



CfAO Overview

**Spring Retreat and Industrial
Board Meeting**

San Jose

21 March, 2003

Jerry Nelson



Outline

- **CfAO Organization and Mission**
- **Thematic structure**
- **Proposal structure**
- **Results and Highlights of Year 3**
- **Year 4 funding profile**
- **Five Year Review and Proposal**
- **Summary**



Background

- **NSF funded STC, established November 1999**
 - One of five selected that year by NSF for funding
- **Center headquartered at the University of California at Santa Cruz**
- **CfAO Mission : Advance and Disseminate Adaptive Optics knowledge in service to science, health care, industry, and education**



Strategies

- **CfAO will pursue its purpose and achieve its goal by:**
 - 1) Demonstrating the power of AO by doing forefront science
 - 2) Increasing the accessibility of AO to the scientific community
 - 3) Developing and deploying highly capable AO systems and laser beacons
 - 4) Coordinating and combining research efforts to take advantage of the synergies afforded by the Center mode of operations



Strategies (cont)

- 5) Integrating education with our research
 - 6) Building a Center community that is supportive of diversity through vigorous recruiting, retention, and training activities
 - 7) Encouraging the interaction of vision scientists and astronomers to promote the emergence of new science and technology
 - 8) Leveraging our efforts through industry partnerships and cross-disciplinary collaborations
- We will enable all of these strategies by achieving, nurturing, and maintaining NSF funding as a Science and Technology Center.

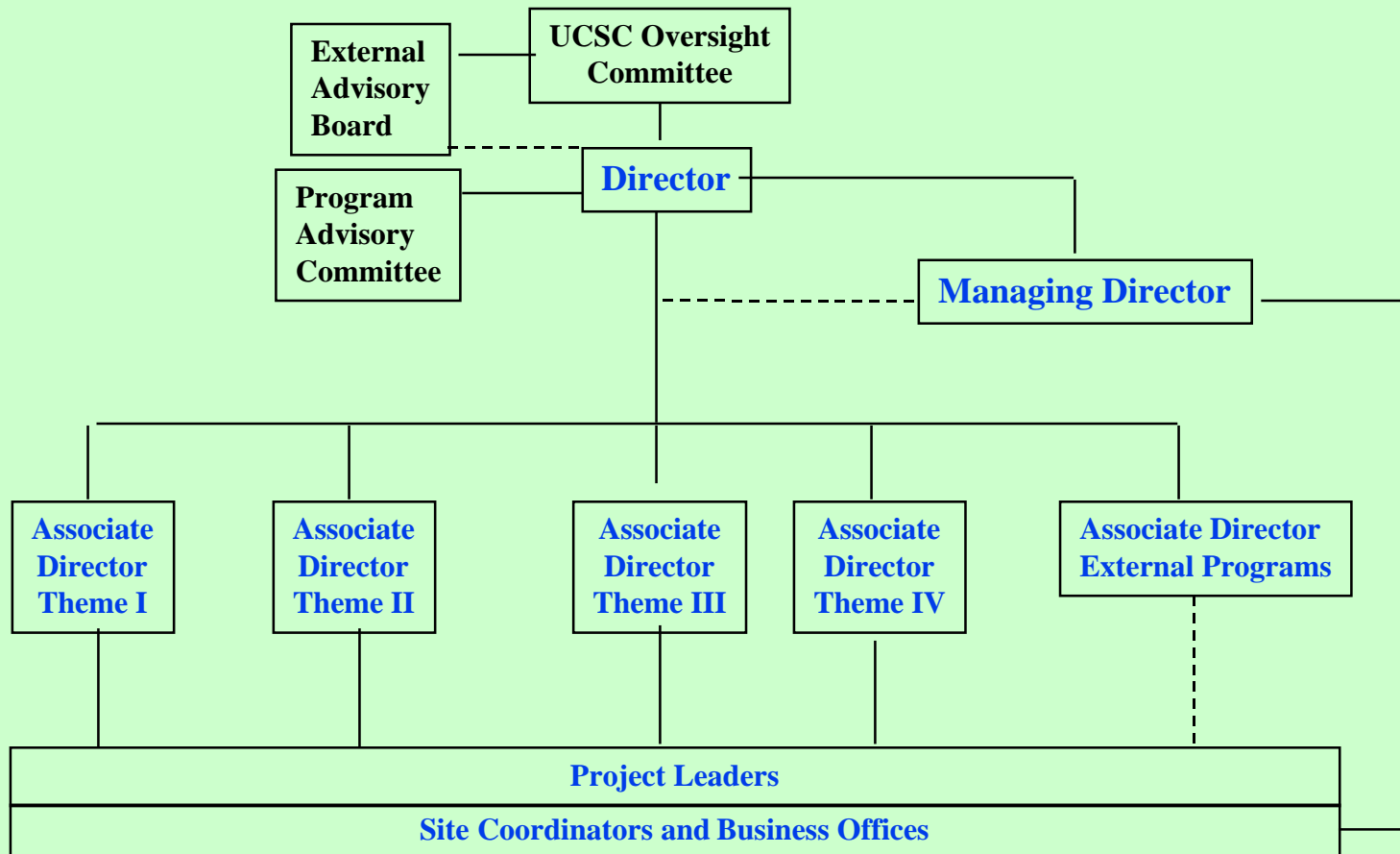


CfAO Operations

- **Funded as an NSF STC**
 - STC Program started in 1989
- **CfAO is unique in the links established between astronomy and vision science**
- **Funded for 10 years at \$40 Million (subject to 5th. Year review)**
 - Matching funds of \$2 Million/yr. from 25 affiliated institutions (academic and industrial)
- **Projects funded after internal and external review**
- **Multi-disciplinary and multi-institutional work is encouraged**
- **Knowledge transfer to industry is key requirement**



Organizational Chart





Executive Committee

- **Jerry Nelson: Director**
- **Christopher Le Maistre: Managing Director**
- **Claire Max: Theme Leader for AO for Extremely Large Telescopes**
- **Lisa Hunter: Associate Director, E & HR (Theme 1)**
- **Scot Olivier: Theme Leader for Extreme Adaptive Optics**
- **David Williams: Theme Leader for Vision Science**
- **Andrea Ghez: Associate Director for Astronomy Science**
- **Richard Dekany: Associate Director Multi conjugate AO**
- **Austin Roorda: Associate Director for Vision Science**



Industrial Advisory Board

- **Representatives from Corporations, Investors, Service Providers**
- **Provides feedback on industrial relevance, market needs, and feasibility of research**
- **Meets at least semi-annually**
- **Coincident with CfAO Spring and Fall Retreats**
- **Assists in setting direction of CfAO**



Theme Organization

- **Designed to focus our efforts, to foster Center-wide collaborations toward common goals (Themes), and to leave valued “monuments” as our legacy**
- **Themes**
 - Theme 1: Education and Human Resources
 - Theme 2: AO for Extremely Large Telescopes
 - Theme 3: “Extreme AO” (ultra high contrast)
 - Theme 4: Compact Vision Science Instrumentation for Clinical and Scientific Use



Theme 1: Education and Human Resources

- **Emphasis on high school-to-college and on retention in college**
- **Integrating Research and Education:**
 - Professional Development Conference for CfAO grad students and postdocs
 - REU Program
 - Increase versatility of our graduate students (astro and vision science)
 - AO Summer School
- **Educational efforts in Hawaii**
 - Alu Like
 - Maui Community College
 - Observatories



Theme 2: AO for Extremely Large Telescopes (30 - 100m)

- **Components:**

- Science that pushes advanced AO capabilities
- Multi-conjugate AO systems on 8-10 m telescopes (design, analysis, optimization)
- AO for GSMT's (30 m telescopes or larger - the next generation)
 - System design, modeling, simulations
 - Control mathematics
 - Hardware
 - Large deformable mirrors
 - wavefront sensors
 - Laser guide stars

Even basic AO architecture and performance not well understood for giant telescopes. This is a major challenge.



Keck Laser is Commissioned



2003 March 21

JEN Retreat Overview

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Theme 3: Extreme Adaptive Optics

Rationale for ExAO

- **An ExAO system on current 8-10 meter telescopes could enable new astronomical science within 3-5 years by improvement in the detectability of dim objects (planets)**
- **Be a stepping stone towards Extremely Large Telescopes - similarity in number of control points etc.**
- **Strengthens links between Astronomy and Vision Science since MEMS deformable mirrors have to be developed for both.**



Theme 4: Vision Science

- **Received high marks from all visiting committees**
- **CfAO provides researchers with funds for Instrumentation**
- **Several prototypes have been developed. CfAO seeking partners for developing commercial instruments**
- **NEI grant confirmed for CfAO led consortium to develop AO enhanced vision science instrumentation**



• Proposal Process



Strategic Plans for Themes

- **Theme Leaders responsible for developing a long term strategic plan (~ 5 yrs.) and a one year strategic plan.**
- **Strategic planning will include discussions with PIs**
- **Milestones and deliverables to be identified for both short and long time scales**
- **Multiple year proposal encouraged**
- **Single year proposals acceptable**
- **Collaborative projects strongly encouraged**



Definitions

- **Milestones - Significant Achievements in research or development plan eg. completion of a phase of the research.**
- **Deliverables - Tangible results eg. delivery and distribution of report on completion of phase of research or delivery of hardware**

Project Evaluation



- **Guidelines sent to PIs and reviewers**
- **Internal review by theme leader and one other review committee member**
- **External reviewer**
- **Final decision on proposal based on reviewer comments and thorough discussion by Program Review Committee**
- **Difficult cases discussed with Program Advisory Committee (PAC)**
- **Reviewers comments sent to PIs.**



Proposal Review Committee (PRC)

- **PRC is equivalent to new Executive committee (9 people)**
 - Director: Nelson, LeMaistre,
 - Theme Leaders: Hunter, Max, Olivier, Williams
 - Technical experts: Dekany
 - Science experts: Ghez, Roorda
- **PRC given all proposals to read**
- **Each PRC member given some proposals to carefully review**



Year 3 Results and Highlights



AO Laboratory Funding (Moore Foundation)

- **Laboratory to be in Thimann Lab at UCSC**
- **PI: Claire Max; Co-PIs: Jerry Nelson, Joe Miller**
- **\$9.1 Million over 5 years**
- **Funding for equipment and personnel**
- **Progress**
 - Site identified (Thimann) and architectural work underway
 - Key staff being hired
 - Programs being designed
 - Interim occupancy expected in ~ 3 months



AO Instrumentation for Advanced Ophthalmic Imaging

- **Agency: NIH - National Eye Institute**
- **Program: Bioengineering Research Partnership Grant (BRP)**
- **Consortium: CfAO Vision Science Group (Rochester, LLNL and Houston), Doheny Eye Institute at USC, UC Berkeley and the Schepens Eye Institute**
- **Amount Granted: \$10 million over 5 years**
- **Deliverables: 6 devices to provide high resolution imaging of eye defects and diseases (Prototypes of 4 have been developed with CfAO support)**



Year 4 Funding

•	Item	proposed	Actual
•	Total funds (\$K)		4000K
	– Directors reserve	250	200
	– Workshops/infrastructure	558	537
•	Remaining for proposals		3263
	– EHR (Theme 1)	647	508 (0.156)
	– ELT's (Theme 2)	1929	1543 (0.463)
	– XAO (Theme 3)	919	596 (0.183)
	– Vision Science (Theme 4)	1511	936 (0.287)
	– Budget imbalance	-1814K	-320 (-0.10)



2003 NSF renewal and Site Visit

- **Proposal was submitted February 3, 2003**
 - Work of many members of the center
 - Defines the direction for the next 5 years
- **NSF Site Visit, April 15 to 17 2003**
 - Critical evaluation of renewal proposal
 - Their recommendations will determine future funding
 - Participation by many center members expected



Summary

- **Good Progress made in 2002**
- **Reorganization to Themes, has led to stronger and healthier Center**
- **Center is receiving international recognition and was well reviewed at last site visit**
- **April site visit will determine funding for the next five years**