6. Management and Budget

An experienced management and advisory team has been assembled to provide effective leadership and focus for the Center for Simulation of Advanced Rockets. The Center is led by Director Michael Heath and the members of the Science Steering Committee. The Center is administratively hosted within the Computational Science and Engineering Program of the College of Engineering, reporting to the Dean of Engineering, William R. Schowalter.

Program Management

The Director and Science Steering Committee members are responsible for nurturing the research program, administering the Center, and maintaining and expanding relationships with the DOE DP laboratories. This directorate provides the leadership necessary to ensure that the Center identifies the most important research areas, attracts the most qualified researchers, and pursues and completes the work effectively over the long term. A small administrative staff has been appointed to properly execute Center activities (Fig. 6.1).
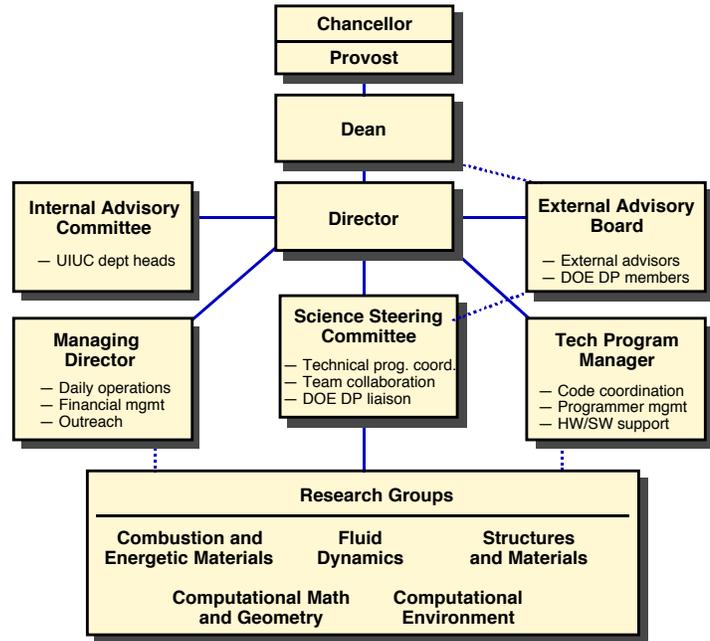
Each of the Research Groups has co-leaders who coordinate the technical program in that area. Nine technical teams have been formed (Fig. 6.2) that address specific issues within the research effort. Two representatives from each of the three DOE DP laboratories have been assigned to serve on a "Tri-lab Support Team" (TST). Each lab has an "applications" and a "computer science" member on the TST; their roles are to integrate Center research into the DOE DP lab programs and to review periodically the technical progress.

Fig. 6.1. CSAR management structure provides clear direction.

The membership of the External Advisory Board (EAB) consists of individuals chosen from the DOE DP labs, industry, other governmental agencies, and other universities. The External Advisory Board reviews research studies, makes research recommendations, and provides expertise for translating research findings into practice. An active communications link is being established with the EAB. The Board is expected to assess the progress of the Center in reports to the Dean of the College of Engineering.

Staffing

Administrative Staff

The Center for Simulation of Advanced Rockets has been able to attract several very high quality people to provide professional and experienced management for the program. Wil-

liam Dick serves as Managing Director of the CSAR and Sheryl Hembrey is the Resource and Policy Analyst. Mr. Dick was formerly Assistant Dean of Engineering for External Affairs, focusing on the unique needs of the federally funded research centers in the College of Engineering. His role in the CSAR is to manage the day-to-day operations of the program, provide strategic direction, address facilities and equipment needs (including ASCI computing resources) and to assure that the Center is responsive to the DOE and ASCI. Ms. Hembrey was previously the business manager of the College of Engineering Department of General Engineering. Her role in the Center is to provide accounting and general administrative support. Robert Fiedler joined the Center in January 1998 as the Technical Program Manager. Prior to joining CSAR, he was employed by Hewlett Packard as a consulting specialist in engineering application support and complex code parallelization. Dr. Fiedler convenes the System Integration Team and manages the code development process.

Technical Staff

Five research scientists, three research programmers, and ten postdocs have been hired to develop codes and to research the subscale simulations and physical models. In addition, forty graduate research assistants were appointed during the first year to work with the faculty PIs. We expect to add one or two research scientists, two or three postdocs, and two research programmers in Year 2.

CSAR Staff Employment

Staff Classification	Current	Projected (Y4)
Senior investigators	42	42
Technical staff	18	25
Administrative staff	5	6
Graduate students	40	40
Undergraduate students	5	15
Total	110	127

CSAR Technical Staff (by Group)

	Senior Investigators	Graduate Students	Technical Staff	Changes in Y2
Structures & Materials	12	9	3	(+2)
Fluid Dynamics	11	7	5	(+1)
Combust & Energ Mtrls	10	9	4	(+2)
Computer Science	9	13	6	(+1)
Total	42	38	18	(+6)

Research Group Structure

The system simulation effort is being carried out in a collaborative manner by a number of teams, each with specific responsibilities indicated below. To facilitate communication and cooperation among teams, there are appropriate overlaps in membership.

Device Specification and Validation Team: Responsible for specifying detailed blueprints of devices to be simulated, including physical dimensions and materials. This team is also responsible for identifying and measuring critical quantities for assessing quality of system simulation.

System Integration Team: Responsible for overall system integration, including the mathematical model selection for the system components and the specification of compatible interfaces between component models. Includes both physical compatibility of component models and software and data interfaces between corresponding component codes.

Fig. 6.2. Team efforts contribute to Research Groups.

Combustion and Energetic Materials Team: Responsible for combustion-injection modeling and corresponding codes for simulating burning of composite propellant. Also responsible for continuum-mechanical and molecular-level modeling and corresponding codes for simulating the thermo-mechanical behavior of energetic materials.

Fluid Dynamics Team: Responsible for fluid-mechanical modeling and corresponding codes for simulating the interior cavity flow and exhaust plume.

Structures and Materials Team: Responsible for solid-mechanical and thermal modeling and corresponding codes for simulating the case, nozzle, insulation, and propellant.
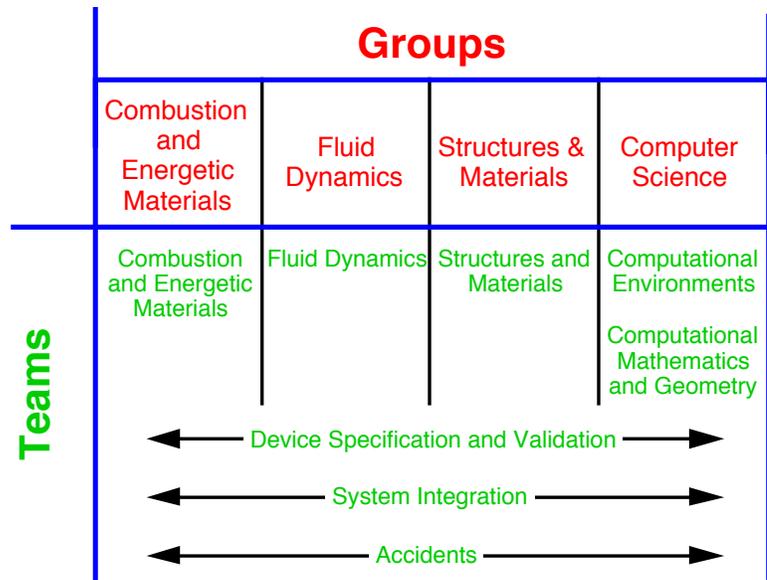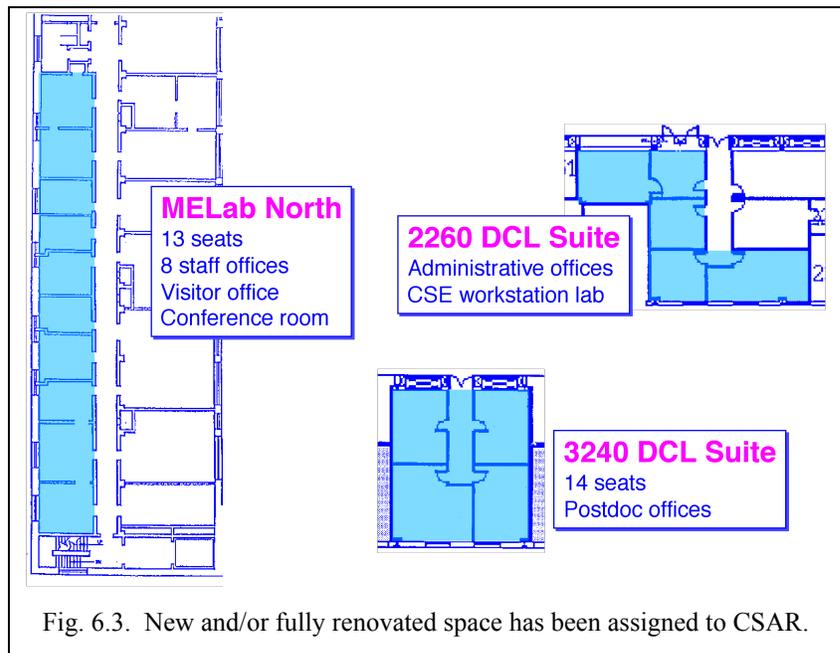
Computational Mathematics and Geometry: Responsible for parallel numerical algorithms, such as sparse linear system solvers, as well as algorithms for mesh generation, partitioning, and adaptive refinement, needed for various component codes.

Computational Environments Team: Responsible for specifying compatible data structures and data formats for scientific data management, and also for parallel I/O and visualization.Also responsible for parallelization strategies, performance evaluation, and tuning of individual component codes as well as integrated system code.

Accidents Team: Responsible for modeling and corresponding codes for assessing various failure modes, and effects of aging and damage on constituent materials. This team will begin work in Year 3.

Facilities and Space

The CSAR has been provided centralized office space for the program management and for the technical research staff. Four contiguous offices on the second floor of the Digital Computer Laboratory (DCL) presently house the management staff and four large offices on the third floor of DCL have been assigned to CSAR. The large offices are sufficient to house 15 research scientist/postdocs.

MELab North
13 seats
8 staff offices
Visitor office
Conference room

2260 DCL Suite
Administrative offices
CSE workstation lab

3240 DCL Suite
14 seats
Postdoc offices

Fig. 6.3. New and/or fully renovated space has been assigned to CSAR.

In addition to the space in DCL, the Center occupies approximately 5000 square feet of office and dry lab/computer space in a nearby building (Mechanical Engineering Laboratory). This space has been fully renovated by the University of Illinois for use by the Center and was occupied on 30 September 1998. This space houses 20 CSAR senior technical staff and visitors.

CSAR Seminar Series

Known as "Rocket Science 101", the Center offers an internal seminar series designed to cross-educate the faculty, staff, and students. Further, the seminar series identifies key technology needs for research project development. The series also serves as a for-credit graduate seminar.

Budget

The CSAR budget has been adequate to maintain an aggressive research program during the first contract year. In addition to funds provided by the DOE, the University of Illinois has

provided needed support for both research expenditures and computer workstations, and facility renovation.

CSAR Program Budget (Y1 and Y2)
(in Thousands)

Expense Category	Y1 Budget	Y1 Expense	Y2 Budget
Salaries			
Sr investigators	$240	$316	$340
Admin staff	40	36	60
Tech staff	790	358	1080
Grad students	320	380	441
Undergrads	0	16	20
Benefits	211	141	374
Equipment	100	340	100
Travel	140	135	150
Materials & supplies	63	68	90
Indirect costs	1,106	923	1345
Total	$3,000	$2,713	$4,000
UIUC Match	300	190	400

Expenditures by Research Group
(in Thousands)

	Y1	Y2
SM	$366	$758
Fluids	517	762
CEM	544	876
CS	691	1,200
Admin	594	404
Total	$2,713	$4,000