Diversity - - - are we still lagging with respect to our peers?
9. Internationalization of research: what is our strategic response?
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.

Background

The Aims and Needs Committee is made up of at two faculty members from each division.

BIO	CCE	EAS	GPS	HSS	PMA
Ray Deshaies	John Brady	Michelle Effros	Jess Adkins	Warren Brown	Shri Kulkarni
Barbara Wold	Brian Stoltz	Axel Scherer	Paul Asimow	Jean Ensminger	John Preskill

Prof. Dervan complimented the committee, noting the comparative youth of the members: they have been here long enough to know how Caltech works, but none of them is a division chair.

The Aims and Needs Committee has been meeting every fortnight since April, 2008 and has meetings scheduled through January, 2009. The Caltech Mission Statement provided its starting point:

*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.*

As a preliminary, the committee articulated the four “essential” principles upon which Caltech’s success is based:

- Caltech has a visible impact, out of proportion to its size. This involves:
  - amplifying the efforts of individual faculty.
  - making careful choices that both reflect the **needs of society** and require the type of **fundamental** research Caltech excels at.
- Caltech attracts the best faculty, hiring selectively and ensuring that faculty members have the resources they need to succeed.
- Caltech enrolls the best students.

- Caltech takes a unique approach, focusing on areas that call for **fundamental advances** and that will be the starting point for new fields and disciplines.

### Recommendations

The committee made six recommendations, most of which are incremental in flavor; “we are not a bunch of revolutionaries!” The recommendations are as follows:

#### **(1) Institute of Sustainability**

The topic of sustainability will be critical to the future and will drive many aspects of science and technology in coming decades. The world needs a credible source of science and technology in this field. Caltech should position itself as a leader in this endeavor with the creation of an Institute of Sustainability, comprising a faculty chair and fifteen endowed professorships, with funding to support interdisciplinary efforts across all divisions. (We are already well positioned to build on existing strengths in climate and energy research, Prof. Dervan noted. There are approximately seven people already here who could participate in such an Institute. The proposal is to add around eight new faculty members, making us stronger at something we are already doing.)

“With all the smart people here, how can we *not* redouble our efforts in this area?”

#### **(2) Life Sciences**

The biological sciences are in the midst of a revolution, a period of accelerated discovery. Over the next generation, we can expect a dramatic increase in our understanding of how living things evolve, develop and function. Discovery in the life sciences is increasingly emerging at the interfaces of Biology with Chemistry, Engineering, Applied Physics, and Computer Science. Thus, there is an opportunity here for Caltech, since we excel in all these areas. The committee proposes that Caltech launch a cross-divisional, cross-disciplinary initiative, on analogy with the Biological Sciences Initiative of the last decade, 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.

In addition, human biology and medicine are intellectually rich areas, especially given the Human Genome Project. Many people who are already doing fundamental work would love to see their work bear fruit for medicine, and Dr. Baltimore is already pursuing translational medicine. Developing a relationship with UCLA might be a good starting point.

#### **(3) Caltech Graduate and Postdoctoral Fellows**

There are tough times ahead with regard to obtaining Federal grants. Many of us are spending an ever growing fraction of our time struggling to secure increasingly scarce federal funds. Furthermore, grants are more and more narrowly targeted, encouraging us to build incrementally on our past achievements rather than gambling in exciting new directions. These disturbing trends will only accelerate in the future.

The committee believes 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, it urges the Administration to launch a new fundraising initiative, with the goal of dramatically expanding Caltech’s supply of endowed Graduate and Postdoctoral Fellowships. Under such a system,

- 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.
- We believe that Fellowships should be distributed by Divisional processes, rather than Institute-wide competition, as the most effective way to optimize how various disciplines utilize fellowship support differently.

#### **(4) 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. Caltech already does a good job with respect to these goals, but the Aims and Needs Committee recommends several additional measures:

- Consistently promote high quality teaching of undergraduates across all divisions.
- Create opportunities for freshmen and sophomores to integrate research into the academic year. In particular, SURFs must be integrated better with students' coursework.
- Move back to a system of face-to-face advising.
- Widen the types of support available for extraordinary innovation in undergraduate education. We need to free up some time for those willing to create new and innovative courses.
- Encourage and promote breadth in course offerings on our campus and through complementary offerings from one or two strategically chosen partner institutions, possibly via electronically shared classes.

#### **Caltech Scholars Program**

In addition, the committee (here being "a little bit bold") urges that we explore new ways to teach the Core, such that core material is better integrated, student-faculty interaction is increased, and research – possibly a group research project organized around sustainability – is incorporated into the freshman year. Towards this end, it proposes the creation of a trial "Caltech Scholars Program," comprising 15-20 students and 4-5 faculty. The Program will include the following

- Integrated core. Freshmen enrolled in the Caltech Scholars Program will satisfy their core requirement by taking a single integrated course organized around themes, rather than subjects.
- 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.

### **(5) K-12 Education in Pasadena**

There are compelling reasons for Caltech to make pre-college education in the Pasadena area a high priority. It is clearly in our self-interest to have quality public schools available to Caltech families, and we also have a moral responsibility to help improve secondary education locally, regionally and nationally. The quickest and easiest way to have a broad impact on local education would be to expand and improve our partnership with the Pasadena Unified School District (PUSD). "This is just the right thing to do."

Prof. Dervan noted that at the Faculty Board meeting, when he presented this item, it was pointed out that there are already people at Caltech who are very involved in K-12 education in Pasadena and elsewhere. "We missed it," he acknowledged, but said that "we need to do more."

### **(6) Information Science and Technology (IST) Division**

The committee urges the Administration to pursue a campus-wide discussion about the possibility of creating a new Division of Information Science and Technology (IST). Information is becoming a major theme of the 21st century, and promises to forge 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 the principle that information science and technology, like mathematics, physics, and chemistry, is now an essential part of the foundation of all science and engineering disciplines.
- The Aims and Needs Committee estimates that at least 40 members of our current faculty passionately embrace this vision and are eager to engage with it.
- Founding an IST Division will send a strong message to the world that Caltech is vigorously committed to a highly innovative and interdisciplinary research and education program.

Prof. Dervan said that if there had been a seventh recommendation, it would concern Undergraduate Residential Life. He said that faculty are becoming alarmingly out of touch with the undergraduates and need to become more responsive to students and better informed about student issues and problems. The Aims and Needs Committee did not address this issue, as many bodies have recently looked into it, their messages being basically the same: "residential life at Caltech is broken and needs to be fixed."

Prof. Dervan recommended looking at house traditions and considering faculty living in the houses and acting as mentors. In general, faculty need to interact more with students in the houses. We should act as role models, teaching students how to interact socially and ethically with others. Dr. Dervan also declared that the Honor Code needs to be better understood. He was "shocked" to discover that while students recognize the Honor Code as governing their academic work, they do not think it applies to their daily lives: "how can we allow [this]?" he asked. Finally, "we could get bold": maybe Caltech should have a freshman residence.

### **Discussion**

Prof. Jack Roberts commented that in previous years, Caltech faculty such as Hale, Pauling, Noyes, Millikan, Lauritsen and Du Bridge were active in government and big on the national

scene. Presidents today are dynamic in many ways, but do not take action like they used to. This is a real weakness.

Prof. Dervan replied that times were much simpler during the 1940's and 50's. He pointed out that it is very complicated to run a modern research university, and that we are lucky to have found people who can do it. He also noted that "the federal government is in our tent, big time!"

Prof. Lynne Hillenbrand asked whether the six recommendations presented are prioritized. Prof. Dervan said that they were not, though their ordering does reflect the passions of the committee: the Institute of Sustainability is primary, in its view. He stressed that the six recommendations are meant to generate discussion.

Prof. Barry Simon declared that the Core is like a democracy: it's the worst way of teaching the material except all the rest. He is unconvinced that we could teach linear algebra, physics, or chemistry except in the manner we do, and thinks that it is not clear that the students would learn the necessary material around a research project. "The Core is one of the best things we do."

Prof. Dervan acknowledged that many colleagues share this view, and said that the Committee understood the centrality of the Core and the boldness of its suggestion. He stressed that the idea was just that the experiment be run, not that the Core be done away with forthwith. Prof. Kennedy comment that the Core is valuable, and suggested that the Scholars program might be suitable for students in their sophomore and junior years, after they have completed the Core.

Kimberly Douglas, University Librarian said:

"The report would benefit from more reflective thinking about the needs to achieve the aims. A case in point is the aim of stimulating interdisciplinary research. It would be productive to think beyond the human behavior approaches of impromptu meetings, and having lunch, and address the models and mechanisms for making research results more accessible for computers as well as humans regardless of where they are located. Research results and papers would be available in open repositories for various digital tools and broader sharing if it were not for legal barriers that hinder yet unknown creative approaches. Until that is done interdisciplinary research aims cannot move to a new level of opportunity here at Caltech or elsewhere."

Prof. Dervan urged the administration and the Board of Trustees to bring new resources to Caltech to make the Institute of Sustainability a reality. He said that fundraising initiatives are needed to programs in place and to add key faculty, and although he said that no new building is envisaged at this stage, it would not be "unthinkable" to consider a new building in the future. While Caltech clearly could not double its size, it could sustain another building or two.

Prof. Tom Tombrello pointed out that the committee had not answered the first line of the President's committee charge: "are we as good as we say we are? If no, what should we do about it?" Prof. Dervan said that this question is better answered by each faculty member for him- or herself.

It was suggested that the Report did not go far enough. We can't be content with a "me too" approach; we need to go back to bringing in "crazy" assistant professors, undergraduates and graduate students.

Prof. Jack Roberts asked whether the Institute of Sustainability were to be comparable to the Beckman Institute. Prof. Dervan replied that such details are not something his committee would address. He reminded everyone that the recommendations are modest, and that the suggested changes are intended to be incremental.

In response to a question from Prof. Joann Stock, Prof. Dervan said that the committee had not discussed in any detail the issue of university branding, particularly overseas. Prof. Stock said that although Caltech is known well in science circles, it is a challenge to reach potential donors and investors outside science. Other universities are taking branding very seriously and are creating universities in other parts of the world in order to raise their profiles. Prof. Tombrello suggested that we encourage foreign students to become advocates for Caltech when they go back to their home countries, and Prof. Dervan thanked him for the suggestion.

In closing, Prof. Dervan thanked the Aims and Needs Committee.

## **5. New Business**

There was no new business.

## **6. The meeting adjourned at 4:00 pm.**

These minutes were approved at the February 23, 2009, Faculty Meeting.