DRAFT OF A DOCUMENT ABOUT SSP FOR FUND-RAISING & PROPOSAL PURPOSES
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SUMMARY

The Student Satellite Project (SSP) is an interdisciplinary project in engineering and science for students. Students participating in SSP are to design, fabricate, test, and deliver a small Earth-orbiting satellite to NASA for a launch by the Hitchhiker Ejection System on the Space Shuttle, and to carry out post-launch operations, data analysis and publications. The duration of the project is estimated at 2.5 - 3.0 years from conceptual design to launch and 1 - 2 year from launch to publications. The scientific objectives of the first attempt are to monitor global distribution of lightning, observe sprites and to perform stellar photometry. In addition, the Strategic Technology Initiative Team plans to conduct a laser communication experiment using the same optical system.

Potential offers:

1. A hands-on experience in the design, fabrication, testing, and operation of a complex system with a well-defined objective through teamwork
2. A needed channel for many students to gain self-confidence and employable skills
3. An example of intercollegiate, inter-departmental, and interdisciplinary collaboration
4. An avenue to enhance beneficial interactions between university and community
5. A test-bed for innovative ideas in a wide variety of areas

Support needed for SSP include:

Types of Need	*Average Annual Need* (in 1000$)	*Brief Description* (See text for details.)
1. Mentoring and advising	21.	• Discretionary fund for all team mentors.
2. Scholarships and stipends	140.	• Yearly support for three categories of students.
3. Operational	7.	• Administrative operations & supplies, and some travel for the Project. Augments team needs.
4. Parts & materials	150.	• An average. Amount depends on phase of project. Generous support from industry can reduce this significantly.
5. Technical facilities		• Must use exiting facilities. User fees must be considered.

Ptential sources of support:

1. Appropriate units on campus -- departments, colleges, and centers
2. Community at large -- industries and interest groups in Tucson and in Arizona
3. Federal agencies -- NSF and NASA cneters

A. What is SSP?

The Student Satellite Project (SSP) is an interdisciplinary project in engineering and science for students. Students participating in SSP are to design, fabricate, test, and deliver a small Earth-orbiting satellite to NASA for a launch by the Hitchhiker Ejection System on the Space Shuttle, and to carry out post-launch operations, data analysis and publications. The duration of the project is estimated at 2.5 - 3.0 years from conceptual design to launch and 1 - 2 year from launch to publications. The scientific objectives of the first attempt are to monitor global distribution of lightning, observe sprites and to perform stellar photometry. In addition, the Strategic Technology Initiative Team plans to conduct a laser communication experiment using the same optical system.

Since its inception on 7 November 1996, SSP has passed a series of milestones and continues to march forward (see Table 1). The same Evaluation & Selection Panel (ESP) that did the proposal evaluation and mission selection in April 1997 completed the Conceptual Design Review (CoDR) on 22 November 1997. Next, the Hitchhiker Launch Manifest Request (Form 1628) will be submitted with a cover letter from Gene Levy, Dean of Science, to NASA Associate Administrator Wes Huntress for approval. Meanwhile, preliminary design, involving some crucial breadboard simulations and testing, will begin in January 1998, in anticipation of the Preliminary Design Review (PDR) in April 1998.

Table 1 SSP Milestones

Tasks Completed	*Completion Date*
Inception	7 November 1996
Preliminary Announcement	24 January 1997
Announcement of Opportunity	5 February 1997
Letter of Interest due	19 February 1997
Letter of Intent to Propose due	24 March 1997
Proposals due	14 April 1997
ESP Meeting	15 April 1997
Announcement of Selection	28 April 1997
Project Organization	8 May 1997
Conceptual Design Review	22 November 1997
Tasks to be Completed	*Planned Completion Date*
Preliminary Design Review	April 1998
Critical Design Review	October 1998
Fabrication, Integration & Testing	November 1999
Pre-delivery Review	December 1999
Launch	To be Announced

B. Why do SSP?

We expect SSP to offer the students, the university, and the community the following benefits:

1. A hands-on experience in the design, fabrication, testing, and operation of a complex system with a well-defined objective through teamwork
2. A needed channel for many students to gain self-confidence and employable skills
3. An example of intercollegiate, inter-departmental, and interdisciplinary collaboration
4. An avenue to enhance beneficial interactions between university and community
5. A test-bed for innovative ideas in a wide variety of areas

Each of these benefits is delineated below.

1. A hands-on experience in the design, fabrication, testing, and operation of a complex system with a well-defined objective through teamwork

There is no substitute for experience. Bad experience may teach us caution and good experience courage; but no experience teaches us nothing.

Complexity and specialization are inseparable. As individual and societal goals become harder to achieve, more complex systems and devices are sought. The more complex the system or device becomes, the more specialized skills and techniques in a wide variety of fields are needed. The whole process of making a complex system work, from conceptual design to fully operational, demands closely coordinated large-scale teamwork. Such teamwork requires people skills as much as technical skills. The development of a complex system also demands time -- a duration longer than the average dwell time of its participants. Such a disparity in time-scale brings on the challenge for patience and dedication to the continuity of a larger self. A modern university can and should provide its students the opportunity to face these challenges and to develop these skills.

Test-oriented courses, result-driven research projects and departmentally-defined programs are necessary building blocks of a university. They alone, however, do not provide the kind of learning just described. Talents already nested in these building blocks, however, can indeed be organized to provide a "hands-on experience in the design, fabrication, testing, and operation of a complex system with a well-defined objective through teamwork" to the students to gain the experience and the varied skills that are more and more demanded of them upon graduation.

2. A necessary channel for many students to gain self-confidence & employable skills

Realistic self-confidence enables further endeavors, and it grows out of excelling in one's performance along the way.

Not all students can excel in classroom-oriented and test-driven learning. Not all students who excel in test-oriented learning are profitably employable. If the university can provide a training ground for professional athletes, who do not necessarily excel in regular classes, there should be room for programs that will enable a larger number of students, who may not necessarily excel in regular classes, to become productive workers in a variety of fields.

Certain subjects and certain modes of learning may prove attractive and successful to certain kinds of students. Not all students can fit the mode defined by test-oriented courses, result-driven research projects and departmentally-defined programs. As a state university, we serve a large number of students with a wide range of interests and abilities. We must try to provide additional modes to attract and retain a larger cross section of students to become future productive citizens.

3. An example of intercollegiate, inter-departmental, and interdisciplinary collaboration

The knowledge and skills required for SSP threads through departments and colleges. The breadth of experience surpasses all existing interdisciplinary programs. What is learned in the process of making SSP a success can be beneficial to other interdisciplinary programs addressing other complex systems. An example of a more practical, but far more complex system, could be the design, construction and operation of a model water-supply system that could adequately, safely and economically serve a community living in a delicate environment.

While much of the problem-solving along the way utilizes analytic tools and approaches, the entire project offers a holistic view and integrating process of working together towards a common goal. Such kinds of projects or programs re-affirm the concept of "UNI" in our "university".

4. An avenue to enhance beneficial interactions between university and community

A holistic view of the university must include the community. From the community, the university draws its life-giving resources in the form of money, goods, employees, and most of all, its students. To the community, the university returns life-enriching truth, beauty and goodness in the form of profound and innovative ideas, useful technology and services, and most of all, responsible and productive graduates.

The University of Arizona is a state institution located in a city that is equipped and working for economic development through "hi-tech" industries, especially in optical- and aerospace-based science and technology. The SSP will intensify the interactions between the community and the university. For example, mutual benefits are expected when the Mechanical Structure & Analysis (MSA) Team of SSP interacts with the Composite Airframe Program at Pima College. Another example could be SSP's use of test facilities and expertise at Hughes as SSP trains skilled potential employees. The selection of the instrument and scientific objectives for SSP's first satellite stands as an example of the electro-optics based science and technology linking the University of Arizona with the local industries.

5. A test-bed for innovative ideas in a wide variety of areas

Generating and testing new ideas are intrinsic to our mission as a university. Unlike most of the research projects -- each conducted by a faculty and professional staff plus one or two graduate students -- SSP is conducted by undergraduate and graduate students. In addition to new ideas generated or stimulated by students, rigid rules and regulations can also be made more rational and tolerant to allow testing new ideas under much less external pressure. This is in obvious contrast to the way NASA and its centers run their missions. SSP can truly serve as a test-bed for ideas in a wide variety of disciplines, in a manner NASA could not afford or dare to pursue.

The test-bed is also available to participating industries. As an example, Tucson Electric Power Co.'s newly developed thin-film solar battery is being considered by SSP for its first satellite. SSP offers other industrial partners similar opportunities to test their ideas or components.

C. What support does SSP need?

To develop and launch a small satellite of the type SSP is aiming for would normally cost around 4 million dollars. However, due to the voluntary nature of the project and the more relaxed administrative and technical regulations and requirements, the actual dollar amount can be reduced to 1 million or even less, depending upon the extent of industrial participation. The most obvious types of support include:

1. Mentoring and advising
2. Scholarships and stipends
3. Operational
4. Parts & materials
5. Technical facilities

An estimate of these types of support is summarized in Table 2. A more detailed description follows. The need for other types of support may surface as SSP progresses. Detailed budgeting will be a coordinated effort among all the teams and with the help from industrial partners.

Table 2 An Estimate of SSP Needs per Year (Overhead not included)

Types of Need	*Estimated Dollar*	*Brief Description*

	Amount per Year (in 1000$)	(See text for details.)
1. Mentoring and advising	21.	Discretionary fund for all team mentors.
2. Scholarships and stipends	140.	Yearly support for three categories of students.
3. Operational	7.	Administrative operations & supplies, and some travel for the Project. Augments team needs.
4. Parts & materials	150.	An average. Amount depends on phase of project. Generous support from industry can reduce this significantly.
5. Technical facilities		Must use exiting facilities. User fees must be considered.

Taking the above estimated averages, the total need for a projected pre-launch period of three years would accumulate to about 954K$, slightly short of one million dollars. For post-launch mission operation and data analysis, expenses can be greatly reduced to less than 150K$ per year, mostly for student support, as the activities will not require the intensive technical and material support.

Following is a more detailed description of each of the five types of needs for SSP, primarily focusing on the pre-launch period.

1. Mentoring and advising

SSP is a student project on a complex system. It requires an enormous amount of guidance, advising and technical assistance from more experienced faculty, staff and other experts on and off campus. SSP has been fortunate to have from the start the highest caliber human resources at no cost. Here we present four groups of mentors and advisors, without double listing. The mere number of supportive experts in all the fields encompassing a scientific satellite, a truly complex system, is SSP's most important resource that matches the enthusiasm of the students.

The first group is the Team Mentors as listed in Table 3. At this writing, only DCH (Data and Command Handling) is without a mentor.

Table 3 Team Mentors

Team	*Mentor/Title*	*Department*
Science	Kurt Thome, Asst. Prof.	Optical Sciences
Data & Command Handling	Vacant	?
Tracking, Telemetry & Command	Kathleen Virga, Asst. Prof.	Electrical & Computer Eng.
Guidance & Navigation Control	Ernie Fasse, Asst. Prof.	Aerospace & Mechanical Eng.
Power Generation & Distribution	Hal Tharp, Assoc.. Prof.	Electrical & Computer Eng.
Mechanical Structure & Analysis	Wayne Chen, Asst. Prof.	Aerospace & Mechanical Eng.
Strategic Technology Initiative	Bill Wing, Prof.	Physics and Optical Sciences

Next to the Team Mentors are research faculty and staff from diverse departments -- astronomy to management -- who are willing to help SSP when the need arises. This pool of talent constitutes the Mission Advisory Panel as listed in Table 4.

Table 4 The Mission Advisory Pool (MAP)

Name	*Current Position*	*Expertise*
Steve Bell	Senior Staff Eng., LPL	Space-borne electronics
Bill Bickel	Prof., Physics	Particle accelerator for detector calibration and radiation effects on space-borne instruments
Lyle Broadfoot	Senior Res. Scientist, LPL	Space-borne EUV imagers. PI on numerous space missions.
Matt Cheselka	Res. Specialist, Steward Obs.	
Elliot Chu	Asst. Prof., Physics	Particle detection & digital electronics
Charles Curtis	Res. Assoc. Prof., Physics	Space-borne particle detectors. Co-I on numerous space missions.
Roger Davies	Assoc. Prof., Atmospheric Sci.	Cloud physics from space
Eustace Dereniak	Prof. Optical Sci.	IR detector & imagers.
C. Y. Fan	Prof. Emeritus, Physics	Space physics
Uwe Fink	Prof., LPL	Stellar photometry
Sy Goodman	Prof., Managem. & Info. Systems	Management
Larry Head	Asst. Prof., Sys. & Industrl. Eng.	Complex systems.
Keith Hege	Assoc. Astronomer, Steward Obs.	Opto-electronics
Ben Herman	Head, Atmospheric Science	Remote sensing via GPS
Jeff Jacobs	Assoc. Prof., AME	Fluid dynamics
Philip Krider	Prof., Atmospheric Science	Lightning & sprites
Larry Lebofsky	Sr. Res. Sci., LPL	Solar system small bodies
Alfred McEwen	Assoc. Res. Sci., LPL	Remote sensing surfaces
Kumar Ramahalli	Prof., AME	Space-borne new materials
Bill Sandel	Sr. Res. Sci., LPL	Space-borne EUV imaging
K. R. Sridhar	Assoc. Prof., AME	Spacecraft engineering
Tom Vincent	Prof., AME	Control & guidance.

Not listed in Table 4 are six staff engineers from SatCON, covering mechanical components, as well as electronics, power, guidance and control aspects of a spacecraft. Other industrial partners have also offered advisory help. Participation from industry is of great value to SSP.

Industrial participation is evident in the Evaluation & Selection Panel (ESP) that does the major evaluation and recommendation at the end of each phase to set the direction and pace of the next phase. The ESP was responsible for setting SSP on its course in conceptual design, completing the Conceptual Design Review with recommendations for the preliminary design. The ESP will also conduct the Preliminary Design Review, Critical Design Review, and Pre-delivery Review. The composition of the ESP is shown in Table 5.

Table 5 The Evaluation & Selection Panel (ESP)

Name	*Current Position*	*Expertise*
Ralph Lorenz (Chair)	Res. Assoc. LPL	Nine years of experience on small satellites at Univ. of Surrey, Univ. of Kent, &

		ESA.
Jill Bechtold	Assoc. Prof., Astronomy	Active in space-based astronomy. Member of NASA selection panels.
Bob Brown	Prof., LPL	Planetary surface science. Mars missions.
Chuan F. (Tony) Chen	Prof., AME	Fluid dynamics & complexity
Don Huffman	Regents Prof., Physics	Optical properties of matter. Nobel nominee for his work on C_{60}.
Don Hunten	Regents Prof., LPL	Senior member of space physics & planetary aeronomy communities. Member of National Academy of Sciences and various national panels.
Matthew Jones	Asst. Prof., AME	Radiative heat transfer
Ron Jost	Chief Engineer, IRIDIUM Project, Motorola	System engineering, integration and testing. DoD & NASA programs since 1969.
Bill Kerwin	Prof. Emeritus, ECE	Analog & digital circuits
Pitu Mirchandani	Head, System & Industrl. Eng.	Complex systems
James Palmer	Assoc. Res. Prof., Optical Sci.	Spacecraft solar-cell engineering.
Ed Pierce	Adj. Assoc. Prof., ECE Senior Engineer, Hughes	Microwave specialist. 34 yrs. with Hughes from design to project management.
John Reagan	Head, ECE	Space radiometry & remote sensing.
Rich Van Riper	Chief Engineering Fellow, Honeywell Satellite Systems	Attitude control & guidance, data handling systems. 35 yrs. in space engineering.
Richard Schotland	Prof., Atmospheric Sciences	Space-borne LIDAR experiments.
Bobby Ulich	Vice-Pres., Kaman Aerospace Res. Prof., Astronomy Chief Engineer, MMT	Electro-optics development. First space-borne adoptive optics.

Finally, there are the Project Mentors and Administrative Mentor. The Project Mentors consists of two faculty members, whose duties are to assure the healthy development of SSP as a whole. Presently, there is only one Project Mentor, C. K. Hsieh, the initiator of SSP. He is expecting a faculty member from the College of Engineering to join him very soon. The Administrative Mentor provides guidance and advice to the SSP Administrative Staff. Susan Brew, Program Coordinator of Arizona Space Grant Consortium, donates her time as the Administrative Mentor.

Were the efforts of all the mentors and advisors in the past year to be converted into dollar amount, it would be approaching the six-digit mark. Fortunately for SSP, all that was a work of love, without monetary rewards. It would increase the effectiveness of the teams, if each Team Mentor could have an annual discretionary fund of $3,000. For seven teams, it totals to $21,000 per year.

2. Scholarships and stipends

In principle, all students joining SSP are rewarded by the fun and experience coming from their active participation. Furthermore, the opportunity to receive academic credit for their work done in connection with SSP is a concrete form of reward. Nevertheless, there are at least three categories of students for whom monetary compensation should be considered: 1) students prevented from joining SSP because they have to work, especially during summer months, to support themselves, 2) students in leadership positions, such as Project Lead and Team Leaders, and staff members, carrying extra loads that are vital to SSP and yet inappropriate for academic credit, and 3) graduate students, who may not be in any official leadership position, but whose maturity and knowledge contribute significantly to the technical as well as organizational correctness and stability. To students in these categories, an appropriate financial reward would be necessary. The establishment of scholarships and work-study stipends is critical to the continuation of SSP. For three graduate fellowships at $18,000 a piece, seven team leadership awards at $3,000 a piece, and 800 student-hours per month at $7/hr., a total of $140,000 would be needed for each calendar year. It is clear that academic credit and financial support cannot be taken for the same work done.

To appreciate the extent of student involvement in SSP, we present here the organization of SSP. Starting with the base of Figure 1, SSP has a pool of interested students, out of which teams are organized. There are seven teams, corresponding to science, the 5 subsystems, and the Strategic Technology Initiative. Each team, with its Team Leader and Team Mentor, is autonomous, but the Team Leader is responsible to the Project Lead for the running of the team and all tasks to be accomplished by that team. Each team meets once a week to make sure all tasks are on course. Each week all the Team Leaders meet with the Project Lead.

When conflict or crisis arises within a team or between Team Leaders, the Project Lead may form an ad hoc committee of mentors to help resolve the problem. The Project Lead consists a Project Coordinator, Project-Coordinator Elect, and Past Project-Coordinator, in a given year. The Project Coordinator is responsible for the entire Project. The Project Coordinator is assisted by the Project-Coordinator Elect and Past Project-Coordinator in carrying out that responsibility. The Project Lead has the service of the Administrative Staff. The Project Lead receives advice from the Project Mentor, Administrative Mentor, the Mission Advisory Panel and the Evaluation & Selection Panel. It is the Project Lead's responsibility to keep all advisory bodies informed of the Project's progress and difficulties. Presently, Chris Lewicki is the Project Coordinator. A Project-Coordinator Elect is expected to be selected in 1998. Chris is the natural choice for the Project Coordinator. When SSP was formally organized, he was the national chair of the Students for the Exploration and Development of Space (SEDS). His enthusiasm, familiarity with satellite projects and ability to lead give SSP an excellent start. Because of SSP, he entered the AME graduate program with a Space Grant Graduate Fellowship in the fall of 1997.

To carry out the heavy load of the Project Lead and keep the growing documents, technical and financial, an administrative staff is necessary. The tasks and size of the Administrative Staff (AS) is defined by the PL at the advice of the Administrative Mentor. Presently, there is only one staff member, Scott Golper, a junior in AME. His diligent work is partially compensated by a Space Grant Internship. An additional member will be needed as SSP moves into its Preliminary Design Phase, with its parallel activities in fund raising.

SSP students, besides Chris and Scott, are listed in Table 6 according to their team affiliations.

Table 6 List of Students According to Teams

Team Name	*Student Name*	*Major / Minor*	*Standing*	*Remarks*
Science				
Data & Command Handling				

Tracking, Telemetry
& Command

Guidance &
Navigation Control

Power Generation &
Distribution

Mechanical Structure
& Analysis

Strategic Technology
Initiative

3. Operational support

SSP operations need readily available funds to keep all teams functioning and connected, all mentors and advisors informed, all records and documentation kept orderly, SSP recruiting and bridge-building continued, etc. Under the umbrella of operations, excluding any salary or wages, there will be communications, supplies, reproductions, and occasional travels. The demand will depend on the phase of the project and the time of the semester; an annual average is estimated at $7,000.

4. Parts and materials

Parts and materials are needed to build the satellite, starting from breadboarding to actual flight unit fabrication. SSP will try its best to cut cost by relaxing specifications on parts within the limits of tolerance; for example, the proposed orbit and the estimated duration of the flight would not need radiation-hardened components. SSP hopes to acquire most, if not all, of the parts and materials through cooperation with potential partners in industry or NASA flight centers. This would reduce managerial responsibilities and risks in financial as well as quality control. There are obvious advantages for technical partners to transfer the needed parts and materials. Not counting “in kind” assistance from industrial partners, SSP needs some liquidity to acquire parts and materials as needed. The estimated average is about $150,000 a year. Again, the actual level will depend on the phase of the project. Some tools and parts should be one-time purchases at the early phases.

5. Technical facilities

As much as possible, SSP will utilize all the facilities that are available on campus through negotiation with the work units operating these facilities. For large scale or more specialized facilities that might not be on campus, SSP will explore the use of facilities of industrial partners; e. g., Honeywell, Hughes, Motorola, etc.

D. How is SSP supported thus far?

Up to date, SSP has been in its very early stage, during which "no metal has been cut" -- except in the machine training class. As already mentioned, all mentors and advisors work for free. Most expenses have been in the category of student support scholarships (including travel) and stipends, communications, and some supplies. In terms of funds, SSP has received a total of $52,703, which includes the first prize awards at the Student Showcase, as listed in Table 7.

Table 7 Funding Received as of November 1997

Source of Funding	*Amount*	*Remarks*
Department of Physics	$5,000.	Summer student stipends; office supplies; and partial support for student travel to AIAA in Utah.
Prizes from Student Showcase	$500.	SSP won first place in engineering undergraduate and first place in engineering graduate.
Department of Atmospheric Sciences	$5,000.	Summer student stipends
WAESO (Western Alliance to Expand Student Opportunities)	$3,386.	Two Undergraduate Grants $1100 Materials & Supplies $286 Admin. Fee $2000 Student Stipends
Space Grant	$38,187.	$6785 5 undergraduate students $25402 1 graduate fellowship $6000 Cash and 486 computer $68 Joel Rademacher's airfare to informational meeting at UA $1000 Partial travel to AIAA in Utah

In addition to the generously contributed funds, SSP is grateful to acknowledge the benefits received in kind. This includes the use of services and spaces in different departments. For example, the Department of Physics provided the crucial service of establishing a SSP website that made publicity and out-reach possible within one month of SSP's inception and the use of a lab space as the SSP Headquarters. The Aerospace & Mechanical Engineering Department also provided the use of two teaching labs for the MSA and the GNC teams, and the use of the Department's machine shop facilities.

E. How to get future support?

SSP has a three-prong approach to securing future support, since there are three potential sources:
1. Appropriate units on campus -- departments, colleges, and centers
2. Community at large -- industries and interest groups in Tucson and in Arizona
3. Federal agencies -- NSF, NASA, and maybe others

What has been done or planned on each of the three fronts is described below.

1. Appropriate units on campus -- departments, colleges, and centers

The response and support from different departments that are directly relevant to SSP have not been uniform. The department that has the largest number of students participating in SSP and technically plays a dominant role is the Electronic & Computer Engineering (ECE), but the number of mentors helping SSP is limited to two, and no other forms of support exists. The change in the department head may lead to a brighter future for SSP, but that remains to be seen. The AME Department has responded positively and there are signs of increased support.

On the collegiate level, the Dean of Science has been most supportive. Work has to be done in order to secure similar support from the Dean of Engineering and the Director of Center of Optical Sciences. It should be noted that Dean Levy, Dean Smerdon and Director Powell did co-sign a letter drafted by SSP soliciting contact with potential partners in the community at large.

2. Community at large -- industries and interest groups in Tucson and in Arizona

Contacts with many potential partners have been made. The presence of experts from industry on the ESP, the sending of the letter from Dean Levy, Dean Smerdon and Director Powell, and the presentation to the Greater Tucson Economic Council (GTEC) represent the initiatives already taken. Mr. Bob Walkup and Ms. Dorothy Finley of GTEC agreed to help organize an effort to solicit support from industries and interest groups in Tucson and in Arizona to meet the needs of SSP. This report is in part a preparation for starting this effort.

Several industries in the area, responded to the letter signed by Dean Levy, Dean Smerdon and Director Powell, and await our presentation to them.

3. Federal agencies -- NSF, NASA, and maybe others

There should be at least two levels of proposals aimed at different programs sponsored by Federal agencies: One is the team level and the other is the project level. Team-level proposals will depend on the initiatives of the team mentors in coordination with the rest of the project. On the project level, a major proposal is planned for the NSF Undergraduate Curriculum Development Program to emphasize the interdisciplinary and hands-on aspects of SSP. The deadline is early June 1998. Although NASA does not have any program into which SSP can fit, SSP -- with the help of Dean Levy -- will explore the possibility of a no-cost launch from the Shuttle and perhaps support from discretionary funds. At the same time, SSP is in contact with JPL to negotiate for parts crucial for the optical instrument and other subsystems.

REMINDER:

This document is meant to be the source of all the facts and ideas about SSP and from which materials can be extracted for specific proposals and public relations activities.

This draft is not yet ready for its intended use. It contains, however, sufficient facts and ideas for soliciting constructive comments and suggestions from SSP participants and supporters on campus to result in a near perfect document for the purpose of fund raising and proposal preparation.