



**LEARNING TECHNOLOGIES
PROJECT PLAN
2002**

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Learning Technologies Project Plan

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LEARNING TECHNOLOGIES

PROJECT PLAN FY02

1. INTRODUCTION

As a national program, the NASA Educational Technology (ET) Program emphasizes innovation, learning, and diffusion of new ideas and practical knowledge. NASA ET Program seeks innovative concepts that meet NASA-identified educational needs and/or have the potential for non-NASA commercial applications to education. Innovations can come in many forms: some are concepts for applications of emerging technologies; others are novel applications of existing technologies; still others exploit scientific NASA breakthroughs or enable new capabilities or major improvements to existing technologies for educational uses.

The Learning Technologies (LT) Project is a multi-center activity funded by Code FE at NASA Headquarters and managed by the Education Project Office at the NASA Ames Research Center (ARC). LT activities fall under the Educational Technology category of NASA's Education Program. LT funds activities that use the National Information Infrastructure (that is, the Internet) and other technologies to foster reform and restructuring in math, science, computing, engineering, and technical education. Over the years LT has generated dozens of legacy projects.

LT uses an on-line presence showcasing NASA's inspiring mission, unique facilities, and specialized workforce in conjunction with the best emerging technologies to promote excellence in America's educational system. LT will maximize the delivery and impact of our education programs by engaging our research and contractor communities in the use of state-of-the-art educational technologies, and by developing partnerships with the education community. LT will continue to promote computer and network literacy. In the next few years LT will expand its suite of technology applications to showcase multisensory and multimedia educational products.

LT will support the Presidents Management Agenda.

“The federal government can secure greater services at lower cost through electronic government (E-government), and can meet high public demand for E-government services. This administration's goal is to champion citizen-centered electronic government that will result in a major improvement in the federal government's value to the citizen.”

LT will support E-NASA in the PMA's goals as listed below:

The Administration will advance E-government strategy by supporting projects that offer performance gains across agency boundaries, such as e-procurement, e-grants, e-regulation, and e-signatures. It will manage E-government projects more

effectively by using the budget process to insist on more effective planning of IT investments by government agencies. A task force of agency personnel in coordination with OMB and the President's Management Council will identify E-government projects that can deliver significant productivity and performance gains across government. The task force will also identify the systematic barriers that have blocked the deployment of E-government advances. The task force will work to:

- Create easy-to-find single points of access to government services for individuals.
- Reduce the reporting burden on businesses—businesses should not have to file the same information over and over because government fails to reuse the data appropriately or fails to take advantage of commercial electronic transaction protocols.
- Share information more quickly and conveniently between the federal and state, local, and tribal governments. We must also do a better job of collaborating with foreign governments and institutions.
- Automate internal processes to reduce costs internally, within the federal government, by disseminating best practices across agencies.

To this end we will support the President's Management Agenda Initiatives. LT's efforts will support citizen-focused, results-oriented, and market-based activities. We will be actively promoting rather than stifling innovation through competition.

NASA's LT project will foster new ways to empower Federal Agencies for e-Learning through our immersive technology approach.

As LT moves into FY03 there will be a much stronger tie between budget and performance. LT will focus on highlighting its outcomes rather than its outputs.

Finally in FY03, LT will once again utilize the External Review Process as it did under HPCC's IAR.

1.1 The LT Vision Statement

“To become a recognized leader in immersive technology utilizing NASA data to expand scientific literacy for the learner”

NASA's Strategic Plan states that: “NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.”

The Learning Technologies Project will make a significant contribution to this vision by using leading-edge technologies to deliver NASA mission content to learning environments across the nation.

1.2 The LT Mission Statement

“To efficiently develop NASA-based educational products which inspire and educate in ways limited by other educational methods for multiple learning environments using innovative and emerging technologies and current educational standards”

Technology is used as a tool for delivering content and for creating immersive learning environments. One of four strategic outcomes from the “Vision, Mission, and Goals” section of the NASA Strategic Plan is to “involve the educational community in our endeavors to inspire America's students, create learning opportunities, and enlighten inquisitive minds.”

To support the NASA Strategic Plan and NASA's Educational Technology Program Implementation Plan, LT researches emerging technologies and develops these technologies into high-quality and affordable learning environments connecting educators with NASA missions. Our intent is to support these educators in their own educational goals, in the goals of the educational systems in which they work, and in their efforts to improve those systems.

1.3 LT STRATEGIC GOALS

These goals support the NASA Education Division goal for Educational Technology as seen at <http://education.nasa.gov/implan/fig1.htm>: “To research and develop products and services that facilitate the application of technology to enhance the educational process for formal and informal education and life long learning.”

This Education Technology goal directly contributes to National Priorities in Educational Excellence as noted in the NASA Strategic Plan: “We involve the educational community in our endeavors to inspire America's students, create learning opportunities, and enlighten inquisitive minds.”

These goals are designed to be expressed in a manner that allows for future assessment. Predominately these will be tied to outcome goals. This project will focus on the span of influence rather than the span of control. The goals of the Learning Technologies Project are:

- **To research and develop immersive technologies using NASA data to support the improvement and enhancement of science and technology literacy in the United States.**
- **To be a value added compliment to NASA mainstream R&D resources and to stimulate educational and commercial applications of those technologies.**

- **To cultivate and develop innovative technology solutions for education, the nurturing of partnership agreements, and the facilitation of commercial opportunities.**
- **To contribute to a regular and sustainable release of NASA demonstration projects that are replicable and scaleable within the Educational Community.**
- **The effective infusion of emerging NASA technologies, R&D, and products into the learning environment.**
- **The continuous pursuit of applying educational and technology research-based solutions towards a vision of learning technologies transformed by the Educational Technology Program.**

In addition LT will be conducting a benchmarking study during FY02 which will be utilized to better focus project goals for FY03 and beyond.

2. LT STRATEGIC OBJECTIVES

These are the measurable targets that describe the end result that a program is expected to accomplish in a given time period. The objectives of the Learning Technologies Project will support enhancements in the way educators teach and will significantly contribute to the Agency's Strategic Outcomes in Education. The following project objectives are designed to meet the associated LT performance goals in the ET Program Plan. These Objectives/ Milestones are detailed with delivery dates, output metrics, and outcomes in the Milestone Section. Predominately outcome oriented, objectives consist of an outcome based on a measurable time-based statement. These will be marked by numerical target.

- Prototype/establish advanced technologies that serve as a catalyst for learning environment use of engineering and scientific data
- Demonstrate integrated learning technology products in relevant educational environments
- Production-ready breakthrough technologies that serve as a catalyst for learning environment use of engineering and scientific data
- Develop prototype of revolutionary multisensory, multimedia technology for education
- Establish impact on NASA's education mission through the demonstration of prototype revolutionary multisensory, multimedia systems for education
- Enable sustained use of LT technologies by educational community

- Transition Appropriate Projects, Technologies, and Demonstration prototypes to NASA Classroom of the Future (COTF) and Spacelink for further infusion into the NASA Education Program.

3. CUSTOMER DEFINITION AND ADVOCACY

The primary customers of LT are the educational communities and lifelong learners. Specifically the students and the teachers comprise the primary target audience of our product scope. LT endeavors to include academia where possible as they are the primary mechanism to pre-service training.

The process used to ensure meeting needs of customer and customer advocacy include six mechanisms:

- Research Evaluation
- Advisory Board Reviews
- External Review of Program by Independent Panel
- Conference Presentations & Interactions
- Dissemination & Feedback
- ET peer review of LT products by NASA's Enterprises' educational product review processes, COTF and Spacelink

Each of our tasks contains an element of ongoing research and evaluation. This process ensures that we are developing and continually reviewing our work and that what is implemented and disseminated to the educational arena is on target.

Advisory Board Reviews occur every six months to ensure that the overall project is producing a product that is consistent with the views of academia and industry and fulfilling the niche for the NASA Education Program.

Conference presentation and interaction gives us direct access to intended customers to share and gather input and feedback directly.

Dissemination of products is a primary delivery mechanism to reach targeted audiences.

COTF and Spacelink are primary dissemination mechanisms used by LT to insure customer advocacy. In addition, LT will utilize NASA's dissemination system (e.g., Enterprises, ERCN and CORE, and AESP) to maximize the diffusion of product base and application within educational communities.

4. PROJECT AUTHORITY

Ames Research Center is the Lead Center for LT. Supporting centers are:

- Dryden Flight Research Center (DFRC)
- Goddard Space Flight Center (GSFC)
- Lyndon B. Johnson Space Center (JSC)
- Glenn Research Center (GRC)
- Langley Research Center (LaRC)
- John F. Kennedy Space Center (KSC)
- George C. Marshall Space Flight Center (MSFC)
- Stennis Space Center (SSC)

5. MANAGEMENT

In general this project is made possible through the collaboration of civil servants, contractors, universities, corporations and other government agencies. The purpose of this section is to describe our project management approach to implementing tasks and disseminating project requirements.

The integration of a results-oriented management system has been implemented to link performance to funding. This system will stress accountability through requirements. A focus will be placed on the Annual Project Performance Plan (APPP), the Annual Project Performance Report (APPR) and Quarterly Project Reviews.

5.1 LT Program Management

NASA's LT program is managed from the Learning Technologies Project Office (LTPO) at ARC that reports to the Education Branch, Code DXE. LT accomplishes its mission through specific tasks conducted by regional NASA centers, grants, cooperative agreements, NASA contracts and sub-contracts.

5.2 LT Project Management

The LT Project Office is supported by the LT Manager, the Deputy LT Manager, and a small project support staff. LT Project Management is also comprised of a Regional Outreach Center (ROC) Manager, the New Solicitation Manager, the grants office Contract Officer (CO) and Contracting Officer Technical Representative (COTR), and Procurement Office Cooperative Agreement COs and COTRs. LT management is responsible for organizing, planning, and executing the LT Project Plan. This includes integrating LT

activities within the NASA Education Technology Program and across the Agency. The Project Office is responsible for managing and disseminating the fiscal budget at the seven-digit Resource, Technology, and Operations Plan (RTOP) level.

5.3 LT Task Management

Each LT task has its own Task Manager who is responsible for managing the task. The LT manager will oversee all tasks and working groups.

Task Management consists of the regional outreach center managers and the Principal Investigators (PI) for the grants and cooperative agreements. The respective organizational structures for each of these levels will be defined in subsequent sections. Task Management also includes the use of NASA procurement vehicles.

5.4 LT Organizational Structure for FY02

The support of all levels of management for the cooperative agreements, grants, NASA contracts and the supporting centers is crucial to the success of LT. These structures, as well as roles and responsibilities are spelled out below. Major management decisions require the approval of NASA ARC Code DXE management and the NASA Headquarters Education Division Senior Management.

The LEARNERS Solicitation is managed out of the NASA GSFC Education Office and is composed of seven grants.

The Regional Outreach Centers consist of nine NASA centers and are coordinated through the Project Office.

The Project Office manages Interagency Agreements, Memorandums of Understanding, Executive Orders and other formal mechanisms to accomplish project milestones.

In addition the LTPO is responsible for implementing LT test-beds to accomplish project milestones.

Figure 1: NASA ARC Code DXE Organizational Chart for FY02

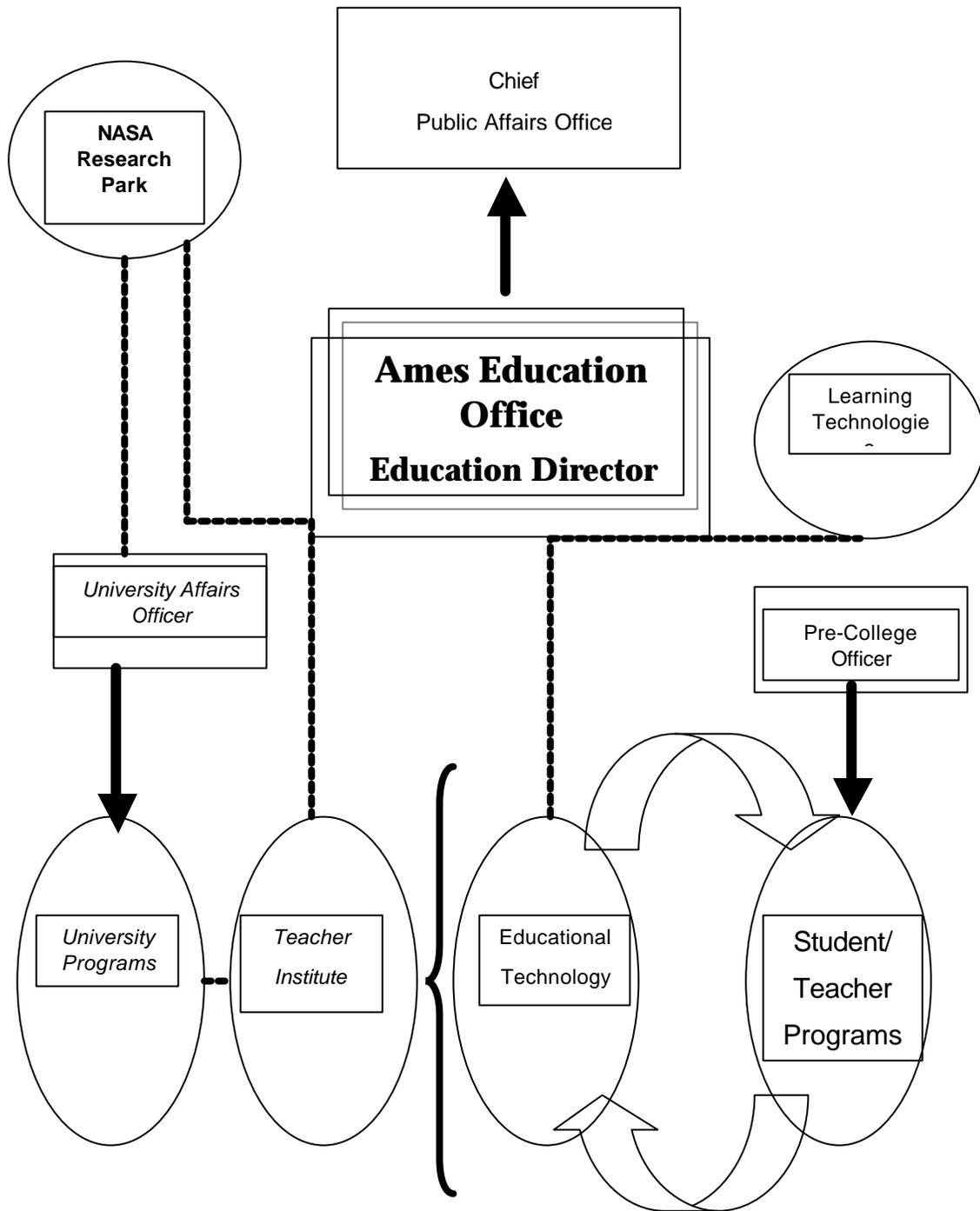
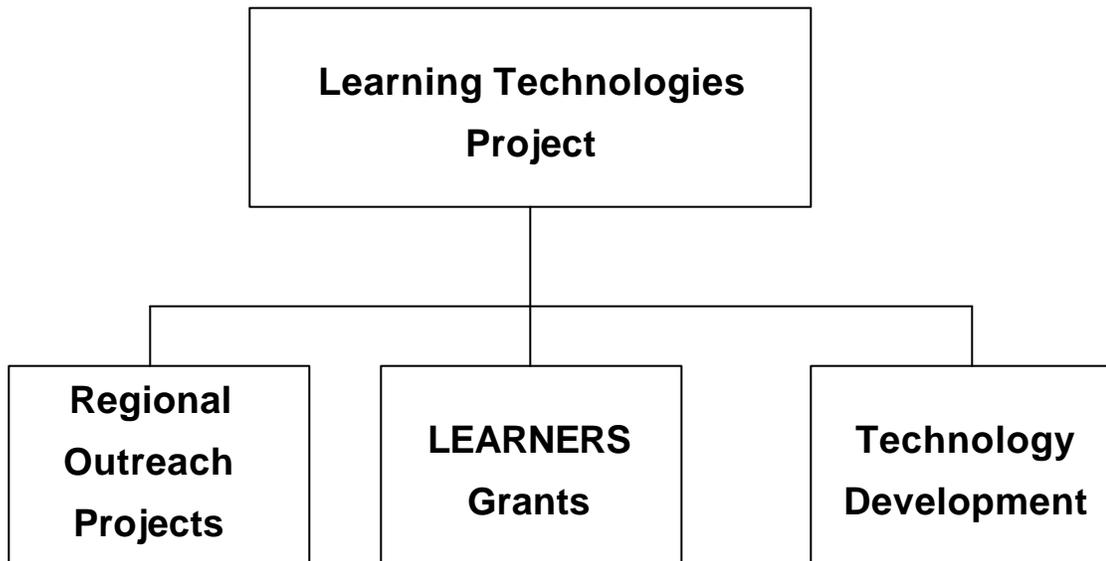


Figure 3: LT Organizational Chart for FY02



5.4.1 LT Project Office Roles and Responsibilities

The LT Project Manager reports to the ET Program Officer located at NASA HQ and the NASA ARC Education Branch Chief. The Project Manager is responsible for the overall management of LT including: implementation of the research and education programs; maintenance of the financial integrity of the project; constructing and maintaining the technology necessary to manage the project (databases, Web sites and mail lists); and preparing, submitting, and presenting reports, reviews, evaluations and projections to NASA ARC and NASA HQ senior management.

As delegated by the Learning Technologies Project Manager, the Deputy Project Manager's responsibilities include, but are not limited to general support of the Project Office and LT collaboration with academia, industry and other federal agencies. These responsibilities are discharged by the LT Deputy Project Manager with assistance from the LT staff. Some requirements will be achieved by matrixing support from other LT managers.

The project office incorporates a number of high level activities to accomplish its objectives as well as core projects designed to support the entire project. Specifically two "five year" grants were awarded in 2000. Current projects were legacy projects from JPL. They are Telescopes in Education and S.P.A.C.E.

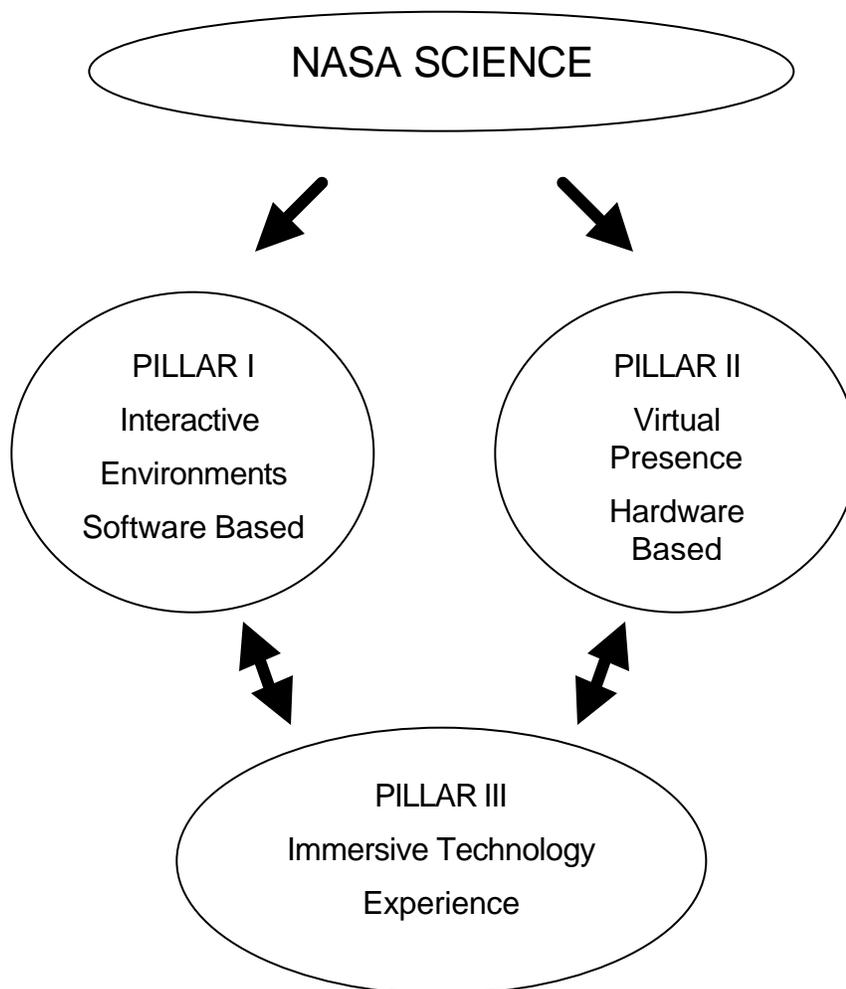
5.4.2 LT Transition

In FY02, the NASA Educational Technology Program begins its transition towards a focus as an “incubator” program. The emphasis on its resources and projects will be on research, development, and evaluation of technologies to the prototyping stages with hand-off to known commercial or internal programs (e.g., Enterprises, NASA Classroom of the Future, and Spacelink) for full development, deployment, and diffusion.

Beginning in FY02, LT will transition to develop projects within three primary pillars of educational technology:

- Interactive Environments
- Virtual Presence
- Immersive Technology Experiences

Figure 4: Three Pillars for FY03



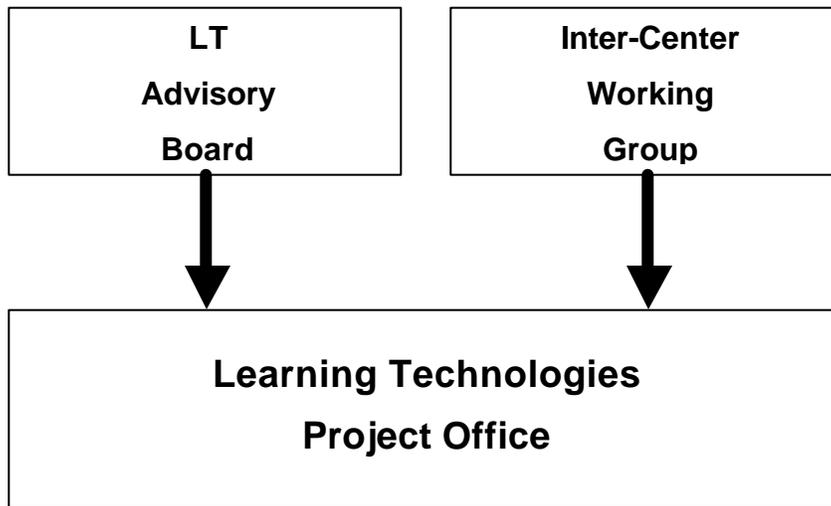
The Learning Technologies Project develops the specific technology and/or systems and establishes the supporting infrastructure for conducting educational technology research and development. It makes recommendations regarding sustained engineering, logistics, and continuing production and operations. Among activities conducted by the Project Office and its designees:

- Conduct benchmarking study
- Conduct analyses and reviews of integrated system designs to optimize design for educational technology project requirements and direct project activity accordingly.
- Execute educational technology contracts and non-procurement instruments and conduct appropriate surveillance for the benefit of NASA Enterprises.
- Provide for the incorporation of new technology/commercialization per technology and/or commercial development plan(s) in order to communicate NASA knowledge.
- Establish and maintain logistics support pipelines to sustain delivered hardware and software systems, consistent with intended mission requirements and plans.
- Ensure critical facilities, equipment and materials are available when needed.
- Provide the appropriate planning to accommodate efficiency enhancements, safety enhancements, and avoid obsolescence.
- Identify, document and control baseline engineering and technical management information.
- Protect intellectual property and technology and assure that a security risk assessment is accomplished in accordance with Center CIO guidance.

The Project Manager and Deputy Project Manager are responsible for the coordination of activities between the five NASA Enterprise Education Officers. They will coordinate with the lead for education in each NASA Enterprise, including NASA Education Division Enterprise (Code FE) Liaisons.

5.4.3 Project Advisement

Figure 5: Project Office Advisement



The Learning Technologies Project Office will use the InterCenter Working Group (ICWG) and the LT Advisory Board as its review board. The purpose of the ICWG will be to internally review and determine that the technology and applications being developed are of sound direction. The purpose of the Advisory Board will be to externally ensure that the technologies and applications being developed are of value to our customers.

5.4.3.1 ICWG Advisement

The ICWG issues are open to anyone interested in the activities of this working group. Within the ICWG there are typically a few active micro working groups at any given time. Reports from these groups will be given to the group periodically during the video conferences.

The longest standing working group is the Multimedia Streaming Group (MSG) chaired by A. Federman (PO) and supported by ARC, Classroom Of The Future (COTF), GSFC, JSC, LaRC, and GRC. This group has been responsible for pioneering the agencies real media backbone. It evolved from multimedia broadcasting tools used in the early nineties to its current form. In addition this group uses m-bone, Net Meeting, QuickTime and some other new software. This group has shown leadership for the agency's real media effort and has expanded to include members from other non-education funded groups across NASA.

LT's Evaluation Working Group (EWG) is currently chaired by J. Sellers (ARC), and supported by DFRC and LaRC. This group has been dormant for the past year. Recent requirements to increase product evaluation internally have prompted its re-ignition.

5.4.3.2 LT Advisory Board - Roles and Responsibilities

The Learning Technologies Project is committed to ensuring the technical and educational excellence of its products and services. To validate the quality of the project, LT seeks outside assessment and guidance. Because LT is committed to implementing changes that enhance the project's quality, feedback from the LT Advisory Board will be used to focus the coming year's activity.

Potential Advisory Board members were invited to participate in April 1998; Feedback received from the Board was implemented in FY02.

The LT Advisory Board is made up of seven leading-edge experts in the field of computing and education. These individuals serve a term of two fiscal years.

The general role of the LT Advisory Board is to examine Learning Technologies tasks, products, and services and offer advice and guidance.

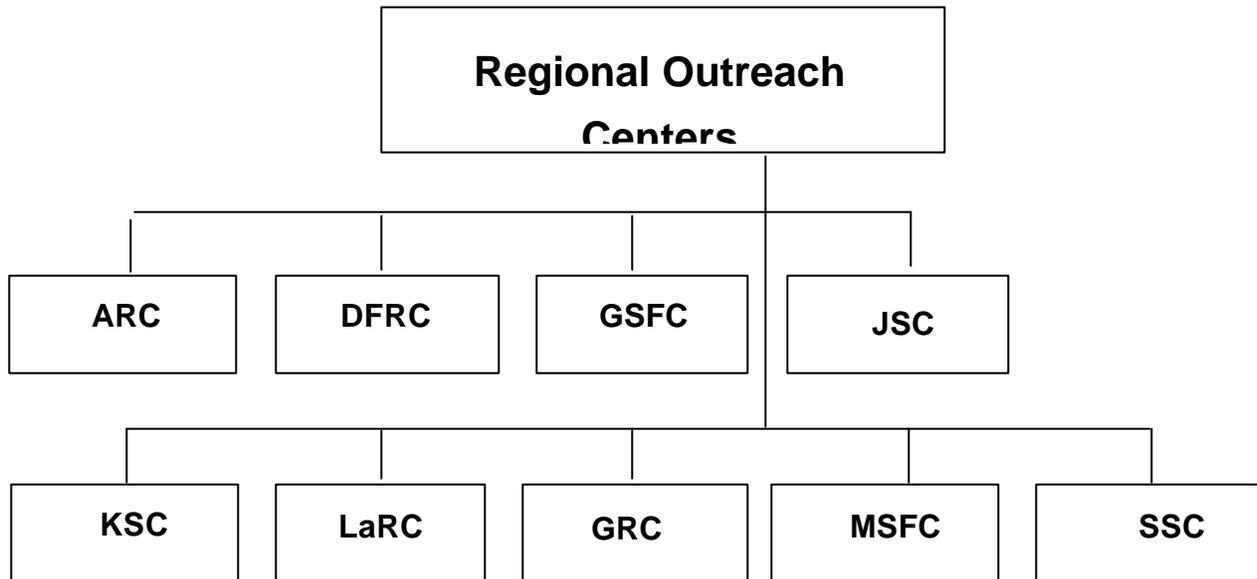
Specifically, the LT Advisory Board will:

- Review annual project plans submitted by the LT Project Office
- Review yearly proposals submitted by LT Regional Outreach Centers
- Conduct an annual review of LT for technical and educational merit
- Help to shape any new solicitations offered by LT
- Identify activities which merit greater or lesser emphasis

5.4.4 LT Regional Outreach Center Projects - Roles and Responsibilities

The Regional Outreach Center (ROC) Manager is responsible for the coordination of activities of the NASA Regional Outreach Center Tasks within the nine LT regional NASA centers. The ROC Manager will keep in regular communication with the regional centers to assure continued technical progress along with compliance with the financial and technical reporting requirements of the Project Office. The ROC Manager will also provide resource advocacy, as necessary, to the Project Office. Supporting NASA Centers will maintain a Regional Outreach Center Manager as a point of contact for the ROC Manager to prepare reports and briefings on task implementation, and to oversee activities at the center. Due to the low availability of Civil Servants, this position can be chaired by a contractor with the typical requirement that the contractor not direct financial transactions or utilization of funds. The ROC manager is responsible for overseeing the submission of EDCATS data, the tracking of performance goals and objectives of the ROC, and tracking the progress towards the ROC performance plans. The performance metric for this position is the successful completion and submission of ROC data to EDCATS, Monthly, Quarterly, and Annual Reports.

Figure 6: Regional Outreach Center Organizational Chart



5.4.5 LT Solicitation - Roles and Responsibilities

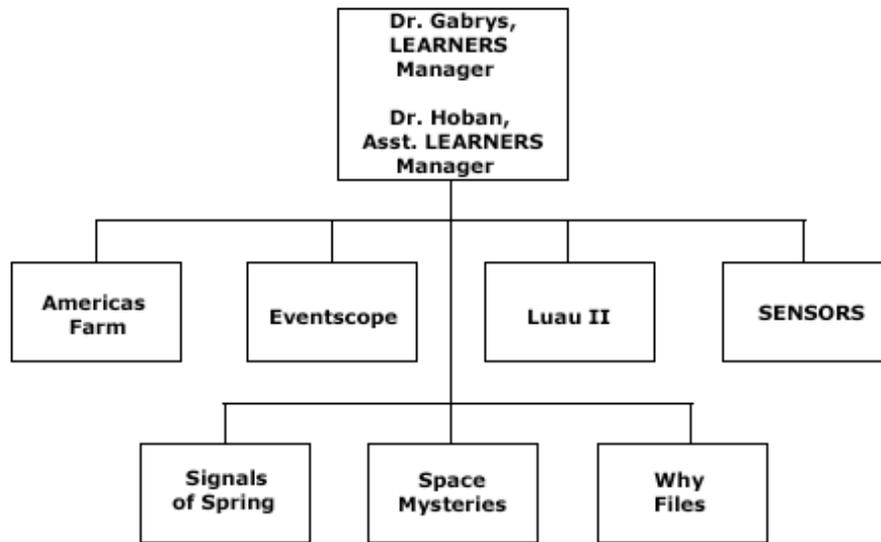
Approximately every three years LT solicits and awards several grants and cooperative agreements consistent with our goals and objectives. These awards are executed through a formal competitive process. These awards are considered sub tasks. In FY99 seven new awards were made. The name of this solicitation was “Leading Educators to Applications, Research and NASA-unique Educational Resources in Science” (LEARNERS). A new solicitation named LEARNERS II will be initiated in FY02

5.4.5.1 Learners I

LEARNERS I Awards Active in FY02-03

- Eventscope under Carnegie Mellon University
- Why? Files under Christopher Newport University
- Luau II under Penn State University
- Space Mysteries under Sonoma State University
- SENSORS under Tufts University
- America’s Farm under University of Nebraska
- Signals of Spring under U.S. Satellite, Incorporated.

Figure 7: LEARNERS I Organizational Chart



5.4.5.2 Learners II (A New Solicitation)

The LEARNERS Manager will be responsible for generation of the LEARNERS II Solicitation Notice, the proposal conference, the proposal peer review, the award process and the management of the new solicitation. A proposed timeline for this solicitation is found in section 6.

The Manager will collect monthly reporting from each of the awarded projects for the purpose of reporting technical progress and milestone status to management. LEARNERS I will extend until FY03.

5.4.5.3 Purpose of the LEARNERS II Solicitation Generic Guidelines

Products will need to leverage off of the NASA-unique content of one or more of the five NASA Enterprises: Aerospace Technology, Earth Science, Human Exploration and Development of Space, Biological and Physical Research, and Space Science.

All proposals must demonstrate or be based on one or more of three LTP Pillars:

- Pillar One: Interactive Environments (Software Based).

Integration of NASA science into high-resolution multidimensional video, audio, tactile, and olfactory data.

- Pillar Two: Virtual Presence (Hardware Based).

Sensory transducer technology established at NASA sites providing high-resolution multi-dimensional video, audio, tactile and olfactory data.

- Pillar Three: Immersive Technology Experience (Firmware Based).

Computer platforms tied to high-speed networks outfitted with multimodal displays in 3-D and 2-D, spatial and stereo sound, haptic gloves and controls, olfactory emitters, and other forms of sensory transmission devices.

5.4.5.4 LEARNERS II Evaluation Criteria Generic Guidelines

1) Project Purpose (20%)

- Defining a specific need or problem
- Proposing a credible solution that employs technologies
- Identifying realistic, measurable outcomes that you expect to result from carrying out the project
- Targeting underserved communities/audiences

2) Innovation (20%)

- Describe in detail aspects of project that are unusual or innovative
- Place efforts in national context by comparing and contrasting project to other efforts or projects in field

3) Diffusion Potential (20%)

- Highlight elements of project that enable its replication
- Discuss how prevalent the problems or needs you hope to address are common to other communities
- Highlight the cost-effectiveness and simplicity of your approach versus other alternatives
- Highlight those aspects of project that are improvements upon existing approaches
- Plans for activity sharing information about your project (publications, journals, conferences)

4) Project Feasibility (15%)

- Technical approach, rationale for selecting this particular technology, and how the various components will be organized and work together
- Applicant qualifications, evidence that the applicant team has the ability to deal effectively with both the technical complexity and the organizational challenges associated with managing the project

- Present an implementation schedule that identifies major project tasks and milestones
- Plans for protecting the privacy and confidentiality of the end users and beneficiaries of the project
- Present a credible plan that includes a discussion of anticipated ongoing expenses and potential sources of non-federal funds to sustain the project (Phase II)

5) Partnerships (15%)

- Present clear discussion of who your partners will be, what their respective roles in the project will be; what benefits each expects to receive, and what specific contributions each partner will make to the project in the form of financial support, equipment, personnel, or other resources

6) Evaluation (10%)

- Present a clearly defined plan to evaluate the degree to which project achieves project outcomes
- Discuss the basics of your overall research design and methodology

Discuss means that will be used to validate and verify performance information

Proposed guidelines and evaluation criteria for the Learners II Solicitation will be further refined and finalized between FY 2002 first and second quarter.

5.4.6 Technology Development - Roles and Responsibilities

This engineering group inside of LTP works with LT projects across the board to establish new cutting edge technologies that will empower LT as a project. These range from fostering emerging technologies to leveraging off of existing agency resources to expand the capability of LT. LT has contracted a full time person responsible for overseeing these activities. This person leads agency wide activities in these areas. Some of these tasks involve all of the centers while some may only involve one or two centers. The primary interface for this group is the LTPO Technology Coordinator with the ICWG. Currently Dr. Alan Federman holds this position. Primary tasks in this section are:

- Digital Multimedia Backbone
- Server support and development
- Immersive Technologies Prototypes

5.5 LT in 2003

Beginning in 2003 and continuing through 2007, LT will place an increased emphasis on three educational technology pillars:

5.5.1 Pillar I—Interactive Environments

LT fosters industrial and academic partnerships critical to prototype formulation and development to provide a virtual NASA that extends the real world with simulated experience. LT utilizes computer interactive Digital Libraries, integrates computer interactive software such as QTVR and VRML, and establishes computer interactive VR Panorama and Video Stitching Software delivered over interactive Streaming 3-D media. Interactive environments include:

- Intelligent streaming that uses only a fraction of the data required by a video stream
- Computer interactive artificial intelligence
- Interactive 3-D representations of NASA Scientists
- Access to complex databases with multiple dimensions
- NASA events digitally re-created as a virtual event that surrounds the viewer with a visual, aural and even tactile experience

5.5.2 Pillar II—Virtual Presence

NASA explores some of the most unique and incredible places in the universe. This pillar is designed to connect the student to NASA science at remote locations as it actually occurs. The next generation of technologies will provide the bandwidth and the transducer sensory equipment necessary to communicate these environments through a virtual experience.

Industrial partnerships will be critical to prototype these technologies.

- Stereo and partially placed sound collection
- 3-D video cameras with streaming capabilities
- 2-D over time to yield 3-D with still images and software
- 3-D graphics capabilities
- HDTV and beyond
- Panoramic images and video
- Haptic and olfactory data acquisition and broadcasting
- Innovative Internet manipulation and utilization
- Remote Internet broadcast capabilities
- Interaction with environment and NASA scientists

5.5.3 Pillar III—Immersive Technology Experience

The end user is the learner. This person will rely on the Immersive Technology Experience to provide the NASA information. This experience will be made possible through a hybrid computer platform consisting of advanced software and hardware connecting the senses of the user to the first two pillars through the digital universe. These prototype workstations will allow students to see, hear, touch and even smell NASA's Data.

- Stereo and partially placed sound streaming media using advanced headsets and office environments
- 3-D video viewing steaming capabilities using advanced headsets and glasses interfaced directly to computer
- Using 3-D glasses, image shift modulation, chromatic aberration
- 2-D over time to yield 3-D with still images and software using advanced headsets with enhanced software
- 3-D Graphics Capabilities using chromatic images and object dimensions
- Panoramic images and video
- Using 360 degree viewing and advanced headsets
- Haptic data generation generating a sense of touch, texture, and temperature
- Olfactory data generation generating a sense of smell
- Innovative Internet manipulation and utilization maximizing data transfer and multicasting
- Remote Internet broadcast capabilities
- Porting remote events to the student

5.5.4 LTP Revolutionary Concept Strategy

Concept Fortification

- Work with Carl Ray, Program Executive for NASA Commercial Programs to integrate SBIR and STIR models into LTP where possible
- Gather environments from NASA Enterprises
- Acquire key industrial and academic partnerships through Joint Sponsored Research Agreements (JSRA)
- Utilize professional partners to firm up benchmarks and conceptual plans
- Use revolutionary technology to port NASA science to the learner
- Where possible tie projects to the national math, science and technology standards
- Develop projects at the alpha and beta phases
- Utilize a diverse educational community to test prototype technologies

- Use Classroom Of The Future (COTF) and industry to showcase technologies
- Use Spacelink to host mature technologies.
- A key attribute at the front-end development cycle is to engage in technology transfer and commercialization where possible.

5.5.5 LTP Revolutionary Concept Strategy

Concept Definition Implementation

- Recreate the project by beginning of Fiscal Year 2003
- Conduct a Proposal Review Process to the 10 NASA Centers funded by NASA HQ Education Programs through LTPO at NASA Ames
- Invest \$1,850,000 into technology projects each funded between \$1,000 and \$250,000 per project
- Provide \$600,000 for Pillar I
- Provide \$600,000 for Pillar II
- Provide \$650,000 for Pillar III
- Some Centers have the current funding terminated
- Retain Learners Two solicitation at \$1,250,000 to fund a few projects at a larger fiscal amount
- Use Learners Two to re-enforce the LTP Concept Strategy
- Retain Learning Technologies Project office at \$550,000, with an additional \$150,000 of Center-based taxes

5.5.6 Phasing of New Work

In a format similar to the SBIR model, LTP will be awarding its new work units in phases that closely follow a similar strategy. That is to generate new technologies at the fundamental level and then develop those that will be of greatest benefit to NASA, the Education Division, and industry in general.

5.5.6.1 Phase-I

The purpose of Phase-I is to develop Alpha Technologies and Applications through partnerships with industry. Alpha technologies implies that a prototype can be demonstrated without full functionality or reliable performance. This phase will be judged by the scientific, technical, and commercial merit and feasibility of the proposed innovation, and the quality of the project with a relatively small NASA investment before consideration of further LT support in Phase-II. NASA LT funding for each Phase-I contract is limited to \$250,000. LTP projects have up to 12 months to complete research and development and submit their report. Successful completion of Phase-I objectives is a prerequisite to Phase-II consideration.

LTP's Phase I is primarily concerned with partnering with industry to develop technology which is not yet fully matured. Immature technology would be defined as not yet ready to enter the market environment. Providing key NASA data sets and environments as the context for the immersive environments. LT isn't investing in technologies which require 5, 7 or 9 years to develop. The Phase I should involve prototype technology that can demonstrate the immersive concepts as described in the LT Pillars. At the end of the first year these prototypes should reach the Alpha software/hardware level, in that it functions in a controlled environment, but may not be ready for classroom Beta testing. The focus here will be to develop applications that use prototype technology or to co-develop prototype technology with industry as LT has in the past with the Multimedia Working Group. The point is to leverage off of existing emerging technology or eminent technology to develop applications based on NASA data.

Phase-I must concentrate on establishing the scientific or technical merit and feasibility of the proposed innovation and on providing a basis for continued development in Phase-II. Evaluation and selection criteria are described in this RFP. NASA is responsible for determining the relative merit of proposals, their selection for award, and judging the value of Phase-I results.

5.5.6.2 Phase-II

The objective of Phase-II is to complete the Beta development effort from Phase-I. Only awarded Phase-I tasks are eligible for Phase-II funding agreements, and only at those NASA Centers that are awarded funding under Phase-I. The NASA Educational Technology Program or LT are not obligated to fund any specific Phase-II proposal. Funding for each Phase-II contract will be limited to \$500,000. Awardees have up to 24 months to complete the effort.

The focus of this effort is to complete the Beta development of applications using new emerging technology. The goal of the Beta cycle is to select a number of schools that will be effectively using the technologies and applications developed by NASA's partnerships with industry. The model here isn't to attempt to fund the entire bill for technology development. Some of these efforts may be quite expensive and will only be possible through partnerships with industry. The goal is to achieve meaningful utilization of immersive technology in the classroom based on NASA Data and Information.

Phase-II projects are chosen as a result of competitive evaluations based on selection criteria to be provided in the near future. Phase-II proposals are more comprehensive than those required for Phase-I and are to be prepared in accordance with instructions for Phase II proposals.

5.5.6.3 Phase III

Currently there is no plans for a phase III. However discussions have been conducted on the possibility of a phase III. Such a phase would be instrumental in developing an improved relationship with NASA's Commercial Technology Program. This focus would further the infusion of rich, high-potential projects between the Commercial Technology Program and LT.

Phase III may be the infusion of the Phase II results into regular NASA programs, learning environments, or into the commercial market. Phase III projects would be funded based on the merits of the Phase II results without further need for competitive application. Private-sector investment, in various forms, will be a major vehicle for Phase III funding.

5.5.7 LT Budgets for FY02-FY03

Budget Impacts

- Slight increase in Learners II
- Slight reduction in overall technology development
- Slight increase in Project Office

5.5.8 Conclusion

- The enclosed proposal will deliver what only NASA can deliver
- No other agency can produce this data
- Industrial collaboration is critical as the current budget is too small to address the high hardware and software costs
- The adjustment to the program will not come without hardship
- Activities at some Centers will stop and work at other Centers may grow
- Transition and new direction of LT is to be a value-added compliment to NASA mainstream research and development resources and to stimulate educational and commercial applications of those technologies

6. TECHNICAL SUMMARY

This section includes the financial allocation of these requirements to be developed and maintained.

6.1 LTPO Work Breakdown Structure [\$635,000]

Program Office Center Taxes (funded at \$120,000)

Both the ARC Regional Outreach Center and the LTPO pay Center-wide taxes. Total taxes amount to several hundred thousand dollars. The ARC Center taxes are appropriately separated between the LTPO and the LT ARC Regional Project.

Learning Technologies Project Office Raytheon Contract (funded at \$250,000)

The LT Project Office support staff maximizes the delivery and impact of NASA online education programs. The office is responsible for conducting a benchmarking study to determine the future technology directions of LTP. The Project Office explores and evaluates emerging technologies and engages LT customers in the use of these educational technologies. The Project Office provides technology dissemination through

presentations and demonstrations. The staff also assists the LT Project Manager in developing partnerships with the greater educational community. The project office is comprised of the Deputy Project Manager, an Assistant Deputy, a technology director and other and assorted student assistants. The project utilizes a small amount of money to fund cell phones, pagers, and computer supplies. The staff supports assistance with performance, evaluation, EDCATS reports, monthly, quarterly, and annual reports.

In FY02 a new Civil Servant Deputy Project Manager will be hired. A Senior Advisor Position will be created supported by a contracted person. The current individual that supports the Project Manager as a virtual deputy will be moved into this position

Learning Technologies ICWG Coordination through Raytheon (funded at \$85,000)

Management of the ICWG is an integral component of LT. This position also coordinates monthly reports, major educational events with Code FE and dissemination of LT products into the mainstream educational community. Currently the Assistant Deputy Project Manager (a contractor position) and LT Evaluation Coordinator support work with this requirement. All reports are posted on the Learn management site <http://learn.arc.nasa.gov/ltpmgmt>.

6.2 Regional Outreach Center Work Breakdown Structure [\$1,955,000]

These projects are comprised of nine Regional Outreach Projects, two grants and a portion of the project office.

6.2.1 ARC Learning Technologies Regional Outreach Center (Funded at \$465,000)

Quest brings NASA people and science into classrooms via integration of on-line technologies. This project continues to be the focal point for the NASA Ames Learning Technology Project. The source of funding is the combination of the traditional ARC ROC at \$465,000 and the KSC \$45,000. Total funds flowing to ARC is \$510,000.

For additional information on budget and task detail see the Level III 5-Year Plans.

NASA Quest is at the beginning of a transformation designed to strengthen its core mission in service to the educational technology community. NASA Quest has been at the forefront of education technology. Having pioneered the educational use of the Internet in K-12 classrooms, Quest is now one of NASA's most popular Web sites. Over the years, Quest has evolved both an extensive user community and a robust set of Internet-based educational services, including live events with NASA professionals via chats, forums and Webcasts, biographies, field journals, Q&A services and discussion lists. These services are applied to several different content areas within NASA Quest, such as Space Team Online, Aerospace Team Online, Space Scientists Online and Women of NASA. Quest is now poised to leverage these strengths for the next five years.

6.2.2 ARC Telescopes in Education Grant (Funded at \$155,000)

The Telescopes In Education (TIE) program has accomplished many goals for FY 2000. These include developing an Internet-accessible 14" robotic telescope system that will

have regular subscribers online by the end of the fiscal year, developing a Beta version advanced training program for educators, adding solar remote imaging, and developing techniques to have multiple users jointly logged onto the 14" system in a cooperative manner.

In FY2001, this project received \$60,000 from Code S and \$25,000 from HPCC. In FY2000, HPCC's NREN project agreed to place a \$150,000 communication facility in the mountains of Las Campanas, Chile, for the purpose of accessing TIE. An NSF grant amounting to approximately \$350,000 was awarded in FY2001 to provide automated software management of TIE and other remote observatories. The NASA ARC grant with TIE is a 5-year grant.

For additional information on budget and task detail see the Level III 5-Year Plans.

The proposal for FY 2002 includes:

- Taking the lessons learned from the Beta advanced users training to develop a standing, advanced training program
- Providing three educator training courses in addition to the hands-on remote training in place with TIE
- Providing access to K-12 educators and students to the TIE network of telescopes at no charge to the schools other than the purchase of the basic software from the software developer
- Developing approaches to joint research efforts under the Students Conducting Hands On Learning in Astronomy Research (SCHOLAR) project
- Adding Internet capability to the 24" telescope system
- Testing and implementing the 14" telescope that is being installed at the Las Campanas Observatory in Chile under an MOU with the Carnegie Observatories
- Meeting all of the metrics requirements under the Learning Technologies Project (LTP) plan for FY 2002

6.2.3 ARC SPACE Grant (Funded at \$175,000)

Project SPACE is an educational program that allows students and teachers to gain information and experience about the basic concepts of space exploration. Project SPACE is designed to communicate the magnitude, complexity and excitement of scientific exploration of our solar system to students while providing basic educational support to teachers and educational institutions.

In FY2001 the LTPO expended \$4,500 towards the SPACE project. This 5-year grant was amended in FY2002 by \$20,000 which was an increase from the original \$155,000 award. This occurred at the request of the Palmdale School District to hire a 0.2 FTE that would be

responsible for evaluating the merit of the NASA project as it was deployed into the classroom.

For additional information on budget and task detail see the Level III 5-Year Plans.

The program is based on actual NASA solar system exploration mission design protocols and utilizes existing NASA mission databases that have been archived from historical and current exploration missions. The overall goal of the project is to act as an extension of current educational curricular content as defined by national, state and local educational standards and frameworks. Project SPACE accomplishes this goal by providing teachers and the public, access to a wide variety of Internet-based curricular support products for use in classroom settings, providing in-service and training to teachers and administrators, and by providing an application extension of curricular concepts in the form of an advanced computer exploration simulation for students.

Project SPACE pays particular attention to current national science, mathematics and technology standards by incorporating specifically designed types of content, activities, models, training, assessment, and current pedagogical research applications. To aid in the process of educators adopting the standards and methods, Project SPACE has designed three basic components. The first is a model applied science and technology classroom to educate and expose teachers to science concepts and the application of technology to curriculum. The second is access to educational resource materials and activities that utilize both digital and Web-based media. The third is the computer space exploration simulation for students. The simulation follows the NASA model and is designed to have students design, build, program and analyze data returned from their own simulated space mission to Mars. The simulation allows students to apply knowledge and problem-solving skills in a unique electronic environment not possible in current textbook-based education.

6.2.4 DFRC Learning Technologies Regional Outreach Center (Funded at \$150,000)

In December 1997, a collaborative project began between the NASA Dryden Flight Research Center and California Polytechnic State University, San Luis Obispo, which resulted in the development of Web-based materials designed for K-12 teachers. In particular, engaging mathematics lessons plans and accompanying worksheets were designed and posted on a Web site (<http://daniel.calpoly.edu/~dfrc/Robin/>) for access by teachers of grades K-12. The lesson plans, which are in alignment with state and national mathematics standards, showcase a variety of current or past NASA Dryden-based flight research projects while emphasizing the mathematics that are used in these projects.

For additional information on budget and task detail see the Level III 5-Year Plans.

The goal of this Web site is three-fold: (1) to provide teachers with a resource of creative mathematics ideas from upon which they can draw while highlighting NASA accomplishments in the fields of flight and aeronautics and aerospace, (2) to make the learning of mathematics more engaging and realistic for students by using real-world applications, and (3) to heighten students' interest in mathematics and the work done at NASA, thereby encouraging career choices in mathematics, the sciences, and engineering.

Since its creation, hundreds of thousands of individuals have visited the Web site. Additionally, the Web site has received a number of major awards including one from the Eisenhower National Clearinghouse for Mathematics and Science Education, StudyWeb, Education World, and the Community Learning Network.

Woven into the mathematics education standards developed by K-12 schools nationwide are the four goals developed by the National Council of Teachers of Mathematics (NCTM): problem solving, reasoning, communication and connections. All four of these goals are addressed in the mathematics lesson plans/activities located on the NASA Dryden/Cal Poly Web site. This is what makes our Web site an invaluable resource for teachers, parents, home schoolers and other users.

6.2.5 GSFC Learning Technologies Regional Outreach Center (Funded at \$160,000)

NASA's Education Vision is to promote excellence in America's education system through enhancing and expanding scientific and technological competence and literacy. NASA's Strategic Plan for Education defines goals and objectives to realize this vision. The Goddard Earth System and Space Sciences Education Ambassador Program addresses this vision directly, and also the goal to implement new education reform initiatives which specifically address NASA mission requirements, and link to national education reform, and national, state, and local standards-based priorities.

For additional information on budget and task detail see the Level III 5-Year Plans.

The NASA Goddard Space Flight Center Earth and Space Sciences Education Ambassador Program also addresses both objectives of Strategy Two under Goal Three of the GSFC Strategic Plan.

Goal three states:

- To enhance the Nation's technological and scientific literacy by sharing the information and knowledge that result from the performance of Goddard's mission.

Strategy two is:

- Working within NASA's Education Strategic Plan, address the needs of the education community by translating the Center's science, engineering, mathematics, and technology knowledge for use with the national education standards for curriculum support, faculty enhancement, student support, and technology applications.
 - The two objectives of strategy two are:
 - To work with external organizations and partners to develop educational programs and products that contribute to a systemic approach in meeting national education standards.

- To develop broad-based education programs aimed at raising scientific and technical understanding at all education levels.

6.2.6 JSC Learning Technologies Regional Outreach Center (Funded at \$250,000)

One of NASA's important contributions to the nation is its commitment to educational excellence. To support NASA's education mission, the vision of the Johnson Space Center Learning Technologies Project (LTP) is to provide innovative Web-based applications that promote learning through hands-on exposure to design, synthesis and critical thinking activities in science, engineering and mathematics. It is our mission to develop and disseminate unique Web applications that capitalize on NASA's mission and technologies to promote learning. In support of this mission, JSC LTP will leverage the scope and scalability of the Web to provide interactive, student-centered activities for learners on an international level.

For additional information on budget and task detail see the Level III 5-Year Plans.

6.2.7 KSC Learning Technologies Regional Outreach Center (Funded at \$50,000)

Kennedy Space Center's vision for the Learning Technologies Project is to utilize KSC's unique assets, its people, facilities, and equipment to reach a wide audience of learners and enhance their understanding of math, science, and technology issues related to the Nation's space program.

The project's baseline budget is for \$50,000. \$45,000 is sent to ARC and \$5,000 is sent directly to KSC.

For additional information on budget and task detail see the Level III 5-Year Plans.

Kennedy Space Center's 2001-2005 LTP efforts will focus on three specific programs comprised of the Space Team Online project, the Learning Technologies/KSC Web Cast Series and Space Commerce Education Opportunities focused at the university, college and community college level. Various technologies will be used for each of these programs, ranging from desktop videoconferencing, Internet Web casting, chat-rooms, online journals and e-mail Question & Answer opportunities. Each of these programs will highlight the activities at Kennedy Space Center, such as orbiter and International Space Station processing to include launch events and virtual tours of the facilities at KSC.

6.2.8 LaRC Learning Technologies Regional Outreach Center (Funded at \$230,000)

LaRC is a leader in the innovative development and appropriate application of technology to the educational process using NASA's unique personnel and information resources. In a culture inundated by technology it has become difficult to determine what technology is both necessary and appropriate to the instructional process in America's K-12 schools and homes. NASA Langley's Learning Technologies Project seeks to develop, evaluate, apply, and disseminate technologies that are effective at improving the educational process through the use of unique NASA information.

For additional information on budget and task detail see the Level III 5-Year Plans.

Research into the application of technology-based devices that provide touch-based feedback to the user will be applied to traditional math and science content. The goal of this effort is to determine if commercially available, economical haptic technology is an effective instructional tool in K-12 classrooms. Computer simulations will be created that allow students to modify the physical properties of an environment and then feel the effect of their changes. Initial work will focus on the creation of math/science-based simulations and the development of student-friendly interfaces. After evaluation and revision of these interfaces, work will focus on the adaptation of the technology to related NASA projects including remote exploration simulations.

6.2.9 GRC Learning Technologies Regional Outreach Center (Funded at \$220,000)

The NASA Glenn Learning Technologies Project (GLTP) consists of two aspects. They are Educational Technology Applications Development and the Distance Learning Technologies Project.

For additional information on budget and task detail see the Level III 5-Year Plans.

Educational Technology Applications Development – This effort involves the development of educational applications that utilize emerging computer and communications technology and provide tools to enhance educational experiences.

Distance Learning Technologies Project – This effort uses distance learning technologies to share with students and teachers programs developed by NASA scientists, engineers and educational specialists.

The NASA GLTP includes a series of activities based on propulsion and aeronautics incorporating emerging Internet technologies (i.e., Java, 3-D, and Flash applications). These activities will pair educational technology applications with distance learning technologies to stimulate students' enthusiasm in essential mathematical, science and engineering concepts.

The educational technology applications are developed by NASA Glenn Research Center to simulate aeronautics-related concepts leading students to discover basic scientific principles by engaging in problem-solving activities. These Web-based activities can be used alone or in conjunction with videoconferences originating from NASA Glenn Research Center.

The programs developed for the Distance Learning Project are based on current NASA missions. NASA employees describe the project they are working on, while emphasizing the relevant mathematics, science and technology concepts.

In the next five years the NASA GLTP will participate in activities centered on the 100th anniversary of flight by the Wright Brothers. This milestone anniversary will be celebrated by Web-based activities and corresponding videoconferences centered on the historic first flight and the process the Wright Brothers used to become the world's first test pilots. The steps in this process will be correlated to current NASA research projects.

Pre- and post-assessments by both students and teachers will be evaluated for continual improvement of both content and the distance learning medium. EDCATS will measure

learner outcomes and metrics gathered through these assessments, and changes and improvements will be incorporated.

6.2.10 MSFC Learning Technologies Regional Outreach Center (\$50,000)

NASA Marshall Space Flight Center (MSFC) has developed two software packages to allow researchers at their home sites using standard personal computers to operate and monitor experiments on-board International Space Station; the Telescience Resource Kit (TReK) and the Internet Voice Distribution System (IVoDS). The MSFC Education Programs Department with the support of the MSFC Ground Systems Department (GSD) proposes to develop a configurable and reusable set of teaching materials and Internet-based software tools that utilize TReK and IVoDS telescience tools for education and public outreach. This set of tools, the Space Experiment Education Kit (SEEK), utilizes inexpensive commercial-off-the-shelf (COTS) products, “piggybacking” on the telescience tools and NASA resources used by remote International Space Station researchers.

For additional information on budget and task detail see the Level III 5-Year Plans.

SEEK will allow schools, science centers, museums, and other informal educational institutions to create interactive space science applications in an educational, exciting, and cost-effective manner. The goal of the MSFC Learning Technologies Project is to facilitate the application of technology to enhance formal and informal education. SEEK provides technology, teaching tools to involve students and educators in NASA missions.

The International Space Station (ISS) is an ideal facility to support a long-term science education and public outreach (E/PO) program. The public Internet provides the means to connect researchers and their experiments with students and the science-interested public, creating a virtual space science school.

6.2.11 SSC Learning Technologies Regional Outreach Center (\$50,000)

The NASA Stennis Space Center (SSC) Education & University Affairs Office supports the NASA Education Mission by using its unique resources to support educational excellence for all. The NASA Learning Technologies Project (LTP) and the Stennis LTP promotes effective use of NASA information and knowledge for formal and informal education and life long learning. The Stennis LTP mission is to develop products and services that facilitate the application of technology to enhance the educational process.

For additional information on budget and task detail see the Level III 5-Year Plans.

The Stennis Learning Technologies project for FY 2001 through FY 2005 is the continued support, growth and enhancement of the From A Distance (<http://education.ssc.nasa.gov/ltp/>) educational Web resource. From A Distance was developed in FY98 through LTP and provides K-12 lesson plans, by grade level, about the spatial information sciences. These sciences generally include remote sensing, geographic information systems (GIS) and global positioning systems (GPS). The From A Distance lesson plans are developed by educators for educators. The goal of this educational technology Internet site is to provide educators (formal and informal) a concise, easy-to-use resource for classroom activities related to the spatial information sciences.

Each lesson plan is designed in an easy-referenced format outlining the grade level, national education standards, goals, objectives, materials needed, Web sites to access, time allotted for lesson, procedures, assessment and suggested lesson extensions. All lesson plans are tied to national standards and are presented graphically in an easy-to-read chart framework. Whether an educator is searching for a meteorological activity for their tenth grade level class or a mapping activity for a second grade level class, the From A Distance Web resource is a great place to start!

The From A Distance FY02 support, growth and enhancement initiative will consist of several major components. The primary components are:

- The creation of new lesson plans
- Continue the dynamic process of updating existing Internet sites used as links within educator lesson plans
- Map previously compiled lesson plans to national education standards to include science, mathematics, geography and technology
- Initiate research to expand the From A Distance Web site to include community college and undergraduate educators

6.3 LEARNERS Work Breakdown Structure [\$1,210,000]

LEARNERS Project (funded at \$1,210,000)

The LT Cooperative Agreement Notice (LEARNERS) attracted and procured seven projects that are integrating the Internet and other information technologies to direct the unique knowledge that flows from NASA's aeronautics, space and Earth system research into the K-12 classroom. Collectively, these projects represent NASA Enterprises. The LEARNERS component of LT comprises the seven Cooperative Agreements (all in Year 3 of 3), one senior manager at 0.2 FTE, an assistant at 1.0 FTE and systems support at 0.1 FTE. The remaining funds are used for travel and conference support of the LEARNERS project.

A new LT Cooperative Agreement Notice (LEARNERS II) will be released to attract and procure approximately five projects to integrate innovative information technologies to contribute to a capability to represent NASA events as virtual events that surround the learner with a visual, aural and/or tactile experience. The following schedule for the LEARNERS II Cooperative Agreement Notice is proposed:

Mar 8, 02	Release
May 17, 02	Letters of Intent Due
Jun 7, 02	Proposals Due
Jul 1, 02	LTP delivers review matrix to NPRS
Jul 1-7, 02	NPRS Prepare packages

Jul 7, 02	NPRS Mail packages to reviewers
Aug 1, 02	Review
Oct 02	Awards
Jan 03	Start

The LEARNERS II projects would be funded for up to two years, and significant cost sharing (25 in year 1; 50% in Year 2) is required. Industrial partnerships critical to prototype formulation and development are encouraged. Enterprise co-funding is anticipated.

6.4 Technology Development Work Breakdown Structure [\$210,000]

LTPO's Technology Development (Funded at \$210,000)

The Digital Media Test Bed Project is responsible for developing a test bed that can serve 5000 streams to schools and students across the nation. It includes a project scientist at 1.0 FTE and utilizes funds for the procurement of streaming software and server maintenance.

7. SCHEDULES

The LT Office shall approve all schedules and schedule modifications. Section 6 is a technical break down of tasks inside of LT. It is broken down by WBS as it relates to the management components. In addition, funding elements were identified by task. The resources section will generalize the tasks into 506 authority. The following sections discuss the milestones as they support the program plan. Section 7.5 outlines the relationship between the milestones, the WBS, the 506 authority, the task and subtask structure. For later-year milestones, the evolution of this technology has not yet been assigned to the WBS or tasks.

7.1 LT Milestones

LT has milestones in three tiers. The first tier, referred to as level I are milestones that the project must produce for the ET Program Office. There can be any number of Level 0 ET Program Milestones. LTP's contribution is noted by the ET-1.L. Series such as ET-1.C or ET-1.S would refer to Classroom Of The Future and Spacelink.

7.2 LT Program Milestones

The Learning Technologies Project is responsible for four program milestones.

Table 1: ET LT Level I Program Milestones, Output Metrics and Outcome Metrics

Performance Goal	Mile-stones/ Objective	Due Date	Output Metrics	Outcome Metric
<p>Identify potential tools to improve the support of educational technology by NASA (near term).</p> <p>Select and fund at least 40 new internal and external educational technology start-ups (medium term).</p>	<p>ET-1.L Production-ready breakthrough technologies that serve as a catalyst for learning environment use of engineering and scientific data</p>	<p>9/02</p>	<p>Five production-ready technology or application breakthroughs providing internet-based multimedia interactive tools addressing national education standards.</p>	<p>Increased public access to, and acquisition of, new technical approaches to provide the American Education System with additional capabilities with which to explore the frontiers of the future.</p>
<p>Capture at least 20 science, engineering and technology products and best practices.</p> <p>Process this knowledge to the continually improve education outreach.</p>	<p>ET-2.L Develop prototype of revolutionary multisensory, multimedia technology for education.</p>	<p>9/03</p>	<p>Prototype technology for education with visual, auditory, motion and haptic interfaces and utilizing digital libraries and artificial intelligence.</p>	<p>Validate new technology approaches to help improve student math and science performance in the classroom.</p>
<p>Examine, apply and transfer at least 10 proven educational technologies to communicate knowledge in formal and informal learning environments.</p>	<p>ET-3.L Establish impact on NASA's education mission through the demonstration of prototype revolutionary multisensory, multimedia systems for education.</p>	<p>9/04</p>	<p>Establish classroom-ready prototype technologies for education with visual, auditory, motion and haptic interfaces and utilizing digital libraries and artificial intelligence.</p>	<p>Transfer new educational technologies to provide extensive student access to the best educational technology tools in the world.</p>
<p>Develop a diverse, internationally competitive workforce of scientists, mathematicians and engineers, well prepared for responsible citizenry and future career employment.</p>	<p>ET-4.L Enable sustained use of LT technologies by educational community.</p>	<p>9/05</p>	<p>Technologies or applications shall be infused as a tool to enhance the learning in a content area or multidisciplinary setting in at least 1,000 learning environments such as schools, museums and science centers, community centers and aerospace education organizations.</p>	<p>Assist in the development of 100,000 students whose participation in NASA LTP activities provides them with increased scholastic achievement, a desire to pursue higher education or greater numbers of advanced degrees from established baselines in needed science, math, engineering, and technology areas.</p>

Note: All projects will be based on NASA Enterprise-related content and will convey concepts vital to the National Education Standards. External Factors: NASA LTP conducts only a few direct educational courses or classes.

Since it primarily influences rather than conducts these activities, it is greatly dependent on the condition and quality of educational resources throughout the country, as well as changes in government-wide practice or policy. None the less, every effort will be made to bring these new technologies to as many students as possible through technology transfer, conference presentations and spin-off activities.

Table 2: LT Level II Project Milestones and Metrics

Objective/ Milestones	Due Date	Output Metrics
ET-1.L.1 Produce telepresence technology for education. (4.2.1)	3/02	Produce one telepresence technology.
ET-1.L.2 Produce three-dimensional modeling software for education. (4.2.2)	10/02	Produce one modeling software package.
ET-1.L.3 Produce simulation software based on NASA science for education. (4.2.3)	7/02	Produce one simulation software package.
ET-1.L.4 Produce simulation software with haptic interfaces tied to education. (4.2.4)	4/02	Produce one simulation software package with haptic interface.
ET-1.L.5 Produce cutting-edge interactive on-line course for the sensory-impaired. (4.2.5)	1/02	Produced one course.
ET-2.L.1 Solicit and implement LEARNERS II agreements with industry & academia. (4.4.1)	1/02	Initiate new cooperative agreements or grants under the LEARNERS II.
ET-2.L.2 Develop 3-D applications with viewing glasses for education. (4.4.7)	5/03	Initiate three 3-D tools.
ET-2.L.3 Develop dual haptic glove technology. (4.4.8)	6/03	Initiate two haptic tools.
ET-2.L.4 Develop voice recognition interfaces for education. (4.4.9)	7/03	Initiate one voice interface tool.
ET-2.L.5 Develop digital library interfaces for educational interfaces. (4.4.10)	8/03	Initiate five digital library tools.
ET-2.L.6 Develop state-of-the-art audio applications. (4.4.11)	9/03	Initiate two audio tools.
ET-3.L.1 Establish impact of classroom-ready prototype technologies for education with visual interfaces. (6.4.1)	6/04	Integrate one technology with visual interfaces into prototype.
ET-3.L.2 Establish impact of classroom-ready prototype technologies for education with auditory interfaces. (6.4.2)	2/04	Integrate one technology with auditory interfaces into prototype.
ET-3.L.3 Establish impact of classroom-ready prototype technologies for education with motion and haptic interfaces. (6.4.3)	4/04	Integrate one technology with motion and haptic interfaces into prototype.
ET-3.L.4 Establish impact of classroom-ready prototype technologies for education utilizing digital libraries. (6.4.4)	12/03	Integrate one technology utilizing digital libraries into prototype.
ET-3.L.5 Establish impact of classroom-ready prototype technologies for utilizing artificial intelligence. (6.4.5)	8/04	Integrate one technology utilizing artificial intelligence into prototype.
ET-3.L.6 Integrate classroom-ready prototype component technologies for education and establish impact. (6.4.6)	5/05	Integrate all five component technologies into one interface into prototype.
ET-4.L.1 Survey LT school's database. (7.3.1)	6/03	Survey all 10000 schools in LT's Database.
ET-4.L.2 Develop a five-point matrix establishing a sustainable period of use. (7.3.2)	8/02	Develop matrix.
ET-4.L.3 Authenticate schools using LT technology. (7.3.3)	6/05	Catalog 1000 schools using LT products over a sustained period of two years.

Table 3: LT Level III Project Goals, Milestones, Metrics and Outcomes

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
ARC – QUEST	Research and develop emerging technologies that meet educators/students' needs and integrate these into Ames Educational Technology Products 02/02	Conduct a needs assessment of technologies that are needed to enhance current educational/instructional needs based on current educational technology research, current research-based instructional methods in science, math and technology and student and teacher needs by February, 2002.	A completed needs assessment by Feb., 2002 would meet the metric. An incomplete needs assessment or a needs assessment that is more than 10 days late would fail, and if completed earlier, would exceed.	Proposed projects for 03 will be aligned with the needs of teachers and students and with research-based instructional methods.
ARC – QUEST	Research and develop emerging technologies that meet educators/students' needs and integrate these into Ames Educational Technology Products 03/02	Report of current trends and recommendations of technologies to focus on in out years that meet needs identified in needs assessment by March, 2002.	A completed technology recommendation report by March, 2002 would meet the metric. An incomplete technology report or a report that is more than 10 days late would fail, and if completed earlier, would exceed.	Proposed projects for 03 will be aligned with current trends and capabilities in technology.
ARC – QUEST	Research and develop emerging technologies that meet educators/students' needs and integrate these into Ames Educational Technology Products 09/02	Integrate Shockwave/Flash elements into 2-3 Webcasts	Shockwave/Flash integrated into 2 or 3 live events would meet the metric. Shockwave/Flash integrated into 1 event or less would fail, more than 3 would exceed.	Enhance the interactivity and learning styles reached by an online event.
ARC – QUEST	Research and develop emerging technologies that meet educators/students' needs and integrate these into Ames Educational Technology Products 09/02	Use virtual presence in 2-3 Webcasts	Virtual presence integrated into 2 or 3 live events would meet the metric. Virtual presence integrated into 1 event or less would fail, more than 3 would exceed.	Take advantage of the capabilities of Webcasting technologies to allow students to experience live locations they otherwise could not visit.
ARC – QUEST	Improve evaluation of NASA Quest.	Build a database to collect data on the number and demographics (individuals, classrooms, grade level, location) of	Evaluation database built, functioning and reports begun by February, 2002 would meet the metric.	Collect accurate assessment on who is attending live events for reporting and marketing

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
	02/02	grade level, location) of participants attending live events. Provide reports on users of Quest by February, 2002.	Evaluation database and reports more than 10 days late would fail. Evaluation database completed earlier would exceed.	and marketing.
ARC – QUEST	Improve evaluation of NASA Quest. 09/02	Produce report of classroom observations of students and teachers using NASA Quest events and using Web site/databases semi-annually.	Evaluation reports received by March, 2002 and September, 2002 would meet the metric. Evaluation reports more than 10 days late would fail. Additional evaluation reports or evaluation reports completed earlier would exceed.	Improve and enhance Web events and site to meet the needs of teachers
ARC – QUEST	Improve evaluation of NASA Quest. 03/02	Conduct a user test of new NASA Quest database and provide a report by March, 2002.	Evaluation report received by March 2002 would meet the metric. Evaluation report more than 10 days late would fail. Evaluation report completed earlier would exceed.	Improve database usability
ARC – QUEST	Increase visibility of NASA Quest 09/02	Increase the yearly average number of unique IPs to the NASA Quest site by greater than 2% compared to the baseline from October 2000-September, 2001 of 102,000	Increase the average of unique IPs to NASA Quest by 2% would meet the metric. Less than 2% increase or no increase would fail. More than 2% increase would exceed.	Increase the number reached by NASA Quest.
ARC – QUEST	Increase visibility of NASA Quest 06/02	Increase the monthly average of event participants from November through June 2002.	A clear trend of an increase in the monthly average of event participants would meet the metric. No increase or a decrease in the monthly average would fail. An increase by more than 10 a month would exceed the metric.	Increase the number reached by NASA Quest.
ARC – QUEST	Increase visibility of NASA Quest 10/01 through 09/02	One event per month will have at 21-40 participants.	One event per month attended by 21-40 participants would meet the metric. One event per month has 20 or less participants. Any	Increase the number reached by NASA Quest.

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
			events with more than 40 participants would exceed the metric.	
ARC – QUEST	Increase visibility of NASA Quest 09/02	Promote NASA Quest at at least 3 educational conferences	Presentation of NASA Quest at 3 conferences would meet the metric. Presentation at 2 or fewer conferences would fail. Presentation at 4 or more conferences would exceed.	Increase awareness and usage of NASA Quest.
ARC – QUEST	Increase visibility of NASA Quest 09/02	Publish at least 1 paper or article on NASA Quest	1 article published would meet the metric. No articles published would fail. 2 or more papers published would exceed.	Increase awareness and usage of NASA Quest.
ARC – QUEST	Increase visibility of NASA Quest 09/02	Increase the number of subscriptions to the AETT listserv by more than 10%	An increase of 10% would meet the metric. No increase or an increase of less than 10% would fail. More than 10% would exceed.	Increase awareness and usage of NASA Quest.
ARC – QUEST	Increase the number of new teachers using NASA Quest 09/02	Create and maintain a listserv that supports newly trained teachers with support as they begin to use Quest	Listserv discussions/support begun by November 15, 2002 and maintained through June, 2002 would meet the metric. Listserv discussions begun more than 10 days late or not maintained throughout the school year would fail. Listserv support continued in the summer would exceed.	Increase teachers' comfort level with beginning to use new technologies.
ARC – QUEST	Increase the number of new teachers using NASA Quest 09/02	Produce 2 teacher training demos	Production of 2 teacher demos would meet the metric. 1 or less would fail; 3 or more would exceed.	Increase the number of teachers aware of and comfortable with the use of NASA Quest in the classroom
ARC – QUEST	Increase the number of new teachers using NASA Quest 06/02	Work with Space Camp to develop Professional Development for NASA Quest by June, 2002	NASA Quest professional development materials and instruction developed by June 2002 would meet metric.	Increase the number of teachers aware of and comfortable with the use of NASA Quest in the classroom

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
			More than 10 days late would fail; Completed earlier and delivered to teachers would exceed.	
ARC – QUEST	Increase the number of new teachers using NASA Quest 09/02	Involve a total of 50 to 70 classrooms in live events from 11/01-9/02	Involvement of 50-70 classrooms would meet the metric. Involvement of less than 50 classrooms would fail; 75 or more would exceed.	Increase the number of classrooms reached by NASA Quest
ARC – QUEST	Serve as an agency-wide resource for delivery of Webcasts, chats, Q and A services and biographies 09/02	Present NASA Quest to the NASA Enterprises and obtain support for operations from at least 2 enterprises.	Obtaining funding for 2003 from at least 2 enterprises would meet the metric. Obtaining funding from 1 or no enterprises would fail; from 3 or more would exceed.	Maintain Quest operations while focusing more resources on R&D efforts.
ARC – QUEST	Serve as an agency-wide resource for delivery of Webcasts, chats, Q and A services and biographies. 09/02	Stream/support 10 calendar events produced by other NASA centers including NASA Connect, Why? Files and Destination Tomorrow episodes, COTF forums and JSC DLO Webcasts through NASA Quest.	Supporting 10 calendar events would meet the metric. Less than 10 calendar events would fail; more than 10 calendar events would exceed.	Facilitate work of other NASA groups by providing access to NASA Quest infrastructure and audience and 1 central location for audiences.
ARC – QUEST	Produce live educational online events that incorporate NASA's missions. 09/02	Produce 10-14 events a year; 3 of which have a strong educational focus in support of the following series: - ISS - Astrobiology - Centennial of Flight	Production of 10-14 events would meet the metric. Production of less than 10 events would fail; 15 or more events would exceed.	Familiarize and teach students, teachers and the general public about NASA's missions.
ARC – QUEST	Form partnership with Apple Computer and other commercial partners for R&D efforts 09/02	Meet with potential industry and university partners and write at least 1 Space Act agreement	1 completed Space Act agreement would meet the metric. No Space Act agreements would fail; 2 or more would exceed.	Build partnerships to assist with R&D goals and with dissemination

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
ARC – QUEST	Make NASA Quest Web site fully ADA compliant. 12/02	Provide text transcripts of Webcasts within 30 business days of Webcasts produced after November 1, 2002.	Transcripts of Webcasts provided for all Webcasts after November 1 within 30 days of the Webcast would meet the metric. Transcripts not provided or provided more than 10 days late would fail. Transcripts also provided for archives would exceed.	Increase accessibility of NASA mission content to those with disabilities.
ARC – QUEST	Make NASA Quest Web site fully ADA compliant 04/02 WORK WITH OSS BROKER, SERCH (Cass Runyon, cass@cofc.edu)	Complete ADA compliancy of archives by April, 2002	ADA compliance of all Quest pages by April, 2002 would meet the metric. ADA compliance completed 10 or more days late would fail; Compliance early would exceed.	Increase accessibility of NASA mission content to those with disabilities.
ARC – PROJECT SPACE	Develop a prototype simulation module software appropriate for Internet I or Internet II. 08/02	<ul style="list-style-type: none"> - Develop appropriate multimedia programming design for Project SPACE Mars Simulation activity module. - Program Project SPACE module for Internet use. - Field test software on the Internet - Field test software on Internet II - Modification of software as necessary. 	Successfully develop one Project SPACE Simulation module from one of the Mars Simulation Mission Phases (<i>Development, Operations or Analysis</i>) for inclusion into the Project SPACE Web site	<p>Have a completely functional Internet programmed Project SPACE Module available for testing. Test on the California Internet II project</p> <p>Delivery Date: August 2002</p> <p>Contact: Stephen Kulczycki Deputy Division Manager Office of Communications & Education MS 186-131 Jet Propulsion Laboratory 4800 Oak Grove Dr. Pasadena, CA 91109</p>
ARC – PROJECT SPACE	Re-Design Project Space Web site to incorporate Interactive Project SPACE simulation module.	<ul style="list-style-type: none"> - Evaluate Current Project SPACE Web site for integration of Project SPACE interactive Web modules. - Produce initial designs of new Web page. - Reprogram Project 	Have a functional Project SPACE Web site that can incorporate interactive Project SPACE Modules	Have a functional Project SPACE Web site that supports education and can act as an informational resource, learning experience and model of NASA planetary

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
	08/02	Space Web site - Field test Web page - Modify Web page as necessary		exploration. Delivery Date: August 2002
ARC – PROJECT SPACE	Produce Educational support materials based on NASA strategic goals, science and engineering for use by education and public. 06/02	Evaluate Project SPACE Web site educational support materials and multimedia interactive tools to measure their effectiveness in supporting classroom science education and alignment to National Science Standards. Design new materials as needed for inclusion into Web site.	Conduct Project SPACE Educator In-services for the purpose of evaluating the Project SPACE Simulation and classroom materials. Modify materials as necessary to successfully support teachers in using Project Space to support Science Education. Modify materials as necessary to support teacher's use of National Science Standards.	Successful completion of four Project SPACE Educator In-services with 40 educator using Project SPACE Web site curriculum support products. In-services to be conducted at the Project SPACE Mission Control Center, Technology Village at Indian Hill, Pomona, California Delivery Date: June 2002
ARC – PROJECT SPACE	Produce Educational support materials based on NASA strategic goals, science and engineering for use by education and public. 06/02	Alpha Test Project SPACE educational materials with middle school students (Grades 4 - 8). Alpha Test Project SPACE Simulation with middle school students (Grades 4 - 8) Modification of Materials, simulation, and workshops as needed.	Middle school students using and evaluating the Project SPACE Simulation software. Incorporation of Project SPACE materials into classroom science curriculum.	Conduct student Alpha tests of the Project SPACE Mission to Mars Simulation Software, with a minimum of 30 middle school students per month during a three-month period using the Project SPACE Mission Control Center Facility, Technology Village at Indian Hill, Pomona, California. Upon completion Simulation Beta test. Delivery June 2002
ARC – TIE	Provide Remote telescope time to K-14 students and educators 09/02	Schools control telescopes on the TIE network	Monthly reports indicating the number of successful connections to the telescopes	Hands on activities as defined by the educators
ARC – TIE	Web site that provides operation instructions,	Provide information that would be useful to	Monthly statistics on hits, unique IP's, and data	Educators will have resources available

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
	activities, and images for educators to use in their classrooms. 09/02	educators and students in the study of astronomical objects in the class room.	downloaded.	to stimulate students in their class room.
ARC – TIE	Bring the Chilean telescope, weather station, and video cameras on line 09/02	Complete equipment and communications upgrades that will allow schools access to the 14” Chilean telescope installation	Schools in the United States will connect to the 14” Chilean telescope and observe the southern hemisphere skies	Students in the United States will have the unique opportunity to study the southern hemisphere sky.
DFRC	To provide teachers with a resource of creative mathematics ideas and activities. 09/02	Add 1,000 educators to the partnership.	Use server statistics to authenticate use of Web site by 1,000 educators.	1,000+ educators access Web site and utilize activities.
DFRC	To develop more realistic and engaging math activities by using NASA missions and projects. 09/02	Study NASA project pages, fact sheets, etc. and identify a math skill central to the project and used by NASA engineers.	Study information about three projects, missions.	Development of three math activities which are related to NASA’s accomplishments in aeronautics, space and earth science.
DFRC	To evaluate usability of newly developed math activities. 09/02	Conduct formative evaluation of activities to ensure customer satisfaction	1. Develop and evaluation instrument. 2. Identify 50 users. 3. Administer instrument and analyze data.	Analysis of data indicates positive, neutral or negative feedback about activities and their usefulness in the classroom. Activities are modified activities to maximize their usefulness.
GRC	Develop new versions of GRC simulation software and define requirements for multi-sensory & immersive capabilities 09/02	Simulation software requirements identified 1/31/02	Requirements documented by developers	Project would be ready to move to the next technological step, which would open up the doorway to student learners.
GRC	Develop new versions of GRC simulation software and define requirements for multi-sensory & immersive capabilities 09/02	2. Software designed and developed 3/31/02	Input from potential users incorporated into design	Project would be ready to move to the next technological step, which would open up the doorway to student learners.

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
GRC	Develop new versions of GRC simulation software and define requirements for multi-sensory & immersive capabilities 09/02	3. Software alpha tested and posted 9/30/02	Feedback received indicating use of software with minimal problems	A small group of students would become more capable and technologically prepared to integrate with the workforce by using this software.
GRC	Develop new versions of GRC simulation software and define requirements for multi-sensory & immersive capabilities 09/02	4. Begin to investigate multi-sensory & immersive capabilities appropriate for simulation software 9/30/02	Several appropriate capabilities described	Project would be ready to beta test the current software version and move to the next technological step, which would open up the doorway to student learners.
GRC	Expand quality and potential audience of videoconferences through commercializing scheduling of ISDN sessions, scheduling high-quality IP sessions, Webcasting live events, using assessments of each session, and researching new technologies to include VR. 09/02	Identify parties interested in Space Act Agreement to schedule ISDN videoconferences, explore use of Polycom for IP sessions, prepare server for Webcasts, develop assessments to document learning, and explore options for using VR 12/31/01	Space Act Agreement finalized; Polycom for IP and server for Webcasts usable; 50% of assessments online; at least one VR option identified	Project ready to move to next step to open doorway to student learners and assess their learning.
GRC	Expand quality and potential audience of videoconferences through commercializing scheduling of ISDN sessions, scheduling high-quality IP sessions, Webcasting live events, using assessments of each session, and researching new technologies to include VR. 09/02	2. Finalize Space Act Agreement; begin scheduling IP sessions with Polycom; test server for Webcasts; complete development of assessments; and decide on option to use VR 1/31/02	Schedule 100-200 ISDN and IP sessions, conduct 1 beta test Webcast, post 100% of assessments online, and work with presenter to incorporate VR in session	Project ready to move to next step to open doorway to student learners and assess their learning.
GRC	Expand quality and potential audience of videoconferences through commercializing	3. Conduct ISDN videoconferences scheduled, conduct IP sessions using Polycom,	At least 100 schools reached via ISDN and IP Polycom and 2 through Webcasts. Feedback on	Students would become more capable and technologically

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
	scheduling of ISDN sessions, scheduling high-quality IP sessions, Webcasting live events, using assessments of each session, and researching new technologies to include VR. 09/02	Webcast two live events, remind teachers to have students complete assessment document, and identify industry partner for VR 9/30/02	assessments from 25% of audiences collected; VR partnership finalized.	prepared to integrate with the workforce by participating in videoconferencing
GRC	Research use of mobile IP videoconferencing equipment by broadcasting from a remote facility 09/02	1. Request a demo of system developed by CSD 2/28/02	Demo conducted	Project would be ready to move to the next technological step, which would open the doorway to student learners.
GRC	Research use of mobile IP videoconferencing equipment by broadcasting from a remote facility 09/02	2. Internal and external partners identified; flight controls/wind tunnel event developed 6/30/02	Plans for event complete.	Project would be ready to move to the next step, which would open the doorway to student learners.
GRC	Research use of mobile IP videoconferencing equipment by broadcasting from a remote facility 9/30/02	3. Event held and broadcast as IP video-con that is Webcast. 9/30/02	At least one school would participate live and at least 5 students would participate through the Webcast.	Students would become more capable and technologically prepared to integrate with the workforce by participating in the event.
GSFC	Establish technologies that serve as a catalyst for learning environment use of engineering and scientific data. 12/01-09/05	Establish Education Mall to serve as a catalyst for learning environment use of Earth and space science data.	Data collected from the feedback mechanisms built into the Mall will be used to track and analyze the growth of the Mall and will be analyzed to authenticate sustained use.	Successful sustained use by educational communities will result in a reliable and relevant structure for utilization in programs or in classrooms
GSFC	Produce three-dimensional modeling software for education. 10/01	Publicize and Disseminate information about the educational product produced to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the educational uses of the developed product.

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
GSFC	Produce simulation software based on NASA science for education. 10/01	Publicize and Disseminate information about the educational product produced to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the educational uses of the developed product.
GSFC	Solicit and implement LEARNERS II agreements with industry and academia. 05/03	Publicize and Disseminate information about the educational product produced to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the educational uses of the developed product.
GSFC	Select Learners II grant. 05/03	Publicize and Disseminate information about the grant to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the grant opportunity and selection process
GSFC	Produce simulation software based on NASA science for education. 05/03	Publicize and Disseminate information about the educational product produced to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the educational uses of the developed product.
GSFC	Select Learners II grant. 06/03	Publicize and Disseminate information about the grant to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the grant opportunity and selection process
GSFC	Select Learners II grant. 06/03	Publicize and Disseminate information about the grant to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the grant opportunity and selection process
GSFC	Select one NASA Enterprise generic Grant. 06/03	Publicize and Disseminate information about the grant to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the grant opportunity and selection process
GSFC	Develop 3-D applications with viewing glasses for education. 02/04	Publicize and Disseminate information about the educational product produced to the formal and informal education communities.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	The educational communities will become aware of the educational uses of the developed product.

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
GSFC	Demonstrate integrated Learning Technology products in relevant education environments 07/01	Education Mall hot buttons will link to Spacelink, NASA Connect, NASA Quest, Observatory, NASA Education Home Page and LTP LEARNERS projects.	Document the use of the Ed Mall and Ambassador Partnerships to publicize and disseminate information.	Educators will have access through the internet to the educational advantages realized by using these sites.
GSFC	Demonstrate integrated Learning Technology products in relevant education environments 09/05	Specific projects will be delineated by element to provide the capability of searching the project as a whole or by part relevant to specific educational needs.	Utilize data collected from the feedback mechanisms built into the Mall to track and analyze the impact of the Mall.	Products are developed which contain large amounts of information, which by itself would prove valuable in education environments. Much of this information is not
GSFC	Establish new partnerships through LT tasks. 09/05	LTP funds will be augmented by funds from partners such as NASA Enterprises, projects, or other funding sources to develop the educational products, which will be placed on the Mall.	Document the funds received from partners and how the funds were utilized in developing the technologies and products. Budget development and end of year reports will reflect the partner funding and the utilization of the funds.	Partnerships, with scientific and educational communities, bring credibility and helps ensure the quality and integrity of developed products. Shared funding brings a sense of ownership and pride in what is developed to all.
GSFC	Establish new partnerships through LT tasks. 09/05	The cadre of teacher Ambassadors will be utilized as resources to use their expertise and experience in product development and in delineating products by element for inclusion on the Mall.	Document the utilization of the Ambassadors as resources in product development and product delineation.	Ambassadors bring a wealth of experience and expertise in working with the scientific and educational communities. This experience and expertise will ease the transition of partners into this process.
GSFC	Establish new partnerships through LT tasks. 09/05	Ambassadors will also serve as consultants to provide training in the development and utilization of products and in the use of the Mall as a rich source of NASA educational products.	Document the utilization of the Ambassadors as consultants in providing training in the development and utilization of products and in the use of the Mall as a rich source of NASA educational products.	This will simplify the program not only for the developer of the program but also will make all products of the program easily accessible by those for whom the program was developed and for

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
				any learner who may wish to use the program or any of its elements.
GSFC	Establish new school partnerships through LT tasks. 09/05	The number of school partnerships will be extended to at least 1000 schools throughout the ten states GSFC region and beyond.	Documenting 1000 school partnerships will meet the goal. Less than 1000 will not meet the goal. More than 1000 will exceed the goal.	The history of the Ambassador program in being involved in successful partnerships with school systems and schools provides credibility for extending school partnerships
GSFC	Establish classroom ready prototype technologies for education. 07/02-09/05	1. Develop the technology or utilize existing technologies to place identified products on the Mall for distribution and use via the Internet.	The Program strives to collect 25-30 evaluations per product to determine usability and needed modifications. The number of accesses to Web site and geographical distribution of accesses will be monitored.	Data collected from the feedback mechanisms built into the Mall will be analyzed to determine the significance of the Mall as a search vehicle, as a prototype for preparing educational programs, and as a prototype for delineating by element and archiving programs to be used in whole or in part.
GSFC	Establish classroom ready prototype technologies for education 07/02-09/05	2. Delineate these products by element to facilitate their use as a whole or in part relevant to need.	The Program strives to collect 25-30 evaluations per product to determine usability and needed modifications. The number of accesses to Web site and geographical distribution of accesses will be monitored.	Data collected from the feedback mechanisms built into the Mall will be analyzed to determine the significance of the Mall as a vehicle for piloting developed educational products.
GSFC	Integrate classroom ready prototype technologies for education and establish impact. 09/05	Utilize data collected from the feedback mechanisms built into the Mall to track and analyze the impact of the classroom ready prototype technologies.	The Program strives to collect 25-30 evaluations per product to determine usability and needed modifications. The number of accesses to Web site and geographical distribution of accesses will	Data collected from the feedback mechanisms built into the Mall will be analyzed to determine the significance of the Mall as a search

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
			be monitored.	vehicle, as a prototype for preparing educational programs, as a prototype for delineating by element and archiving programs to be used in whole or in part, and as a vehicle for piloting developed educational products.
GSFC	Enable sustained use of LT technologies by the educational community 09/05	The Mall is designed to be a dynamic ever-growing resource for NASA educational products. The concept of expanding because of demonstrated need will insure that there will always be a growing customer base.	Data collected from the feedback mechanisms built into the Mall will be used to track and analyze the growth of the Mall. Users will be encouraged to electronically evaluate elements and programs as well as suggest additional elements or programs to be added to the Mall.	Feedback on the effectiveness of the products within different education environments will help inform educators of the value of the products for their specific educational environments.
GSFC	Authenticate sustained use by the educational communities 09/05	Utilize data collected from the feedback mechanisms built into the Mall to track and analyze the sustained use of the Mall by the educational communities.	Data collected from the feedback mechanisms built into the Mall will be analyzed to authenticate sustained use. Users will be encouraged to electronically evaluate elements and programs as well as suggest additional elements or programs to be added to the Mall.	Successful sustained use by educational communities will result in a reliable and relevant structure for utilization in programs or in classrooms
GSFC – LEARNERS 1 Cooperative Agreements	LEARNERS I Establish classroom ready prototype technologies for education. 09/02	Product review submission to appropriate enterprise for approval. Minimum of 4 projects will be approved. 09/02	80% of projects will have met their goal of completing their projects as defined in their original proposal.	Collection of educational technology projects that use NASA mission data and remote sensing to learn and understand math, science, geography, and remote sensing.
GSFC – LEARNERS 1 Cooperative Agreement	LEARNERS I Integrate classroom ready prototype technologies for education and establish	Demonstrate that products are used in the classroom. 09/02	Demonstrate that 80% of products are being used in the classroom.	Collection of educational technology projects being integrated into science, math, geography, and

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
s	impact. 09/02			other appropriate courses.
GSFC – LEARNERS 1 Cooperativ e Agreement s	LEARNERS I Authenticate sustained use by the education communities. 09/03	Demonstrate tool to authenticate sustained use. Present results of authentication review. 09/03	Establish percent or number of one or more of the following: Number of teachers still using product. Number of students being impacted by product. Number of schools still implementing product.	Knowledge and understanding of long-term use and sustainability of educational technology products.
GSFC – LEARNERS 1 Cooperativ e Agreement s	LEARNERS II Solicit and implement agreements with academia and industry. 09/02 and 09/03	Development of CAN II Release Proposal Review Selection of awards FY 02/03	Schedule met (Release, selection, and awards on schedule)	A suite of approximately 5 new Learning Technology Teams.
JSC	Produce telepresence technology for education 09/02	1. Support and enhance ROVer Ranch 3-D robotic software	1. Mars exploration missions completed. 2. Prototype evaluative tracking mechanism	Use emerging technologies to provide interactive, student-centered activities focused on NASA's mission
JSC	Produce telepresence technology for education 09/02	2. Pilot test experiments for VSL software	1. Prototype tool to gather, display and model data	Provide technology - based teaching tools derived from the NASA mission
JSC	Produce telepresence technology for education 09/02	3. Support DAT5K or other streaming media initiative	1. Provide support to Ames DAT5K initiative as needed	Utilization of technology to disseminate NASA science and math information and to facilitate communication within the education community
KSC	Produce Web-cast Events from KSC	1. Use KSC networking infrastructure to stream Web cast events to students, teachers and life-long learners.	1. Six Web-cast events and supporting elements will be produced over the 9-month school-year.	1. Increase awareness of Space Shuttle activities and payloads at Kennedy Space Center

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
	07/03	<p>2. Provide supporting Internet-based lesson guides prior to Web cast events to better prepare participants.</p> <p>3. Provide supporting animated presentations to represent Web cast content.</p> <p>4. Provide chat room accessibility to allow real time discussion between participants and NASA guests.</p> <p>5. Provide post event chat room for follow -up events.</p>		<p>2. Increase awareness of the International Space Station activities and construction.</p> <p>3. Encourage participants in the use of Internet-based learning materials and technologies.</p>
LaRC	<p>Develop Math/Science Haptics Modules for K-12 Education</p> <p>09/02</p>	<p>1. Alpha Test middle school level software. 4/02</p> <p>2. Beta Test middle school software in four schools or with four student groups. 7/02</p> <p>3. Release software via the Web and inform the general public of its availability. 9/02</p> <p>4. Publish paper documenting software development and/or educational significance of project. 9/02</p>	<p>1. Successful software development & alpha testing produce functional software</p> <p>2. Testing in 4 schools would meet metric, and testing in 5 schools would exceed metric.</p> <p>3. Software publicly available meets metric.</p> <p>4. A paper published in a journal or presented at a national conference meets the metric.</p>	<p>1. Project would be ready to move to the next technological step of involving additional students/schools in the project.</p> <p>2. A small group of students will provide feedback on the usefulness and usability of the software in order to make additional improvements.</p> <p>3. Students will develop a deeper understanding of mathematical & scientific concepts through the use of this software. Students will also become more capable and technologically prepared for a technology-based workforce.</p> <p>4. Results & significance of the project will be widely</p>

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
				disseminated in order to publicize the work and promote student use.
LaRC	Develop Web-based Math/Science/ NASA Animation 08/02	1. Develop Flash-based animation pertaining to NASA program. 5/02 2. Solicit user feedback from 25 K-12 student/educator pilot testers. 8/02	1. One completed 3-5 minute animation meets the metric 2. Twenty-five evaluations meet the metric.	1. Prototype animation will serve as a template for evaluation and development of additional modules. Students, educators, and parents will be exposed to NASA content. 2. Evaluation data will provide direction for future project development.
LaRC	Develop NASA "Why?" Files Web site 09/02	1. Develop Problem Based Learning focused Web site with elements related to each NASA "Why?" Files broadcast. 6/02 2. Conduct evaluation (formative, summative, and/or usability) of the NASA "Why?" Files Web site. 9/02 3. Publish paper documenting Web site development and/or evaluation process. 7/02	1. Publicly accessible Web site with components tied to each broadcast meets metric. 2. A completed evaluation report meets the metric. 3. A paper published in a journal or presented at a national conference meets the metric.	1. Students, parents, and educators will become more skilled at problem solving techniques while learning about math, science, and NASA content using technology. 2. Evaluation data will provide direction for future project development. 3. Results & significance of the project will be widely disseminated in order to publicize the work, promote project visibility.
SSC	Supporting the NASA and LT education mission, develop new lesson plans and activities to be utilized by formal and informal spatial information science educators in an Internet environment through the <i>From A Distance</i> Web site.	1. Develop 25 new K-12 lesson plans, with national education standard references. 10/01/01-09/30/02 2. Distribute Statement-of-Work to at least 75 grade-level specific contractors. 12/31/01	1. 25 Lesson plans compiled and delivered to SSC LT Lead in announced format as prescribed in statement-of-work.	1. The delivery of 25 lesson plans to SSC LT Lead will set the stage for the evaluation of these lesson plans and the eventual uploading of lesson plans resulting in the enhancement of the <i>From A Distance</i> spatial information science Web

Project	Performance Goal	Objective/ Milestone	Output Metric	Outcome
	09/02	3. Select and monitor progress of content development lesson plans by at least 8 educational contractors. 01/01 to 07/02		resource.
SSC	Evaluate and enhance the resource of spatial information science lesson plans and activities being distributed to formal and informal educators over the Internet Web site <i>From A Distance</i> . 10/01 to 09/02	1. Review, edit, evaluate, and approve 25 lesson plans delivered from educational contractors. 03/01/02-07/15/02 2. Upload 25 approved lesson plans delivered from educational contractors. 07/15/02-08/31/02 3. Enhance <i>From A Distance</i> Web site by increasing usage by 10%. 4. Enhance <i>From A Distance</i> Web site by increasing the amount of accessed data by 10%.	1. 25 evaluated and approved spatial information science lesson plans. 2. 25 uploaded lesson plans available to formal and informal educators over the <i>From A Distance</i> Web site. 3. Web statistic metric <i>Number of Hits</i> for the <i>From A Distance</i> Web site for FY2002 reaches at least 10% over FY2001, which was 79,229 hits. 4. Web statistic metric <i>Kilobytes Transferred</i> for the <i>From A Distance</i> Web site for FY2002 reaches at least 10% over FY2001, which was 1,240,398.	1. Larger quantities of spatial information science lesson plans are available to a growing number of formal and informal K-12 educators through the Internet Web site <i>From A Distance</i> .
SSC	Maintain and provide quality control for the spatial information science resource of lesson plans and activities housed and distributed over the Internet Web site <i>From A Distance</i> for formal and informal educators. FY2002 10/01/01-09/30/02	1. Monitor all and revise required Web site links included in lesson plans housed on the <i>From A Distance</i> Web site. 01/01/02-04/30/02 2. Map previously compiled lesson plans to national education standards in science, mathematics, technology and/or geography. 03/01/02-06/30/02	1. No more than 5% of all Web site links included in all lesson plans on the <i>From A Distance</i> Web site result in a "Link Not Found" response. 2. All lesson plans included on the <i>From A Distance</i> Web site will have applicable references to national education standards in science, mathematics, technology and/or geography.	The development, maintenance and enhancement of a spatial information science integrated learning technology product will enhance the educational process for formal and informal education and life long learning.

7.3 LT Metrics for FY02

The NASA Educational Technology Program Category links performance to funding and stresses accountability. LT, as a core asset to the Program Category supports this results-

oriented system. LT Project Metrics grow out of the guiding principles, goals, and outcomes discussed earlier. LT shall use the Education Division Computer Aided Tracking System (EDCATS) as its formal method of data collection. Information from the monthly reports, and Quarterly Reviews will be summarized by the Regional Centers and entered into EDCATS. The Project Office will also make independent entries as appropriate.

Table 4: LT General Output Metrics and Related Outcomes

Metric	Related Outcome(s)
<ul style="list-style-type: none"> Awards and recognition received 	<ul style="list-style-type: none"> LT is recognized by the academic and industrial communities
<ul style="list-style-type: none"> On-line: Web statistics (hits, Kb transferred, unique addresses) per month 	<ul style="list-style-type: none"> LT is visible and findable Well-defined technical training path Large-scale integration of LT into classrooms
<ul style="list-style-type: none"> Off-line: Number of conferences and other external activities 	<ul style="list-style-type: none"> LT is visible and findable
<ul style="list-style-type: none"> Number of “referenceable” papers submitted by LT and affiliates 	<ul style="list-style-type: none"> Raised level of math, science, engineering, and technology awareness
<ul style="list-style-type: none"> Number of schools and underserved schools served by LT projects 	<ul style="list-style-type: none"> Raised level of math, science, engineering, and technology awareness

Each Center must make a reasonable effort to meet these five metrics, in addition to fiscal year performance goals. The agency is likely to judge the project by its numerical success in these areas.

Metric 1 will be calculated at one major award for every \$100K spent on the project rounded to the nearest whole number. If a project budget is \$150K, 1.5 prestigious awards, rounded to two prestigious awards will be required to meet this metric.

Metric 2 will be calculated at a minimum of one hit per dollar. If a center has a budget of \$300K, the metric would be at least 300,000 hits for the year. In general most projects far exceed this metric in a single month, however the lower boundary has been set.

Metric 3 will measure one major conference or public activity for every \$100K rounded to the nearest whole number. If a project has a budget of \$220K per year, it is expected to support 2.2 events, rounded to two events.

Metric 4 will be calculated at one paper for every \$100K rounded to the nearest whole number. A center receiving \$500K would be expected to produce at least five papers during the year.

Metric 5 will be calculated at three schools for every \$10K. A center with \$20K would be expected to have data on six schools that it has supported in some fashion. Note this could be as simple as preparing an Internet kit for the school or doing an Internet activity. In general this can be a very low level of personal involvement, but enough for the school to know that NASA is providing it with something.

Table 5: LT FY01 Target Metrics (Goals and Actual Results)

Metric	ARC	DFRC	GRC	GSFC	KSC	JSC	LaRC	MSFC	SSC
• Awards & Recognition Target	5	2	2	2	0	2	2	0	0
• Awards & recognition Actual	7	10	11	0	0	6	1	0	0
• # of hits Target	510K	150K	220K	160K	5K	250K	230K	50K	50K
• # of hits Actual in K	700,701	2,828	69,605	0	N/A	14,378	14,421	0	60
• # of activities Target	5	2	2	2	0	2	2	0	0
• # of activities Actual	77	6	67	0	0	9	3	0	10
• # of papers Target	5	2	2	2	0	2	2	0	0
• # of papers Actual	7	0	8	0	0	3	0	0	0
• # of schools Target	153	59	66	48	1	75	60	19	19
• # of schools Actual	0	280	288	37	0	1009	83	0	183

7.4 LT Reports

The Project-reportable metrics selected below represent how well the respective projects are doing toward producing the desired results identified in the table of outcomes listed above. The table below specifies the data collection methodology and responsibility. This information will be recorded at the Project Office level.

The Project Office will also routinely report results or unusually successful (or unusually unsuccessful) efforts to the ET Program Office and other senior management. The Learning Technologies Project Office will be responsible for taking any necessary follow-up action as required. Task contributions and results will be among the criteria used by the Project Office in determining future budget allocations for proposals that are competed between Centers.

Table 6: LT Metrics and Data Collection for all Levels

Metric	Data To Be Reported Monthly
<ul style="list-style-type: none"> Amount of awards or recognition received 	<ul style="list-style-type: none"> Each task reports new awards to its respective Manager
<ul style="list-style-type: none"> On-line: Web statistics (hits, Kb transferred, unique addresses) per month 	<ul style="list-style-type: none"> Each task reports hit and domain statistics to its respective Manager (alternatively, this can be collected by RSPAC)
<ul style="list-style-type: none"> Off-line: Number of conferences and other external activities 	<ul style="list-style-type: none"> Each task reports type of conference participation and demographic make-up to its respective Manager
<ul style="list-style-type: none"> Number of papers submitted by LT and affiliates 	<ul style="list-style-type: none"> Each task reports numbers and type of collaboration to its respective Manager
<ul style="list-style-type: none"> Number of schools and underserved schools served by LT projects 	<ul style="list-style-type: none"> Each task reports school name, location, and point of contact to its respective Manager

The LT will all report directly to EDCATS in addition to all other requirements.

7.5 Task Metrics for Grants and Cooperative Agreements

These milestones represent subtask requirements as determined by procurement and listed in the awarded grants and cooperative agreements. The metric for success is meeting all milestones on schedule. For example, most grants are only required to produce a report at the end of each grant year while cooperative agreements typically have several specific milestones to be accomplished during the course of the agreement.

7.6 LT Financial Metrics

All Learning Technologies Projects will work with financial accounting to track commitments, obligations and accruals. At a minimum, LT tasks and subtasks shall maintain metrics that track progress in meeting Office of Aerospace Technology budget performance requirements. These requirements are that there be 83% accrual and 100% obligation of FY funds by the end of September. In addition, it is required that there be 100% accrual of funds by the end of the calendar year. Line organizations at each NASA field center are responsible for meeting or exceeding these performance targets.

8. RESOURCES

8.1 Financial

Funding and workforce budgets have been coordinated among the various NASA centers participating in LT. The LT budget profiles for the fiscal years FY02 - FY07 are shown in the following table in millions. Note that this budget could be further reduced based upon Congressional passback and earmarks.

Table 7: LTP Multi-Year Budget Plan

FY	Code FE Provision
2002	\$ 3.8 M
2003	\$ 3.8 M
2004	\$ 3.8 M
2005	\$ 3.8 M
2006	\$ 3.8 M
2007	\$ 3.8 M

Table 8: LT 506 Authority Plan for Fiscal Year 2002

Learning Technologies Project Budget		FY02
ARC	LTPO	\$635,000
ARC	Grants TIE & SPACE	\$330,000
ARC	ROC	\$465,000
KSC	ARC	\$45,000
ARC	Total	\$1,475,000
GSFC	LT Solicitation	\$1,210,000
GSFC	ROC	\$160,000
GSFC	Total	\$1,370,000
DFRC	ROC	\$150,000
KSC	ROC	\$5,000
JSC	ROC	\$250,000
LaRC	ROC	\$230,000
GRC	ROC	\$220,000
SSC	ROC	\$50,000
MSFC	ROC	\$50,000
NASA	Super Total	\$3,800,000

Further detail is available in section 6.

Table 9: LT Budget Plan for Fiscal Years 2003 – 2007

Learning Technologies Project Budget		FY03	FY04	FY05	FY06	FY07
ARC	Project Office	\$700K	\$700K	\$700K	\$700K	\$700K
NASA	Phase 1 & 2	\$1,850K	\$1,850K	\$1,850K	\$1,850K	\$1,850K
GSFC	LEARNERS	\$1,250K	\$1,250K	\$1,250K	\$1,250K	\$1,250K

The budget numbers represent totals for the performing centers and cooperative agreements.

8.2 Procurement Strategy

Procurement will be in accordance with normal procedures for R&D activities at the procuring centers. Competitive procurements will be used to the maximum extent practicable. Among the procurement vehicles which are expected to be utilized on the ET Program are Performance Based Contracts, Grants, NASA Research Announcements, Cooperative Agreements, Fixed Price hardware purchases and leases, and cooperation with other Federal agencies.

8.3 Proposal Timeline for FY03

MANAGEMENT

Initiate GPRA Management Process (train)	Sep-01
Announce GPRA APPR A-11 Reporting	Sep-01
Prepare GPRA APPR Reports - one report each task	Oct-01
Review APPR Reports	Oct-01
Announce (confirm) FY02 Funding Levels	Oct-01
Produce Final Report FY01	Dec-01
Complete FY'02 Management Plan	Oct-01
Conduct Ed. Tech. Environmental Assessment	Nov-01
Examine Task Alignments to NASA / Education Plans	Nov-01
Complete LT Strategic Plan FY03-FY07	Dec-01

REPORTING INFRASTRUCTURE

Quarter 1-FY02 Report (EDCATS) - one report each task	Jan-02
Quarter 1-FY02 Review and Evaluation	Jan-02
Quarter 2-FY02 Report (EDCATS) - one report each task	Mar-02
Quarter 2-FY02 Review and Evaluation	Mar-02
Quarter 3-FY02 Report (EDCATS) - one report each task	Jun-02
Quarter 3-FY02 Review and Evaluation	Jun-02
Quarter 4-FY02 Report (EDCATS) - one report each task	Oct-02
Quarter 4-FY02 Review and Evaluation	Oct-02
Produce Final FY02 APPR Reports	Oct-02
Produce Annual Final FY02 Evaluation Report	Dec-02

IN-HOUSE PROJECTS (ROC / Others)

- Solicit Projects for Phase I Funding (In-House)
- Receive Project Proposals Phase I (In-House)
- Peer Review of Phase I Proposals (In-House)
- ET/LT Staff Review Phase I for Recommendation
- Asst. Director Education Approval
- Final List to Selection Official for Approval
- Notification of Proposers (successful/unsuccessful)
- Public Phase I Award Announcements
- Initiate Phase I Awards / Kickoff

LEARNERS II

Develop LEARNERS II Solicitation	Apr-02
LEARNERS II CAN Notice	May-02
Receive Letters of Intent LEARNERS II	Jun-02
Receive Proposals LEARNERS II	Jul-02
Review of LEARNERS II Proposals	Jul-02
ET/LT Staff Review LEARNERS II for Recommendation	Aug-02

Asst. Director Education Approval	Aug-02
Final List to Selection Official for Approval	Sep-02
Notification of Proposers (successful/unsuccessful)	Sep-02
Public LEARNERS II Award Announcements	Sep-02
Implement LEARNERS II Activities / CAN Opener	Sep-02

8.4 Proposal Timeline for FY03

FY03

Establish Baselines (EDCATS)	Oct-03
Quarter 1-FY03 Report (EDCATS) - one report each task	Jan-03
Quarter 1-FY03 Review and Evaluation	Jan-03
Quarter 2-FY03 Report (EDCATS) - one report each task	Mar-03
Quarter 2-FY03 Review and Evaluation	Mar-03
Quarter 3-FY03 Report (EDCATS) - one report each task	Jun-03
Quarter 3-FY03 Review and Evaluation	Jun-03
Quarter 4-FY03 Report (EDCATS) - one report each task	Oct-03
Quarter 4-FY03 Review and Evaluation	Oct-03
Produce Final FY03 APPR Reports	Oct-03
Produce Annual Final FY03 Evaluation Report	Dec-03
Solicit Projects for Phase II Funding	Jun-03
Receive Project Proposals Phase II	Jun-03
Peer Review of Phase II Proposals	Jun-03
ET/LT Staff Review Phase II for Recommendation	Aug-03
Asst. Director Education Approval	Aug-03
Final List to Selection Official for Approval	Aug-03
Notification of Proposers (successful/unsuccessful)	Aug-03

Public Phase II Award Announcements Aug-03

Initiate Phase II Awards / Kickoff Sep-03

FY04

Establish Baselines (EDCATS) Oct-04

Quarter 1-FY04 Report (EDCATS) - one report each task Jan-04

Quarter 1-FY04 Review and Evaluation Jan-04

Quarter 2-FY04 Report (EDCATS) - one report each task Mar-04

Quarter 2-FY04 Review and Evaluation Mar-04

Quarter 3-FY04 Report (EDCATS) - one report each task Jun-04

Quarter 3-FY04 Review and Evaluation Jun-04

Quarter 4-FY04 Report (EDCATS) - one report each task Oct-04

Quarter 4-FY04 Review and Evaluation Oct-04

Produce Final FY04 APPR Reports Oct-04

Produce Annual Final FY04 Evaluation Report Dec-04

Project Spinoffs Dec-04

FY05

Re-establish Baselines (EDCATS)

Quarter 1-FY05 Report (EDCATS) - one report each task Jan-05

Quarter 1-FY05 Review and Evaluation Jan-05

Quarter 2-FY05 Report (EDCATS) - one report each task Mar-05

Quarter 2-FY05 Review and Evaluation Mar-05

Quarter 3-FY05 Report (EDCATS) - one report each task Jun-05

Quarter 3-FY05 Review and Evaluation Jun-05

Quarter 4-FY05 Report (EDCATS) - one report each task Oct-05

Quarter 4-FY05 Review and Evaluation Oct-05

Produce Final FY05 APPR Reports Oct-05

Produce Annual Final FY05 Evaluation Report Dec-05

9. CONTROLS

Commercially sensitive information that is generated under formal cooperative research agreements between NASA and non-Federal parties is protected by the amended (October 1992) NASA Space Act of 1958. Data produced under such an arrangement will be protected from Freedom of Information Act (FOIA) requests for a period of five years after the date of dissemination.

NASA center management, working with industry and NASA LT researchers, is responsible for identifying sensitive technologies. These technologies are handled in such a way that their dissemination to foreign companies, laboratories, and universities is restricted. The LTPO will adopt conventional security techniques.

Negotiated License Agreements are used to restrict access to privately developed technology performed under the auspices of the NASA LTPO. These agreements provide NASA with limited rights to use proprietary data or designs in NASA in-house or cooperative research projects. These agreements specify limits on the distribution and use of the proprietary data by NASA and NASA-licensed entities.

Some software and information developed within the NASA LTPO may be subject to protection under the Export Administration Regulations (EAR) or the International Traffic in Arms Regulations (ITAR), which are export controls established by law. The participants in the ET Program will follow applicable export control laws. These regulations establish lists or categories of technical data and/or products that may not be exported without an approved export license. (Note that the definition of "exported" includes "disclosed" and "discussed" as well as published.)

10. IMPLEMENTATION APPROACH

The work breakdown structure for LT has been defined to have a management component and four major elements as defined in section: 1) Learning Technologies Project Office; 2) Regional Outreach Centers; 3) LEARNERS; 4) Strategic Tasks; and 5) Technology Development. Please see section 5.4 for more details on the WBS.

10.1 NASA Field Center Responsibilities

Table 10: Approximate Field Center Support by NASA Center

Center	OES	OSS	HEDS	OBPR	OAT
ARC	0%	25%	25%	25%	25%
DFRC	0%	0%	0%	0%	100%
GSFC	50%	50%	0%	0%	0%
JSC	25%	25%	13%	12%	25%
KSC	100%	0%	0%	0%	0%
LaRC	25%	25%	13%	12%	25%
GRC	0%	0%	0%	0%	100%
MSFC	100%	0%	0%	0%	0%
SSC	100%	0%	0%	0%	0%

11. ACQUISITION SUMMARY

Free and open competitive procurements will be used to the maximum extent possible. Among the procurement vehicles expected to be put to use by LT are NASA Research Announcements (NRA), NASA Cooperative Agreement Notices (CAN), and Request for Proposals (RFP). These vehicles will result in grants, cooperative agreements and contracts. Cooperative Agreement Notices (CAN) will be used to the maximum extent possible for the incorporation of technology and applications into the Program. Interagency agreements for joint R&D endeavors and the utilization of early prototype systems will also be used.

12. PROGRAM/PROJECT DEPENDENCIES

12.1 Cooperation with Other NASA Programs and Enterprises

LT maintains a liaison with NASA's other education programs, including the Education Offices residing at NASA field centers and the Education Division at NASA Headquarters.

Frequently LT is required to implement technical demonstrations to high level VIP's. Code FE has demonstrated a dependency on LT to execute such events on short notice.

12.2 Cooperation with Other Federal Agencies

- DARPA (Advanced Research Projects Agency)
- Department of Commerce
- Department of Defense
- Department of Education
 - Eisenhower National Clearing House
- Department of Energy

12.3 Cooperation with Other Organizations

A key concept of LT is early and continuing interaction with, and involvement of, the domestic academic communities. LT will actively foster this relationship through workshops, periodic in-depth reviews, and planning and review activities, as appropriate. These workshops and review activities are designed to elicit direct, unfettered feedback from some of the nation's best experts in the field of scientific education in primary, secondary and post-secondary educational environments regarding the goals, objectives, priorities and structuring of the programs planned under LT.

LT has established an Advisory Board consisting of key individuals in the domestic academic communities. This Planning and Review Team will meet at least annually in coordination with the LT budgeting and planning process but will be consulted and kept informed regularly.

Table 11: Interaction with Other Organizations, Excluding School Partnerships

Center	Major Liaison Activities
Project Office	Access America Board CoSN (Consortium of School Networking) CUE (Computer Using Educators) ISTE (International Society for Technology in Education) ISOC (Internet SOCIety) NCTM (National Council for Teachers of Mathematics) NEA (National Education Association) NHU (National Hispanic University) NII (National Information Infrastructure) NSF (National Science Foundation) NSTA (National Science Teachers Association) NetDay Committee Los Angeles County Office of Education (LACOE) The California State Department of Education Science Framework Committee California Museum of Science and Industry, Los Angeles, CA California State Government Mitsubishi Air Touch Software Bisque Mount Wilson Institute Naval Observatory Celestron Mead Instruments Santa Barbara Instruments Group Silicon Graphics Boston Museum of Science Little Thompson Science Foundation Hayden Planetarium Griffith Observatory

Center	Major Liaison Activities
ARC	California State Teachers Association (CSTA) US Department of Education The JASON Project The Discovery Channel SpaceNews GTE/Americast Institute for Computer Technology The GLOBE Program Other California state & local education organizations
DFRC	California State Government
GSFC	Maryland State Government
JSC	Clear Creek School District Texas Education Network (TENET) Other Texas state & local education organizations Mississippi State University (Research, Rehabilitation, & Training - Center on blindness and low vision)
KSC	Florida state and local education organizations Florida Gulf COAST University Florida State Commissioner of Education
LaRC	Virginia state & local education organizations Elizabeth City State University US Department of Housing and Urban Development Virginia Space Grant Consortium WHRO Public TV
GRC	Ohio State Government Ohio Space Grant Consortium, WVIZ-TV (Cleveland Public TV)
MSFC	Alabama state & local education organizations
SSC	Mississippi state & local education organizations

13. AGREEMENTS

LT utilizes Interagency Agreements (IA), Memorandums of Understanding's (MOU), and other NASA mechanisms for accomplishing work with other parties.

Internal agreements:

LT maintains agreements between NASA HQ Code F, NASA ARC Code IC, and ET's NREN Project. All of these projects involve leading-edge Internet communications technology to support educational requirements.

External agreements

A Space Act Agreement between NASA GRC and the Educational Television Association of Metropolitan Cleveland (WVIZ-TV) for the creation of a NASA Educational Channel on an Instructional Television Fixed Services Channel was signed July 27, 1998.

14. PERFORMANCE ASSURANCE

LT will work with industry, academia and other federal agencies to assure the quality of their products.

14.1 General

LT will leverage off its relationship with the Educational Training and Human Resources working group to debut new technologies.

14.2 Reliability

Each task is responsible for utilizing evaluation mechanisms on their deliverables such that all software and interactive systems are 95 percent reliable. For example the multimedia backbone will be operational 19 attempts out of 20.

14.3 Quality Assurance

The NASA Education Division and the intercenter working group will have the opportunity to review all data content and assure 100 percent accuracy in all NASA data. Finished LT-funded products within the Earth Science and Space Sciences content areas should be required to be submitted and reviewed under Enterprise Education Product Review Process. ROC managers should oversee that this requirement is met by Center LT Offices.

14.4 Performance Verification

LT will utilize the ICWG as the primary source of performance verification and the LT Advisory Board as the secondary source of performance verification.

14.5 Software Assurance

LT will utilize the ICWG as the primary source of performance verification and the LT Advisory Board as the secondary source of performance verification.

14.6 Maintainability

It is the requirement of LT that all project software be supported and easily maintainable by the end user. A primary requirement is that the software be easily replicable and inexpensive for the user to run on typical desktop systems.

15. RISK MANAGEMENT

Responsible risk assessment must be made of all new technologies disseminated into all formal and informal learning environments.

15.1 Overview

In the development of technology, risk arises from unexpected developmental difficulties. LT was planned with a portfolio of risk versus payoff. While the minimum success criteria are expected to be achieved, there are some high-risk, high-payoff elements in LT. Milestones have been designed with the probability that they can be achieved.

15.2 Technical Risk

NASA's LT mission requires currency with the leading edge of technology and a direction that is consistent with the future. To minimize the potential risk of investing resources in the wrong technology, NASA frequently meets with industry and other Federal agencies to help plan the future of the technology.

Systems software developed to date is built on conventional personal computers and similar architectures. To minimize the risks of software development, NASA is leading efforts to pool the resources of multiple government agencies and strengthen collaborative efforts with industry and academia.

It is critical that NASA continues to pursue a quick and responsive procurement mechanism for acquiring experimental software that is compatible with the user community. To minimize the potential risks, NASA has developed in-house procurement vehicles that permit rapid vendor responses. NASA also partners with other Federal agencies to leverage off other procurement vehicles.

As a partner in an overall Federal program wherein high-risk research is shared by other participating federal agencies, NASA portions of jointly-sponsored research initiatives are often dependent on funding and work commitments made by partner institutions. This risk is mitigated through cooperative planning with the other agencies to ensure a cohesive plan with no unforeseen consequences.

The detailed technical risks of the project are encapsulated in the various sub-projects. The project technical risks are shown in the table below.

Table 12: Technical Risk Assessment

<p>Risk</p> <p>(probability without mitigation)</p>	<p>Impact</p>	<p>Mitigation</p>
<ul style="list-style-type: none"> • Educational Community requirements change <p>(low)</p>	<ul style="list-style-type: none"> • Products do not meet customer requirements • Reduced technology transfer success • Increased customer efforts required to adapt products <p>(medium)</p>	<ul style="list-style-type: none"> • Track the development of National and State standards to insure that the technology developed by LTP is consistent with any changes in the educational community.
<ul style="list-style-type: none"> • Educational projects do not meet expected interactive performance <p>(medium)</p>	<ul style="list-style-type: none"> • Reduced benefit at user level <p>(high)</p>	<ul style="list-style-type: none"> • Assign Task Managers to access their technology platforms annually with educational capabilities and industrial development trends to insure that LTP products will exceed or meet interactive performance requirements.
<ul style="list-style-type: none"> • Duplication of Process by another federal agency <p>(high)</p>	<ul style="list-style-type: none"> • Inefficient use of program resources • Valuable project activities not funded <p>(low)</p>	<ul style="list-style-type: none"> • Utilize interagency forums more efficiently through the use of LTP liaisons with various Federal Agencies such as NSF, DOE, DoEd, DARPA, and the DOD.

To help understand and mitigate technical risk at the LT level, LT is monitored on a regular basis by specialists external as well as internal to NASA. In addition to the regularly scheduled reviews, the overall LT project and each individual task have technical working groups to bring external peer-reviewed input to the technical activities.

15.3 Resource/Schedule Risk

NASA’s LT software and network testbeds are critical to ensure the future success of NASA’s Education Division, Educational Technology goals. LT partners with other Federal agencies and industry to use their facilities when necessary. LT has established an allocation and scheduling system for its testbeds that ensures best possible use of the facilities. Additionally, LT is pursuing more cost-effective means of providing versatile testbeds for the future.

Risk in LT is managed primarily through the manipulation of inputs. In the event that schedules may not be met, greater resources may be deployed to compensate schedule problems. These resources would be redirected from lower-priority task milestones or from tasks that have achieved their milestones ahead of schedule.

The Table below presents an overview of the overall resource/schedule risks faced by LT, their potential impact, and the mitigation actions either taken or to be taken by the Project.

Table 13: Resource/Schedule Risk Assessment

Risk (probability without mitigation)	Impact	Mitigation
<ul style="list-style-type: none"> • Educational Products overtake NASA development (medium)	<ul style="list-style-type: none"> • Project activity descope • Resources are wasted (low)	<ul style="list-style-type: none"> • Increase participation with National Science and Teachers Association, Consortium of School Networking, and the National Education Computing Association.
<ul style="list-style-type: none"> • Reduction/loss of funding (high)	<ul style="list-style-type: none"> • Reduced TRL for program products • Near-term milestones delayed or descope with long-term milestones descope or eliminated • Project or element terminated with loss of benefits (high)	<ul style="list-style-type: none"> • Establish a formal process for budget reduction that requires HQ Code FE to confer with the Executive Committee prior to any funding reductions.

16. ENVIRONMENTAL IMPACT

There are no environmental impacts generated by this project.

17. SAFETY

Standard safety regulations are maintained by all NASA civil servants and contractors as required by the individual field centers and Principle Investigator (PI) locations.

18. TECHNOLOGY ASSESSMENT

LT is an education technology and applications project that pursues technologies that are between five and twenty years of maturity. Applications in the areas of K-12 education, the four NASA enterprises, and ET project areas are used as drivers of LT's technology

research, providing the requirements context for the work that is done. These applications are generated from NASA engineers working with industry to develop capabilities and features that will drive the next generation of technology. As the technical capability of hardware and networks is challenged, the applications will be used to achieve project objectives.

LT conducts research activities intended to prove feasibility, develop and demonstrate educational technologies for eventual introduction into NASA's Education Program. In addition, LT conducts education technology outreach demonstrations that are essentially at Technology Readiness Level (TRL) 7-8. Note that LT engages in technology that is initiated at TRL-1.

19. COMMERCIALIZATION

Commercialization opportunities will be exploited through Space Act Agreements, Cooperative Research Agreements and Memoranda of Understanding with industry. Joint projects in high-risk areas will be pursued on a cost-sharing basis with industry and in close collaboration with government laboratories and academia. NASA will foster horizontal partnerships between NASA and multiple companies within the aerospace sector. The NASA LT Project Office will also foster the vertical integration of collaborative teams between hardware suppliers, third-party software vendors, and members of the U.S. aerospace community. Lastly, the LT Project Office sponsors and conducts technical meetings and workshops and promotes the publication of scientific and technical papers to maintain the flow of technology from NASA to industry and academia.

20. REVIEWS

The LT manager and Deputy Project Manager will submit reports on a regular basis and hold reviews periodically to evaluate technical and administrative progress on LT.

Comprehensive program reviews are conducted to evaluate the progress of the project and give critical feedback to the project managers. In addition to appropriate NASA personnel, representatives from other federal agencies, academia and industry may be invited to participate. Reviews are conducted in accordance with established policies and procedures.

20.1 Reviews

LT has four primary reviewing entities. The strongest is the Advisory Board which meets once a year to review all of the projects and provide guidance. In addition, the advisory board reviews all of the project plans prior to their approval in the management plan. The second most influential review is the annual review. The whole LT contingent meets to discuss and review the project. The third reviewing agent is the InterCenter Working Group. This panel meets once every two months to collaborate and exchange views on the status of project development. It is an open forum designed to improve the LT product. The fourth review process is conducted once every two weeks by the immediate LT management whereby projects are assessed and corrected where necessary

The Regional Projects are responsible for regular review of their agreements and subtasks by the appointed technical liaisons. This should be handled in the form of regular telecons and at least one site visit per year. The LT Office will conduct at least one review of each cooperative agreement and grant.

20.1.1 Project Reviews

The release of program funds to the three core projects will be directly tied to review of performance on a quarterly basis. Contingent upon release of NASA appropriates at the beginning of each fiscal year, the following review and fund release will be as follows:

- 1st Quarter. Annual Performance Plan Review.
- 2nd Quarter. Progress evaluation.
- 3rd Quarter. Progress evaluation.
- 4th Quarter. Preparation of Annual Performance Report with participation of entire Educational Technology Program Management Team in Quarterly Review Proceedings.

20.2 Reports

All elements and projects are responsible for providing monthly and annual project reports. Centers with ROC subtasks are required to provide the information necessary for these reports on time. All projects will be required to provide information for the LT Annual Report. All types of data may be requested

In preparation for the transition in FY03, the following reports will be required to assess progress on FY'01 goals. Each ROC shall provide, in accordance with the Government Performance and Results Act of 1993 (GPRA):

20.2.1 FY '01 Annual Performance Reports (Report on Progress)

- Comparison of actual performance with the projected performance in annual performance plan
- When performance is not met, report includes explanation for not achieving a goal(s) and describes steps for meeting goals in the future
- IF performance goals for a particular (FY'01) program activity have not been expressed in an objective, quantifiable, and measurable form, than the alternative form shall be submitted:
 - Include separate descriptive statements of –
 - (A) (i) a minimally effective program, and

(ii) a successful program, or

(B) with sufficient precision and in such terms that would allow for an accurate, independent determination of whether the program activity's performance meets the criteria of the description

20.2.2 FY '02 Annual Performance Reports (Report Format)

Cover Page

- Principal Investigator
- Field Center/Institution/Grant or cooperative agreement number
- Task Title
- Reporting Period (From: 10/1/00 To: 9/30/01)

Performance and Evaluation Report (3-7 pages total)

- Summary of FY
- Goals
- Objectives
- Activities
- Describe the evaluation component of the Task.
- Describe the approach for assessing the effectiveness of task/activities.
- Describe the type of evaluation that was conducted.
- Describe the evaluation process that was conducted.
- Describe the outcome of the task/activities.
- Describe the impact of the task/activities
- Describe the data collection procedures used
- Indicate whether you believe the data collection procedures were effective in measuring the objectives

20.2.3 Comparison of Actual Performance with the Projected Performance*:

3.1 Performance Target: _____

3.2 Actual Performance: _____

*When performance is not met, then include explanation for not achieving a goal and describe steps for meeting goal in the future.

3.3 Target Assessment: _____

*Assign performance rating to each of the targets:

Blue - significantly exceeded performance target

Green - achieved performance target

Yellow - did not achieve performance target, progress was significant and achievement is anticipated within the next fiscal year

Red - failed to achieve performance target, do not anticipate completion with next fiscal year, target may be infeasible or non-achievable

White - insufficient data to determine assessment

3.4 Data Source(s): _____

*NOTE:

If a performance goal for a particular FY '01 activity has not been expressed in an objective, quantifiable, and measurable form, then submit the following information:

*Include a descriptive statement of activity with sufficient precision and in terms that would allow someone else (independent of the project) to determine whether the activity's performance (successfully, minimally, or does not) meets the criteria of the description.

20.2.4 FY '03 Annual Performance Planning (Establishes Connections Between those Long-term Strategic Goals and the Day-to-Day Activities)

- To systematically provide decision-makers with information on the results to be achieved for a proposed level of resources. Plans should clearly inform reader of annual performance goals, the measures that will be used to gauge performance, the strategies and resources required to meet the performance goals, and the procedures that will be used to verify and validate performance/measured values.
- Establish performance indicators to be used in measuring or assessing the relevant outputs, service levels and outcomes of each program activity.
- Provide a basis for comparing actual program results with the established performance goals.

- Quantifiable information that addresses whether or not program activities are achieving the desired annual goals, which in turn produce the desired outcomes for the people or communities served by the program; often short-term and intermediate outcomes
- Concise statements of: 1) what will be accomplished (specificity), 2) how much will be completed (deadline), and 3) by whom (responsibility)
- Development of annual performance goals aids decision-making and accountability; also forms the basis of a rational budget request; performance goals and measures must be linked to program activities in budget requests.
- Annual performance goals should define an objective, quantifiable, and measurable target level of performance for each program activity.

20.2.5 FY 02 Environmental Assessment

(Leads: Educational Technology Program Management Team). The study is to be undertaken and completed by December 2001. The effort is the starting point and foundation for defining what the Educational Technology Program Category. Three practices are critical for successful strategic planning: 1) involve the stakeholders, 2) assess internal and external environments, and 3) align activities, core processes, and resources to support Agency and Education Program related outcomes.

The assessment will look at the internal and external environment. the current state, activity, emphasis and interest by federal agencies, business and industry, universities with technology in education. The following areas will be studied by the following management team members:

- Technologies (LT). Survey industry leaders in innovative technologies currently under research. Leaders to include IBM, Microsoft, Sun, 3Com, Cisco, Pioneer, and Sony.
- Federal Agencies/Labs (COTF). Survey federal agencies that have an arm related to educational technology or technology opportunity programs. Agencies to include US Dept. of Education, US Dept. of Commerce, National Science Foundation, National Institute of Health, and NASA Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs.
- Technology Diffusion (Spacelink). Survey leading commercial and government-funded Web sites that target educators, students, and kids. Assess electronic services they offer, how they promote, met-tag, organize, customize, bring users back to sites. Sites would include those educational (e.g., Disney online, CartoonNetwork.com, Nickcom, NickJr.com, Yahoo!igans.com, FoxKids.com, PBSKids.org, gURL.com, Kbkids.com, and KidsDomain.com, ePALS.com) plus media sources with an educational aspect (radio online channels,

CNNfyi/Turner Learning). Examine NASA policy for linking to external non-government sites (regulatory and compliancy issues, etc.).

- Internal Assessment (All). The internal assessment is to become an ongoing evaluative tool for analyzing what the Educational Technology Program and its core assets have accomplished in the past and where it needs to head in the future. It should be used in annual review of the educational technology projects, the Educational Technology Program and of the NASA Implementation Plan for Education.

Each manager will focus on four key areas in looking at themselves, their internal resources, processes and performance. The assessment will examine: strengths, weaknesses, opportunities and threats (or SWOT). The following types of questions will be addressed:

- How successful are internal processes, products, and services in meeting the needs of the target population and other Agency customers? In what ways has the agency grown, remained the same or changed internally, and why? What are its internal accomplishments? What has failed to be accomplished internally and why?
- What is the public's perception of the quality of products and services? What is being done poorly? How do products and services and internal processes compare to evaluation criteria? Do programs and activities support one another, or is there conflict or duplication among them?
- What programs or activities are expected to grow or decline, and how does the Education Program (and NASA Implementation Plan for Education) plan to accommodate those changes? What are the program's current and anticipated resource needs? What strengths, weaknesses, opportunities, or threats (SWOT) characterize internal operations?

External Assessment (Co-Leads: HQ/Flint Wild and Peggy Steffen, Support: All). The following questions should be addressed:

- What are our target populations and what changes, if any, are anticipated within the strategic planning period? What is the level of demand and public need for our electronic products or services? What are the most significant indicators of customer demand and public need? What trends have been identified with respect to these issues?
- What major issues, conditions, or problems in the external environment are relevant to the delivery of our Program's goods and services? What conditions could affect or alter key elements of the environment? What implications do specific environmental changes hold for the Program, such as changes in federal law/regulations? What relationships exist between our

Program and other similar programs with related target populations? What opportunities may exist for improving coordination or eliminating duplication between other agency programs?

- What SWOT characterizes our external relationships? What opportunities are available that have not been previously explored? How can we mitigate known threats?
- What progress has been made by the NASA Education Program toward achievement of desired educational technology program outcomes and objectives in the current NASA Implementation Plan for Education? How reliable are annual performance projections for the next strategic planning period?

Strategic Issues (All). Strategic issue identification helps the NASA

Education Program and Educational Technology Program Category identify what it must excel at in light of its mandates, vision and mission; and places that information in the context of the environmental analysis. Based upon the input from the above categories of assessment, the question to be answered is:

- “What are the most significant challenges and opportunities facing the NASA Educational Technology Program Category?”

21. TAILORING

The ET Program will be managed and implemented in accordance with the normal procedures used by the Education Technology Program under the Education Division, HQ Code FE. There are no major deviations from these procedures.

22. CHANGE LOG

Changes to LT since inception in 1993:

- December 1992. HPCC IITA K-12 Project initiated
- June 1993. HQ makes ARC lead Center for IITA K-12 Project
- May 1995. HQ moves IITA Project Office to ARC
- March 1996. Out-year milestones. Eliminated IITA milestones due to funding cuts.
- September 1997. IITA project ends due to funding cuts.
- October 1997. LT Project initiated. IITA education activities and milestones transferred to LT.

- PCA update April 2000

23. REFERENCES

- 1999 LTP Annual Report
- 1999 LTP Product Guide
- 1998 LTP Product Guide
- 1998 LTP Annual Report
- 1998 LTP Five-year Plan for Education
- 1997 IITA Annual Report
- 1997 IITA K-12 Education Proposal Plan
- 1996 NASA Communicating Science, A Celebration of Accomplishments
- 1996 NASA Communicating Science, A Celebration of Accomplishments (Second Printing)
- 1996 K-12 Outreach Proposal Plan
- 1996 IITA Products Guide
- 1996 IITA Annual Report
- 1996 IITA K-12 Annual Report
- 1995 K-12 Outreach Proposal Plan
- 1995 The Educational Technology Information Infrastructure Technology & Applications K-12 Internet Education Project Program Evaluation Report October 1995
- 1995 IITA K-12 Annual Report
- 1995 IITA K-12 Evaluation Report Briefing to L. Holcomb at NASA HQ November, 1995
- 1994 Educational Technology: Technology for the National Information Infrastructure. Supplement to the President's Fiscal Year 1995 Budget
- 1994 Learning Technologies: A Report to the ETIT LT Task Group. January 4, 1994
- 1994 IITA K-12 Annual Report

- 1993 The National Information Infrastructure: Agenda for Action, the Information Infrastructure Task Force. September 15, 1993

24. ACRONYMS

AECC	Aeronautics Education Coordinating Committee
AIRNet	Alabama Internet, Inc.
ARC	Ames Research Center
AREN	Alabama Research and Education Network
ASCD	Association for Supervision for Curriculum Development
DARPA	Advanced Research Projects Agency
CAN	Cooperative Agreement Notice
CCF	Community College Foundation
CCIC	Committee for Computing, Information and Communication
CNES	French Space Agency
CO	Contract Officer
COSN	Consortium of School Networking
CoTF	Classroom Of The Future
COTR	Contracting Office Technical Representative
CS	Civil Service
CUE	Computer Using Educators
DoE	Department of Energy
DFRC	Dryden Flight Research Center
EDCATS	Educational Division Computer Aided Tracking System
EL	Enterprise Liaison
EOS	Earth Observing System
ESE	Earth Science Enterprise
ETHR	Educational Training and Human Resources
EWG	Evaluation Working Group
FTE	Full Time Equivalent
FY	Fiscal Year
GSFC	Goddard Space Flight Center
HEDS	Human Exploration and Development of Space
ET	Educational Technology
HQ	Headquarters
ICWG	InterCenter Working Group
IITA	Information Infrastructure Technology and Applications
ISOC	Internet SOCIety
ISTE	International Society for Technology in Education

ITEA	International Technology Education Association
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
K-12	Kindergarten through 12th grade
KSC	Kennedy Space Center
LaRC	Langley Research Center
LEARNERS	Leading Educators to Applications, Research and NASA-unique Educational Resources in Science
GRC	Glenn Research Center
LT	Learning Technologies
LTC	Learning Technologies Channel
LTP	Learning Technologies Project
MOU	Memorandum of Understanding
MSG	Multimedia Streaming Group
MSFC	Marshall Space Flight Center
MTO	Mars Team Online
NASA	National Aeronautics and Space Administration
NECA	National Education Computing Association
NECC	National Education Computing Conference
NII	National Information Infrastructure
NRA	NASA Research Announcement
NSF	National Science Foundation
NSTA	National Science Teachers Association
OAT	Office of Aerospace Technology
OSS	Office of Space Science
OtH	Over the Horizon
PCA	Program Commitment Agreement
PI	Principal Investigator
PO	Project Officer
R ²	ROVer Ranch
RFP	Request for Proposal
ROC	Regional Outreach Center
RSPAC	Remote Sensing Public Access Center
SEWG	Special Events Working Group
SIMON	School Internet Manager Over Networks
SOMO	Space Operations Missions Office

SPACE	Sun, Planets, Asteroids, Comets, Exploration
SSC	Support Service Contractors
SSC	Stennis Space Center
STO	Space Team Online
TIE	Telescopes in Education
TRL	Technical Risk Level
UPN	Universal Project Number
U.S.	United States
USFIRST	U.S. For Inspiration and Recognition of Science and Technology
VSM	Virtual Science Mentor
WBS	Work Breakdown Structure
WELES	Web-Enhanced Learning Environment Strategies

APPENDIX A: LEARNING TECHNOLOGIES “NEXT GENERATION”

“EXPLOITING” LT’s niche:

- To be a value added compliment to NASA mainstream R&D resources and to stimulate educational and commercial applications of those technologies.
- To cultivate and develop innovative technology solutions for education, the nurturing of partnership agreements, and the facilitation of commercial opportunities

Section 1: The Near-Term (August 2001-September 2002)

With the arrival of the new millennium comes the next generation of the Learning Technologies Project. Fiscal year 2002 will serve as the transition year for the Learning Technologies Project with performance-based management, as envisioned by the **Government Performance and Results Act of 1993 (GPRA)**, being more explicitly operationalized. Projects receiving funding can expect to be funded at or near the same level as FY '01, contingent upon the FY'01 Center Project Performance Report, which shall address the performance goals set by the project and the measure of performance for FY '01. Required elements (*per GPRA*) in and guidance on writing an **Annual Project Performance Report (APPR)** will be provided to LT Center Managers. (*See requirements of APR in Section 232 of OMB, Circular No. A-11, July 2000 and GPRA, Sec 4, section 1116*)

For FY '02, no new starts will be encouraged by the Center LT Project Offices, but rather the continuation in the maturing of FY '01 projects to a level where the project could be completed by FY '02 or other funding sources could be acquired to continue the project. There will not be the assumption that projects currently funded under the existing LT will be funded in the LT Next Generation.

In FY '02, Center LT Project Offices will submit proposals under guidelines similar to FY '01, with additional required elements related to development of an annual performance plan. Required elements (*per GPRA*) in and guidance on writing an **Annual Project Performance Plan (APPP)** will be provided. (*See requirements of APP in GPRA, Sec 4, section 1115*)

Section 2: The Mid-term (FY'02-03)

January-June 2002. The results (e.g., identification of strategic issues) and recommendations from the **ETP Environmental Assessment** (December 2001) will set the stage for the LT Next **Generation Strategic Planning Process**. The Educational Technology Program Officer and the LT Project Manager will construct a strategic plan-to-plan. This **Strategic Plan-to-Plan** will outline the sequence of strategic planning steps, list the participants invited to each step in the decision making process (who will be involved), describe the types of decisions they will make (what decisions will they make), and describe when they will make those decisions. Additional guidance in the preparation of the LT Next Generation Strategic Plan will be obtained from the OMB Circular No. A-11, Sec 210 (2000). The Strategic Plan shall be consistent with the NASA Strategic Plan and the NASA Implementation Plan for Education. The intended outcome is a strategic plan that will be submitted for review and approval no later than June 2002, for implementation in FY'03. This plan shall cover a period of not less than five years forward from the fiscal year it is approved, and shall be updated and revised at least every three years.

- Vision (program’s sense of future direction, its dream for an ideal state; meaningful enough to instigate and inspire action and achievement; all actions of organization should be directed toward this vision)
- Mission (concise statement that conveys what a program does, how it does it, why, and for whom; supports Agency’s and Education’s mission statements)

- Strategic Goal (general ends toward which a program directs its efforts, based on the issues that have been identified as priorities; broad statement of accomplishment focused on the long-term programmatic, policy, and management of goals of the program)
- Strategic Objectives (measurable targets that describe the end result that service or program is expected to accomplish in a given time period; linked directly to strategic goals; predominately *outcome* oriented, consist of an outcome indicator and a numerical target)
- Program (set of related activities and outputs directed at common or closely related purposes that a meaningful portion of the Agency's resources is dedicated to achieve; in order to measure a program's outcome, it must have a distinct, clearly defined mission, and a clearly defined target population or customer base)
- Program Evaluation (assessment through objective measurement and systematic analysis)
- Outcome (intended result, effect or consequence of carrying out a program or activity; important to analyze where program outcomes are targeted)
- Output (product of a program's activities; units of work or services delivered that meet predefined characteristics or attributes)

June-September 2002. Technical, Educational, and Evaluation Infrastructure Definition

Current thinking is that an application process will be developed by which NASA-lead educational technology teams might submit proposals for funding. Program funding priorities will be identified and applications accepted that target those priorities. As a national program, the NASA Educational Technology (ET) Program emphasizes innovation, learning, and diffusion of new ideas and practical knowledge. NASA ET Program seeks innovative concepts that meet NASA-identified educational needs and/or have the potential for non-NASA commercial applications to education. Innovations can come in many forms: some are concepts for applications of emerging technologies; others are novel applications of existing technologies; still others exploit scientific NASA breakthroughs or enable new capabilities or major improvements to existing technologies for educational uses.

The structure of the NASA Educational Technology Program reflects the Congressional understanding that the processes of innovation and bringing new products to the market have a high degree of technical and financial risk. By FY '03, transition the scope, focus and approach of Learning Technologies to a NASA SBIR-like LT Innovative Project (L-TIP):

Phase I is the opportunity to establish a feasibility and technical merit of a proposed innovation. Selected competitively, projects selected would last for up to 12 months with a maximum funding level yet to be determined (e.g., \$50K). Each Phase I proposal must suggest a possible solution to a problem or opportunity stated in the ET Solicitation.

Phase II is the major research and development effort. It continues to be the most promising of the selected Phase I projects based on scientific/technical merit, expected value to NASA and educational community, and commercial/industry potential. Phase II places greater emphasis on evidence of educational and commercial development than Phase I. Projects selected under Phase II will be funded to a maximum of \$\$\$\$ (TBD) for a period of up to 24 months, dependent upon quarterly reviews and annual assessment on performance information.

Phase III is the infusion of the Phase II results into regular NASA programs, learning environments, or into the commercial market. Phase III projects are funded based on the merits of the Phase II results without further need for competitive application. Private-sector investment, in various forms, will be a major vehicle for the Phase III funding process.

Proposal Review Criteria

Reviewers will review and rate each application using the following proposed criteria. The relative weights of each criterion are identified in parentheses.

- Project Purpose (20%)
 - Defining a specific need or problem
 - Proposing a credible solution that employs technologies
 - Identifying realistic, measurable outcomes that you expect to result from carrying out the project
 - Targeting underserved communities/audiences
- Innovation (20%)
 - Describe in detail aspects of project that are unusual or innovative
 - Place efforts in national context by comparing and contrasting project to other efforts or projects in field
- Diffusion Potential (20%)
 - Highlight elements of project that enable its replication
 - Discuss how prevalent the problems or needs you hope to address are common to other communities
 - Highlight the cost-effectiveness and simplicity of your approach versus other alternatives
 - Highlight those aspects of project that are improvements upon existing approaches
 - Plans for activity sharing information about your project (publications, journals, conferences)
- Project Feasibility (15%)
 - Technical approach, rationale for selecting this particular technology, and how the various components will be organized and work together
 - Applicant qualifications, evidence that the applicant team has the ability to deal effectively with both the technical complexity and the organizational challenges associated with managing the project
 - Present an implementation schedule that identifies major project tasks and milestones
 - Plans for protecting the privacy and confidentiality of the end users and beneficiaries of the project
 - Present a credible plan that includes a discussion of anticipated ongoing expenses and potential sources of non-federal funds to sustain the project (Phase II)
- Partnerships (15%)
 - Present clear discussion of who your partners will be, what their respective roles in the project will be; what benefits each expects to receive, and what specific contributions each partner will make to the project in the form of financial support, equipment, personnel, or other resources
- Evaluation (10%)

- Present a clearly defined plan to evaluate the degree to which project achieves project outcomes
- Discuss the basics of your overall research design and methodology
- Discuss means that will be used to validate and verify performance information

Selection Process

The selection process for Phase I and II will be similar. However, one cannot submit to Phase II without first submitting project to Phase I and completing the Phase I feasibility study.

The selection process will involve four stages. The **NASA Peer Review Services** will be utilized in conducting the external review process. The Services will be further utilized in supporting the facilitation and collection of analysis by NASA program staff and presenting document containing results and recommendations to the ET Program Officer. Further details of the process are provided, below:

- During the first stage, each eligible application will be reviewed by a panel of outside readers, who have demonstrated expertise in both the programmatic and technological aspects of the application. The review panels will evaluate applications according to the review criteria provided in the ET Solicitation and make non-binding written recommendations to the program.
- Upon completion of the external review process, NASA education and LT program staff may analyze applications as necessary. Program staff analysis will be based on the degree to which a proposed project meets the program's funding scope, the eligibility of costs and matching funds included in an application's budget (Phase II applicants); and the extent to which an application complements or duplicates projects previously funded or under consideration by other federal programs. The analysis of program staff will be provided to the NASA HQ ET Program Officer in writing.
- The ET Program Officer then prepares and presents a slate of recommended Phase I (II) projects to the Assistant Director of Education Programs for review and approval. The Program Officer's recommendations and the Assistant Director of Education Programs' review and approval will take into account the following selection factors:
 - a. the evaluations of the outside reviewers;
 - b. the analysis of program staff;
 - c. the degree to which the proposed projects meet the ET Program's priorities;
 - d. the variety of technologies and diversity of uses of the technologies employed;
 - e. the provision of access to and use of digital network technologies by rural communities and other underserved groups;
 - f. avoidance of redundancy and conflicts with the initiatives of other federal agencies; and
 - g. the availability of funds
- Upon approval by the Assistant Director, the Program Officer's recommendations will then be presented to the Selecting Official, the NASA Director for Education. The Director for Education selects the applications taking into consideration the Program Officer's recommendations and the degree to which the slate of applications, taken as a whole, satisfies the selection factors described above and the ET Program's stated purposes as set forth in the Solicitation.

Reporting Requirements

To ensure collection of systemic evaluation data on each project, successful applicants have a number of basic reporting requirements once they are awarded funds. At project outset, awardees provide via EDCATS detailed baseline information on the project objectives, goals, partners, and populations to be served. **Phase I** projects will be expected to submit a Project Performance Plan (as modified from GPRA APP) and **Phase II** projects will submit an Annual Performance Plan.

Each fiscal quarter, awardees provide financial reports and updates on project activities. This will be submitted electronically via EDCATS. A quarterly review of a project will be held via videoconferencing with LT Project Manager, ET Program Officer, and other personnel, as invited by Educational Technology Program Management.

At **Phase I** project completion, awardees will submit a project performance report. Phase I projects that wish to submit for Phase II funding need to make sure the report is complete, accurate, and demonstrates verification and validation of performance information to guide future decisions on project funding by decision-makers.

For each **Phase II** project, an annual performance report must be submitted and a final evaluation report must be completed by an independent evaluator or team of evaluators who are not in a direct reporting relationship with the applicant. Copies of final evaluation reports will be made available electronically to the public.

External Advisory Board

An external advisory board will be formed for the purpose of reviewing on a yearly basis the L-TIP to ensure that all investments are relevant.....

APPENDIX B: ETP STRATEGIC PLANNING AND INCUBATOR INITIATIVES

NASA Educational Technology Program

Strategic Planning and Incubator Initiatives FY '02

Executive Summary

This report highlights four key recommendations on how the NASA Educational Technology Program could offer the potential to dramatically transform current practices in ways that will benefit the NASA Education Program and the educational community.

Four recommendations:

1st Recommend that NASA Human Resources and Education Office assume a leadership role in transforming government through the enhanced use of information/educational technology. Specifically, the NASA Educational Technology Program will assume the lead and define a coordinated and aggressive research and incubator program which addresses long-term technology in education (and in learning environments) challenges. Further, the Educational Technology Program Officer would be empowered and provided with appropriate funds at a level annually justified within the authorization and appropriations process to enable multiyear, cross-agency, and intra-agency projects.

2nd Recommend establishment of new, results-oriented management system for the Educational Technology Program Category which links performance to funding and stresses accountability through new requirements to include Annual Project Performance Plans and Reports and Quarterly Project Reviews.

3rd Recommend establishing targeted one-year pilot projects and initiatives by the three core assets within the NASA Educational Technology Program – Learning Technologies, Classroom of the Future, and Spacelink -- to bridge the gap between research and operational systems and to encourage and promote technology in education integration across the NASA system and cross Federal Agencies. Pilot projects are intended to extend technology and transfer it into operational systems; and should be budgeted and executed to increase the use and utility of IT/ET for NASA Education Programs

4th Recommend that a Learning Technologies Innovative Project (L-TIP) be created to identify and fund mid- to high-risk, exploratory, and experimental IT/ET projects. To execute such a strategy, LT will need to establish partnerships among government, industry, and universities. It is recommended that a streamlined version of the NASA Small Business Innovative Research (SBIR) Program serve as a model for defining a clear framework for and management, operations, and evaluation of this project.

Introduction

As a national program, the NASA Educational Technology (ET) Program emphasizes research, innovation, learning, and diffusion of new ideas, practical knowledge, and technology-rich learning tools.

In fiscal year 2002, the NASA Educational Technology Program Category begins its transition towards more focus as an “incubator” program, whereby the emphasis on its resources and

projects will be on research, development, and evaluation of technologies to the prototyping stages with hand-off to known commercial or internal programs (e.g., Enterprises, NASA Classroom of the Future) for full development, deployment, and diffusion.

The following projects currently receive funding from the educational technology program area:

Learning Technologies (LT) <<http://learn.arc.nasa.gov>>

LT Leading Educators to Applications, Research, and NASA-related Educational Resources in Science (LEARNERS) <<http://learners.gsfc.nasa.gov>>

NASA Classroom of the Future (COTF) <<http://www.cotf.edu>>

NASA Spacelink (SL) <<http://spacelink.nasa.gov>>

NASA Aerospace Encounter/Astro-Venture <<http://astroventure.arc.nasa.gov>>

NASA CONNECT <<http://connect.larc.nasa.gov>>

The core assets of the program category are LT, COTF, and SL. The managers and deputies from these three projects, along with Flint Wild, curator of the NASA Education Home Page, comprise the Educational Technology Program (ETP) Management Team. This team meets monthly via telecon with the Educational Technology Program Officer. FY '01 was the first year that this team was active and the activity by the group was primarily of sharing what one another was doing and helping to promote one another's programs. In addition, in FY '01 the first NASA Educational Technology Program Training Conference was implemented, held in conjunction with the NASA Educator Resource Center Network and included civil servant and contractor participation from all educational technology project areas funded by the Program Category.

In conjunction with the eNASA Agency initiative (Dec. 2000 – June 2001), this ETP Management Team conducted a preliminary assessment of the three projects by examining current and proposed activities and then mapping these educational activities and services on a "Value Matrix" based on level of innovation, risk, and value to the NASA Education "business."

Several drivers for submitting this concept paper at this time with the purpose of proposing a new focus for the overall educational technology program category and its management structure. Among the top reasons is the "soon to begin" process for reviewing and updating the current NASA Implementation Plan for Education for the next five-year period. Added to this are the activities under eNASA, the external evaluation of the NASA Education Program, federal education reports, and OMB direction related to e-government and linking performance to budget. Careful reflection on all of these things has produced the following sections for consideration.

Section 1: Strategic Planning

Strategic Outcome: *Leading results-oriented organization with focus on strategic planning. The Educational Technology Program is results-driven, stressing accountability, continuous planning, and evaluation.*

As FY '01 draws to its final quarter, there are several new mechanisms being proposed in closing out the year and in preparing for FY '02. Three new management systems are presented and one benchmarking study.

The management systems are intended to raise the importance of accountability to higher level of consciousness and application by project managers and associated staff. The proposed systems include the introduction of Annual Project Performance Plans (APPP), Annual Project Performance Reports (APPR), and Quarterly Project Reviews (QPR).

There is no more important element in results-oriented management than an organization's strategic planning effort. The benchmarking study will be instrumental, and an important first step, in developing a NASA Educational Technology Strategic Plan. This study will be completed during the first quarter of FY '02 by the Educational Technology Program Management Team.

FY '01 Annual Performance Reports (report on progress)

Comparison of actual performance with the projected performance in annual performance plan

When performance is not met, report includes explanation for not achieving a goal(s) and describes steps for meeting goals in the future

IF performance goals for a particular (FY'01) program activity have not been expressed in an objective, quantifiable, and measurable form, than the alternative form shall be submitted:

Include separate descriptive statements of –

(A) (i) a minimally effective program, and

(ii) a successful program, or

(B) with sufficient precision and in such terms that would allow for an accurate, independent determination of whether the program activity's performance meets the criteria of the description

FY '02 Annual Performance Planning (establishes connections between those long-term strategic goals and the day-to-day activities)

To systematically provide decision-makers with information on the results to be achieved for a proposed level of resources. Plans should clearly inform reader of annual performance goals, the measures that will be used to gauge performance, the strategies and resources required to meet the performance goals, and the procedures that will be used to verify and validate performance/measured values.

Establish performance indicators to be used in measuring or assessing the relevant outputs, service levels and outcomes of each program activity

Provide a basis for comparing actual program results with the established performance goals

Quantifiable information that addresses whether or not program activities are achieving the desired annual goals, which in turn produce the desired outcomes for the people or communities served by the program; often short-term and intermediate outcomes

Concise statements of: 1) what will be accomplished (specificity), 2) how much will be completed (deadline), and 3) by whom (responsibility)

Development of annual performance goals aids decision-making and accountability; also forms the basis of a rational budget request; performance goals and measures must be linked to program activities in budget requests.

Annual performance goals should define an objective, quantifiable, and measurable target level of performance for each program activity

Environmental Assessment (Leads: Educational Technology Program Management Team). The study is to be undertaken and completed by December 2001. The effort is the starting point and foundation for defining what the Educational Technology Program Category. Three practices are critical for successful strategic planning: 1) involve the stakeholders, 2) assess internal and external environments, and 3) align activities, core processes, and resources to support Agency and Education Program related outcomes.

The assessment will look at the internal and external environment. the current state, activity, emphasis and interest by federal agencies, business and industry, universities with technology in education. The following areas will be studied by the following management team members:

Technologies (LT). Survey industry leaders in innovative technologies currently under research. Leaders to include IBM, Microsoft, Sun, 3Com, Cisco, Pioneer, and Sony.

Federal Agencies/Labs (COTF). Survey federal agencies that have an arm related to educational technology or technology opportunity programs. Agencies to include US Dept. of Education, US Dept. of Commerce, National Science Foundation, National Institute of Health, and NASA Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs. Developing a list of cross-agency initiatives that could have a large impact on e-government.

Technology Diffusion (Spacelink). Survey leading commercial and government-funded Web sites that target educators, students, and kids. Assess electronic services they offer, how they promote, met-tag, organize, customize, bring users back to sites. Sites would include those educational (e.g., FirstGov for Kids, Disney online, CartoonNetwork.com, Nickcom, NickJr.com, Yahoo!igans.com, FoxKids.com, PBSKids.org, gURL.com, Kbkids.com, and KidsDomain.com, ePALS.com) plus media sources with an educational aspect (radio online channels, CNNfyi/Turner Learning). Examine NASA policy for linking to external non-government sites (regulatory and compliancy issues, etc.)

Internal Assessment (All). The internal assessment is to become an ongoing evaluative tool for analyzing what the Educational Technology Program and its core assets have accomplished in the past and where it needs to head in the future. It should be used in annual review of the educational technology projects, the Educational Technology Program and of the NASA Implementation Plan for Education.

Each manager will focus on four key areas in looking at themselves, their internal resources, processes and performance. The assessment will examine: strengths, weaknesses, opportunities and threats (or SWOT). The following types of questions will be addressed:

How successful are internal processes, products, and services in meeting the needs of the target population and other Agency customers? In what ways has the agency grown, remained the same or changed internally, and why? What are its internal accomplishments? What has failed to be accomplished internally and why?

What is the public's perception of the quality of products and services? What is being done poorly? How do products and services and internal processes compare to evaluation criteria? Do programs and activities support one another, or is there conflict or duplication among them?

What programs or activities are expected to grow or decline, and how does the Education Program (and NASA Implementation Plan for Education) plan to accommodate those changes? What are the program's current and anticipated resource needs? What strengths, weaknesses, opportunities, or threats (SWOT) characterize internal operations?

External Assessment (Co-Leads: HQ/Flint Wild and Peggy Steffen, Support: All). The following questions should be addressed:

What are our target populations and what changes, if any, are anticipated within the strategic planning period? What is the level of demand and public need for our electronic products or services? What are the most significant indicators of customer demand and public need? What trends have been identified with respect to these issues?

What major issues, conditions, or problems in the external environment are relevant to the delivery of our Program's goods and services? What conditions could affect or alter key elements of the environment? What implications do specific environmental changes hold for the Program, such as changes in federal law/regulations? What relationships exist between our Program and other similar programs with related target populations? What opportunities may exist for improving coordination or eliminating duplication between other agency programs?

What SWOT characterizes our external relationships? What opportunities are available that have not been previously explored? How can we mitigate known threats?

What progress has been made by the NASA Education Program toward achievement of desired educational technology program outcomes and objectives in the current NASA Implementation Plan for Education? How reliable are annual performance projections for the next strategic planning period?

Strategic Issues (All). Strategic issue identification helps the NASA Education Program and Educational Technology Program Category identify what it must excel at in light of its mandates, vision and mission; and places that information in the context of the environmental analysis. Based upon the input from the above categories of assessment, the question to be answered is: "What are the most significant challenges and opportunities facing the NASA Educational Technology Program Category?"

Project Reviews. The release of program funds to the three core projects will be directly tied to review of performance on a quarterly basis. The proposed approach to releasing funds to Center/Project Offices mirrors that used by NASA Enterprises. Contingent upon release of

NASA appropriates at the beginning of each fiscal year, the following review and fund release will be as follows:

1st Quarter. Annual Performance Plan Review. Fund release up to 50% of allocated budget for project.

2nd Quarter. Progress evaluation. Fund release up to additional 30% of allocated budget for project for fiscal year.

3rd Quarter. Progress evaluation. Final 20% of funds released.

4th Quarter. Preparation of Annual Performance Report with participation of entire Educational Technology Program Management Team in Quarterly Review Proceedings.

Workforce Development. The Program is only as good as its people. Recruitment, in-house training, and internal/external development opportunities.

Training Areas. Four key categories for development of competency and educational technology standards will be sought by all personnel within the area of educational technology. The four areas and performance indicators are listed below.

Technology Operation and Concepts

Demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies

Planning and Designing Learning Environments and Experiences

Design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners

Apply current research on teaching and learning with technology when planning learning environment and experiences

Identify and locate online NASA educational resources and evaluate for accuracy and suitability

Plan for the management of technology resources within the context of learning activities

Teaching, Learning, and the Curriculum

Facilitate technology-enhanced experiences that address content standards and student technology standards

Use technology to support learner-centered strategies that address the diverse needs of students/teachers

Assessment and Evaluation

Use technology resources to collect and analyze data, interpret results, and communicate findings to improve NASA electronic learning environments, experiences, and products

Apply multiple methods of evaluation to determine appropriate application and delivery of technology resources for learning and communication

Section 2: FY '02 ETP Management Incubator Initiatives

Proposed Incubator Initiatives to be lead by specific project managers for fiscal year 2002 include:

Immersive Technology Pillars Survey (**Lead: LT/Mark Leon**, Support: HQ/Peggy Steffen and Flint Wild, GSFC/Bob Gabrys). A sample of researchers from the Earth Science (e.g., HPCC/Omar Spaulding), Space Science, and Biological and Physical Research Enterprises will be presented with the list of sample Pillar technologies. Ask researchers that if these technologies were available to them, what would they do with the technologies. Use responses to identify possible learning projects that would utilize the proposed technologies as a mechanism for further research as to their feasibility in learning environment. Potential use of information for communicating research & development areas for future proposal funding under LT "Next Generation" (FY '03).

eNASA Public Channel: Wireless Networking Technology Feasibility Study (**Lead: COTF/Nitin Naik**, Support: LT/Alan Federman and HQ/Flint Wild)

Potential to deliver just-in-time information over Internet-enabled handheld devices (2-way pagers, cell phones, Personal Digital Assistants, or PDA)

Explore potential partners in research/application for education and training (e.g., Latitude360, division of RWD Technologies in Merritt Island, FL [David Metcalf]; 3Com, manufacturer of networking products, 3Com University [Geoff Roberts], Cisco)

Worldwide demand for Internet-enabled handheld devices (2-way pagers, cell phones, Personal Digital Assistants, or PDA)

Wireless devices expected to replace the PC as preferred vehicle for accessing the Internet

NASA TV Education Channel Study (**Lead: COTF/Stanley Jones**; Support: Spacelink/Jeff Ehmen;, LaRC OEd/Thom Pinelli, MSFC/Rodney Grubbs and HQ/Ray Castillo, NASA Television)

A NASA TV Education File survey will be written by COTF and announced through Spacelink EXPRESS listserv in September 2001. Currently, there are approximately 4,500 educators registered on this listserv. In addition, the online Monthly Education File Schedule will provide a link to the survey so that others who might not be on the EXPRESS listserv, but who visit the file schedule site might also have the opportunity to provide us with feedback. This will be the first step in assessing how the existing NASA TV Education File is being utilized by schools and educators. Questions will also be included soliciting suggestions on how to improve the system and what they would like to see IF a NASA TV Education Channel were possible.

NASA Education Home Page Refreshed (**Lead: HQ/Flint Wild**; Support: Spacelink/Sandy)

NASA Education Portals (**Lead: Spacelink/Jeff Ehmen**; Support: HQ/Flint Wild)

Establishment of the following three sites as core NASA Education Program Portals – NASA Education Home Page, Spacelink, and CORE. These sites will be maintained by MSFC/CSC, with the result being to provide centralized services and a richer, integrated, seamless gateway to NASA Education services. The goal is to define an eBusiness Plan that will synchronize this

multichannel system and provide users with full and easy access to NASA Education regardless of their physical location, level of computer literacy or physical abilities; offer the means of personalizing interactions between customers and NASA; and install an intelligent system that guides user by providing a “one-stop shopping experience” for locating requested information. The US Government interagency Kids’Portal, “Firstgov for Kids” (www.kids.gov) will be included in this plan to ensure that the best NASA kids’ sites are listed on this Firstgov portal.

Education Web Sites “Good Housekeeping Seal”. (Lead: Spacelink; Support: HQ/Flint Wild and Peggy Steffen, sciLINKS/Troy Cline, GSFC)

Additional Information

Vision (program’s sense of future direction, its dream for an ideal state; meaningful enough to instigate and inspire action and achievement; all actions of organization should be directed toward this vision)

Mission (concise statement that conveys what a program does, how it does it, why, and for whom; supports Agency’s and Education’s mission statements)

Strategic Goal (general ends toward which a program directs its efforts, based on the issues that have been identified as priorities; broad statement of accomplishment focused on the long-term programmatic, policy, and management of goals of the program)

Strategic Objectives (measurable targets that describe the end result that service or program is expected to accomplish in a given time period; linked directly to strategic goals; predominately *outcome* oriented, consist of an outcome indicator and a numerical target)

Program (set of related activities and outputs directed at common or closely related purposes that a meaningful portion of the Agency’s resources is dedicated to achieve; in order to measure a program’s outcome, it must have a distinct, clearly defined mission, and a clearly defined target population or customer base)

Program Evaluation (assessment through objective measurement and systematic analysis)

Outcome (intended result, effect or consequence of carrying out a program or activity; important to analyze where program outcomes are targeted)

Output (product of a program’s activities; units of work or services delivered that meet predefined characteristics or attributes)

Strategic Planning Cycle

Prepare to Plan

Mission & Mandates

Environmental Analysis

Strategic Goals

Strategic Objectives

StrategiesAnnual Planning Cycle.....Link to
Evaluation and Results.....return to Number 1

Annual Performance Planning Cycle

...Link from Strategic Planning Cycle to Strategic Plan

Annual Performance Goals

Short-term strategies

Resource Requirements

Prioritize Strategies

Annual Budget Request

Align Annual Goals with Approved Budget