

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PART ASSESSMENTS¹

¹ For each program that has been assessed using the PART, this document contains details of the most recent assessment. These details are presented in their original form; some programs have revised performance targets and developed or replaced performance measures since the original assessment. The PART summaries published with the 2006 Budget (in February 2005) provide current information on follow-up to recommendations and other updates.

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PART Performance Measurements

Program: Aeronautics Technology
Agency: National Aeronautics and Space Administration
Bureau: Aeronautics Research Mission Directorate
Type(s): Research and Development Competitive Grant

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	73%	67%	Effective

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight: 20%

Explanation: The Aeronautics Theme has recently completed a reformulation of its programs / projects to align each project with a specific strategic objective / long term measure. In addition, crosscutting teams, reporting to the Theme Director, have been formed to manage the technology disciplines that occur in each of the AT programs. This will enable efficient management by elimination of duplicative efforts and identification of technology gaps.

Evidence: The AT Theme has recently undergone several major reviews. By Aeronautics Theme policy, each program must respond to all findings and recommendations and correct any problems discovered in either a quality, programmatic, or relevance review. For example, the theme is currently in the process of responding to each finding, recommendation, and comment from the recent NRC Review of NASA's Aerospace Technology Enterprise: An Assessment of NASA's Aeronautics Technology Programs. Other documentation include the NRC letter report on the Vehicle Systems Program replanning efforts, the status reports contained in the ERASMUS database and Program Management Accomplishment System (PMAS), and the reports of the Independent Program Assessment Office / Systems Management Office and ATAC. ERASMUS contains the current cost, schedule, performance, and risk management & assessment data. PMAS contains a historical description of the Theme's activities, accomplishments, and test programs.

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight: 20%

Explanation: The AT Theme is structured to ultimately benefit the public by increasing the safety and security and reducing the environmental impact of aviation operations, increasing the capacity and efficiency of the NAS, and contributing to the security of the Nation. The Theme plans and coordinates efforts with its partners and customers in order to meet these purposes.

Evidence: The specific foci of the AT Theme are listed as objectives in the NASA Strategic Plan, IBPD, and the individual project plans. Road mapping toward the accomplishment of the Agency Strategic Goals are being updated to reflect the current status of the R&T activities and the results of the system analyses addressing both technical and implementation risks. Joint roadmaps have been developed with our partners in the FAA and are being worked with the Transportation Security Administration and Department of Homeland Security.

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 10%

Explanation: Outcome-based performance measures are difficult, if not impossible, to construct as NASA's responsibility lies in developing and transferring technologies to users who can then incorporate these (e.g., into aircraft, airports) to 1) create a safer, more secure, more environmentally friendly, and more efficient air transportation system; 2) increase performance of military aircraft; and 3) develop new uses for science or commercial missions. Thus, output measures are often used as a proxy.

Evidence: The long-range performance goals and associated outputs are documented in the IBPD, Agency and Mission Directorate Strategic Plans, and Measures Tab.

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2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight:10%

Explanation: Over the past year, the Theme has initiated the Pathfinder effort, a toolkit that explicitly links strategic objectives, strategies to achieve these objectives, and capabilities needed to implement the strategies, and compares these to capabilities that result from program and project outcomes. Pathfinder recognizes that the performance of the air transportation system results from complex interactions among its many elements (vehicles, airports, air traffic management, operators, the military, etc.). For that reason, many relationships are portrayed as many-to-many, rather than hierarchically. Pathfinder also integrates project-level roadmaps with the strategies and objectives.

Evidence: Technical milestones , which are tied to long-range performance objectives, for assessing progress over the next five years are in the IBPD. Timeframes and targets are also in the strategic Plans, roadmaps, program and project plans.

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight:10%

Explanation: For each long-term goal, the program has identified a set of annual performance measures. Again, outcome-based performance measures are difficult to construct as NASA's responsibility lies in developing and transferring technology to users who can then incorporate these into their systems.

Evidence: Based on Pathfinder and roadmapping efforts, longer term and annual goals are defined in greater specificity and timeframes in the Aeronautics program and project technology roadmaps, Integrated Budget and Performance Document, the individual Program Plans and Project Plans, and interagency technology roadmaps.

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight:10%

Explanation: Each annual goal is defined in terms of either a quantifiable output (traceable to the long term goal) or in terms of the metric established for the long-term goal. Goals are identified through the system analysis process cited above.

Evidence: Aeronautics technology roadmaps, IBPD, Strategic Plans, program and project plans

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: YES Question Weight:10%

Explanation: As part of the planning process for Theme's programs and projects, workshops are held to present the proposed research portfolios and obtain comments and recommendations from the overall aviation community. These are incorporated into the program / project plans thereby resulting in a research portfolio that has wide agreement in the total community.

Evidence: Program goals are included in all solicitations and contracts. Progress in meeting goals is determined by contractor/grantee reports that include either a discussion on meeting goals or systems analysis based on their technical accomplishments. Deliverables are evaluated for progress toward achieving program objectives. Failure to achieve or make progress on these tasks will result in a decision review on the continuation of the effort. Partner performance status and/or accomplishments are reported via Technical Interchange Meetings, conferences, monthly reviews, or formal meetings. Where appropriate, earned value / incentive based contracts are used. For example, ASP and its projects utilize Earned Value Management (EVM) to measure and achieve program execution effectively. EVM techniques are then employed to track monthly cost and schedule variances. In addition, program and project roadmaps contain preplanned decision gates that will require a formal review prior to proceeding with the research.

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2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight:10%

Explanation: Every three years, the NRC conducts a review of the AT Theme to assess the quality of the research. The Independent Program Assessment Office (IPAO), the NASA Aerospace Technology Advisory Committee (ATAC), and program/project reviews address the issues of relevance and performance.

Evidence: At the request of the AT Theme, the NRC convened a panel of 40 experts to assess the direction of research and suggest promising avenues for future research. This resulted in the NRC Report - Review of NASA's Aerospace Technology Enterprise: An Assessment of NASA's Aeronautics Technology Programs. The IPAO conducts periodic Independent Implementation Reviews on programs to evaluate implementation performance. Findings are briefed to the Enterprise and Agency Program Management Council. The IPAO also conducts Non-Advocate Reviews (NAR) of all new projects to assess the adequacy of the formulation planning, scheduling, documentation and budget prior to the project proceeding into implementation. Two NARs were held over the past year and each panel consisted of 10 subject matter experts that had no relationship to either the project or its parent program. The ATAC advises the NASA Administrator through the NASA Advisory Council on Agency programs, policies, plans, and other matters pertinent to the Agency's responsibilities for Aerospace technology. In addition, the programs and projects hold periodic reviews to report progress and ascertain continuing relevance to customer needs. These reviews are open to the public and normally have several hundred participants from government, industry, academia, and the general public in attendance.

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: YES Question Weight:10%

Explanation: The full cost budget requirements and performance targets are integrated as part of the Agency Integrated Budget and Performance Document for each program in the Theme.

Evidence: The IBPD and program/project plans document the linkage between performance goals and the annual budget request.

2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight:10%

Explanation: The AT Theme has taken steps to identify and correct deficiencies in its strategic planning process, particularly in regards to the Vehicle Systems Program and Airspace Systems Program.

Evidence: Over the past year, the theme has been able to maximize its programs' ability to achieve their goals and objectives and eliminate the perceived problem areas. One example of this was with the significant and detailed reprogramming of VSP, through the use of a Risk Management Plan, assessments and road mapping. Schedule, cost, and technical performance are tracked and reported to the Program Manager on a monthly basis and also reviewed by the Theme Director. This effort is being strengthened through the use of Pathfinder. Program and Project level descope strategies are maintained and used to respond to externally and internally driven changes. Additional efforts are being made to improve the technology transfer mechanisms with the user community.

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2.RD1 If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals? Answer: YES Question Weight:10%

Explanation: The AT Theme evaluates a wide range of alternative technologies, comparing them to other government and industry efforts with similar goals. One way this is done is through system studies, which are used to determine the potential benefits, costs, and acceptability of competing technologies. These studies are used during formulation to develop a portfolio of technologies that are to be researched and as key data sources at decision gates / downselect reviews.

Evidence: The Theme has set up crosscutting teams to assess and coordinate technology disciplines (e.g., weather) spanning the three programs. Integrated product teams have been established with the FAA, DoD, and more recently DHS to accomplish a similar coordination among the various governmental agencies. The Commercial Aviation Safety Team is a combination of industry and associations that was formed to coordinate the safety activities of the member organizations. One example of coordination of alternative approaches is in noise abatement. Noise can either be reduced at the source or the local jurisdictions can soundproof, air condition local homes, or restrict operations to reduce local community impact. The amount spent on local noise abatement far exceeds the research and implementation costs. However, due to the time required to develop technology, both approaches are being pursued. The NASA objective for the noise reduction program is to restrict aviation noise to within any airport boundary, thereby eliminating the costs of soundproofing and maintenance.

2.RD2 Does the program use a prioritization process to guide budget requests and funding decisions? Answer: YES Question Weight:10%

Explanation: The Enterprise has established its six top priorities and these priorities are further refined as they are applied at the Theme, Program, and project levels. These priorities have been vetted through workshops, advisory committees, and the Enterprise Executive Board. There are also guidelines used to make the final determination in descope decisions. Each level of the Theme maintains a formal descope plan based on its priorities.

Evidence: The Vehicle Systems Program and the Aviation Security project have recently completed a replanning effort of their research portfolio using a rigorous priority system, in which results were presented at a public workshop. These priorities are being used by the Program to make resource and programmatic decisions in the development of the POP 06 budget request. The Aviation Safety and Security and Airspace Systems Programs also have a prioritized list of requirements they are using to plan various projects, which are also part of the POP 06 budget request. Public workshops have been held to get comments from our customers and partners on the planning activities and results.

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3.1 Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance? Answer: YES Question Weight: 9%

Explanation: Performance data (e.g., current schedule, technical performance, resources, and risk management) are collected on a weekly and monthly level using NASA's Erasmus database and then reported out to the programs and the theme. The data is shared with key program partners via a multitude of forums including: joint informational meetings; program/ project management customer site visits; workshops and sponsored conferences; clauses written into grants and contracts.

Evidence: Using Erasmus, the Theme Director conducts a monthly review of each program and briefs the NASA Program Management Council on the Theme's performance on a quarterly basis. Each program manager provides a quarterly program status briefing to the Enterprise Program Management Council on the status of the program including current accomplishments, status against schedule and projections for the next six months. If the performer is not making progress or there is a milestone decision gate, a formal review is held prior to allowing an activity to proceed. In the case of incentive contracts, a separate review is conducted to determine the award fee based on the progress against the stated goals.

3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: YES Question Weight: 9%

Explanation: The Theme Director and the individual Program / Project Managers have as part of their performance plan elements that include establishing clear measurable program objectives and outcomes linked to the Agency Strategic Plan and meeting their objectives. Center Directors are similarly held accountable. Contractors and grantees are also held accountable for their performance. The actions that are taken for less than adequate performance are based on the contractual vehicle used for the effort.

Evidence: For incentive contracts, the award fee is tied to performance. For other contracts and grants, the effort will not be continued and/or renewed if adequate progress is not being made against the stated goals and schedule.

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 9%

Explanation: At the beginning of each year spending plans are compiled at the various NASA Centers for costing and obligating the funds necessary to conduct the aeronautics programs. These plans are updated mid-year to reflect any discrepancies driven by external factors (e.g., continuing resolutions, budget cuts, policy changes).

Evidence: Progress towards these spending plans is tracked on a monthly basis. Obligation rates for the Theme have consistently been in the high 90's%. In FY 2003, the rate was 89%, a result of the problems with the conversion to the integrated financial management program (IFMP) and how the service pool charges are handled in the system.

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3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: NO Question Weight: 9%

Explanation: Although the AT Theme has management procedures in place to ensure the efficient use of dollars spent on program execution, it has not tracked any overall efficiency metrics.

Evidence: The AT Theme has developed a new annual efficiency measure this year.

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 9%

Explanation: The Aeronautics Theme has extensive coordination with other Government Agencies, Academia, Industry, the Aviation Community (e.g. airlines, CAST, airports, unions, general aircraft owners, pilots), and the public. This coordination has resulted in general agreement that NASA will concentrate its activities on the long range, high-risk technology developments and transfer its validated technology to the appropriate customer for maturation, certification, and inclusion in a product.

Evidence: The AT Theme and the FAA have a long history of close collaboration and have developed joint technology roadmaps to guide the development of safety and Air Traffic Management technologies. A similar roadmapping effort is underway with the Department of Homeland Security in regards to aviation safety and security. The AT Theme is an active member of the Joint Planning and Development Office (JPDO). This is a multi-agency organization, under management of the FAA, charged with the development of a national plan to transform the National Airspace System. The Aeronautics Enterprise provides the Deputy Director and over half of the workforce for the JPDO.

3.6 Does the program use strong financial management practices? Answer: NO Question Weight: 9%

Explanation: The AT Theme utilizes the NASA IFMP system and is reliant on it to provide accurate and timely information. Although none of the Aeronautics programs received a material control weakness finding during the latest annual audit, the Theme relies on the IFMP system for its financial records. The most recent Independent Auditor report identified four material weaknesses (two of which are repeats) as well as noncompliance with the Federal Financial Management Improvement Act.

Evidence: NASA's FY 2003 Performance and Accountability Report includes the communication from the NASA Inspector General and the report of the Independent Auditor. In addition, the GAO has published numerous reports identifying shortcomings in NASA's new financial management systems as well as its financial management processes (most recent is GAO-04-754T released on May 19, 2004).

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3.7 Has the program taken meaningful steps to address its management deficiencies? Answer: YES Question Weight: 9%

Explanation: Each program is subject to an independent review conducted through the Independent Program Assessment Office (IPAO) to assess the programmatic aspects of the program. The results of these reviews are subsequently briefed to the Enterprise and Agency Management Council. Every finding in the report is tracked through the Theme until it is closed out. The NRC also completed an assessment of the AT programs. Every finding, recommendation and comment in the report has been cataloged, actions assigned, and the responses and action plans are being tracked.

Evidence: The AT Theme is preparing a formal response to the NRC documenting the actions that the Theme has taken (draft at <http://www.aerospace.nasa.gov>). Many of the NRC recommendations have been already addressed including the following: establishment a Council of Deans to provide better coordination with the academic community, completion of the replanning of the Vehicle Systems Program, completion of the Tropospheric Airborne Meteorological Data Reporting comparison with results obtained with NASA's icing research aircraft, and the establishment of a research activity to address items relevant to rotorcraft. In order to better manage risk, the theme is implementing a risk management system at all levels of a project. Specific activities include: a. Completion of an initial assessment of the adequacy of sub-project plans and mitigation strategies; b. Prioritization of risks across the sub-projects; c. Begin monthly tracking, management and reporting via ERASMUS upon project implementation

3.CO1 Are grants awarded based on a clear competitive process that includes a qualified assessment of merit? Answer: YES Question Weight: 9%

Explanation: Over 95% of funding for grants is awarded through a competitive process to ensure that only the highest quality proposals are considered for funding.

Evidence: The mechanisms used are the NASA Research Announcements, Requests for Proposals, and JSRAs. In each case, the evaluation process includes a technical evaluation by highly qualified peers from both inside and outside of NASA. The NASA solicitation announcements are available at <http://prod.nais.nasa.gov/cgi-bin/eps/bizops.cgi?gr=D&pin=>

3.CO2 Does the program have oversight practices that provide sufficient knowledge of grantee activities? Answer: YES Question Weight: 9%

Explanation: The AT Theme provides significant oversight to ensure knowledge of activities.

Evidence: Grantees are partnered with a NASA researcher who provides the oversight and ensures that the work will be successfully infused into NASA applications. NASA researchers conduct annual status reviews and periodic site visits of grantee activities. The performance of each grantee is periodically briefed to the Project Manager, Program Manager, and Theme Director. Continued funding of multi-year activities is contingent upon performance.

3.CO3 Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner? Answer: YES Question Weight: 9%

Explanation: Formal progress reports, which are a required for each R&T task, are submitted on a periodic basis, with results made available to the public through various means.

Evidence: The results of grants-based research are broadly disseminated to the public through the use of workshops and technical interchange meetings. The major accomplishments are included in the annual NASA Performance and Accountability Report, the annual Aeronautics and Space Report of the President and the annual Theme Performance Reports (http://aerospace.nasa.gov/aboutus/ar_02.pdf).

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3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality? Answer: NO Question Weight: 9%

Explanation: The theme's intramural programs do allocate some of their funds through a competitive awards process, About 9% of the theme's funding is earmarked. The theme also plans on increasing the use of peer review.

Evidence: In the initial stages of the program formulation, the AT Theme uses a variety of means including NRAs and workshops to obtain the information necessary to create the highest and quality and most relevant portfolio of research tasks. Prior to the award of any grant or contract, a technical, cost, and programmatic evaluation of the proposal is conducted by subject matter experts from both inside and outside NASA. This provides a quality check prior to award. During implementation, the progress of these activities against the established goals and schedules. A formal decision review is held at any of the pre-established decision gates or if the activity is not meeting its performance and schedule metrics before it is allowed to continue. This ensures that the quality of research is maintained and that unproductive lines of investigation are terminated.

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: YES Question Weight20%

Explanation: The theme is currently on track toward the accomplishment of its FY 2008 strategic objectives.

Evidence: Annual Agency performance reports, system studies, Program assessments

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: LARGE EXTENT Question Weight20%

Explanation: As cited in the annual performance reports, the theme has accomplished 17 of its 19 annual performance goals. The significant items that have not been met as planned were accomplished within the following year. Many of the schedule adjustments were the result of factors outside of the theme's control e.g., safety stand down of NASA's 757 test aircraft.

Evidence: The 2003 Performance and Accountability report identifies progress on annual goals.

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: SMALL EXTENT Question Weight20%

Explanation: The Theme is taking action to increase the efficiency and effectiveness of achieving program goals in terms of personnel and procurement although currently it does not have efficiency measures in place.

Evidence: A detailed assessment of the direct Civil Service manpower required to execute each project was conducted. As a result, the theme is proposing a significant reduction of direct civil service personnel over the 06 timeframe to enable additional funding to be applied to the out-of-house research activities. In another example, the VSP has established a competitively awarded series of Indefinite Delivery - Indefinite Quantity contracts for eight discipline areas. More than one contractor may have been qualified in each of the discipline areas. This allows proposed tasks to be competed between those companies that were awarded contracts in the same discipline area as the task. After peer / technical review, the winning effort can be applied to the appropriate contract. This instrument saves time on individual procurement efforts and overall enabled VSP to be much more efficient in its contracting while maintaining the quality of the research. A similar effort is being instituted for the Communication, Navigation and Surveillance work in AvSSP and ASP.

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4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals?

Answer: LARGE Question Weight 20%
EXTENT

Explanation: Studies and reviews of NASA Aeronautics have made comparisons to other programs with similar purposes and goals (e.g., FAA) and have highlighted areas of NASA's aeronautic research that are outstanding or world-class.

Evidence: The National Science and Technology Council's 1999 report, National Research and Development Plan for Aviation Safety, Security, Efficiency, and Environmental Compatibility cites the role of NASA vis-à-vis other organizations like FAA as doing the long-term technologies necessary for major aviation improvements. Two NRC reports, 'Review of NASA's Aerospace Technology Enterprise: An Assessment of NASA's Aeronautics Technology Programs' and 'Securing the Future of Air Transportation: A System in Peril' highlight NASA's unique role and program performance in comparison to other similar programs.

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results?

Answer: LARGE Question Weight 20%
EXTENT

Explanation: The AT programs are evaluated by the NRC every three years, and by the ATAC every six months and reported to the NASA Advisory Committee at least yearly. The NRC reviewed each program within the Theme over the past year. All reviews concluded that the Theme and its programs are effective and achieving excellent and in some cases world-class results.

Evidence: The NRC's report, Review of NASA's Aerospace Technology Enterprise, assessed the scientific and technical quality of the Aeronautics Technology Theme. The ATAC conducted a review to assess the relevance and content of the AT Theme. The minutes of the ATAC meetings are available at <http://www.hq.nasa.gov/office/aero/aboutus/advisors/atac/ats/index.htm>. The IPAO / Systems Management Office has conducted IIR's to assess the programmatic performance of the AT Theme. The NRC review indicated that AT programs were effective and made recommendations for further improvement. These recommendations are being implemented, and status will be reported back to the review panels.

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Measure: Percent reduction of NOx emissions (from 1996 ICAO standard for takeoff and landing) through the development of low NOx combustors for aircraft.
Additional Information: Baseline is the 1996 International Civil Aviation Organization (ICAO) standard for Landing/Takeoff NOx emission.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2001	50	50	
2008	70		
2013	80		

Measure: Maturation of the technologies that is consistent with a 35% reduction in vulnerabilities to the National Airspace System, completed in three stages.
Additional Information: The stages of the maturation process include proof of concept (2006), validation in a laboratory environment (2007) and demonstration in a relevant environment (2009).

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2006	1: Success		
2007	2: Success		
2009	3: Success		

Measure: Demonstrations of Uninhabited Aerial Vehicle (UAV) system performance (in terms of duration altitude, and payload) through the use of five UAVs of varying capabilities.
Additional Information: The five demonstrations are routine operations (equivalent to manned aircraft) above 18,000 feet in 2008, Storm Tracker (14 day endurance at 60K feet loiter altitude, 200kg payload) in 2009, Global Observer (60K feet, 100 day endurance, 150kg payload) in 2014, Global Ranger (75K feet, 2 day endurance, 1000kg payload) in 2016, and Heavy Lifter (60K feet, 30 day endurance, 3000kg payload) in 2019. This can lead to use in earth science and space missions.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2008	1: Success		
2009	2: Success		
2014	3: Success		

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2016 4: Success

2019 5: Success

Measure: Increase in the capacity of the National Airspace System through the development of technology. For example, 3X indicates the tripling of the capacity.
Additional Information: Baseline is the 1997 NAS utilization

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	1.9X	1.8X	
2009	2.05X		
2016	2.5X		
2025	3X		

Measure: As agreed upon by both NASA and the Federal Aviation Administration (FAA), number of validated Air Traffic Management Decision Support Tools developed for terminal area and en route throughput for transfer to the FAA.
Additional Information: Development and validation of decision support tools that could enable air traffic controllers to safely increase the capacity and efficiency of the National Airspace System.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2002	3	3	
2004	5	3	
2005	1		
2007	2		
2009	6		

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Measure: NASA Advisory Council rating of success in transferring aeronautics technologies.

Additional Information: Standards for success are still under development

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2006	Successful		

Measure: Percentage of research funding subject to external peer review prior to award. [New measure still under development]

Additional Information: Standards for success are still under development

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual

Measure: Validation of combustor technology that is consistent with 70% NOx emission reduction, through a series of four increasingly complex tests, culminating in a full engine test.

Additional Information: The first test is a stand alone flame tube (2003). Next, several flame tubes are integrated into a combustor sector (2004). After passing this test, several sectors are integrated into an annular configuration (2006), and finally the complete combustor is tested in an actual aircraft engine (2008).

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2003	1: Success	Success	
2004	2: Success	Success	
2006	3: Success		
2008	4: Success		

Measure: Percent reduction in CO2 emissions (based on CO2 emissions from 1997 subsonic aircraft) through the development of a suite of technologies for aircraft engines and airframes.

Additional Information: 1997 subsonic aircraft are the current state-of-the-art (SOA) in the fleet

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2010	25		

PART Performance Measurements

Program: Aeronautics Technology
Agency: National Aeronautics and Space Administration
Bureau: Aeronautics Research Mission Directorate
Type(s): Research and Development Competitive Grant

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	73%	67%	Effective

2014 35

Measure: Validation of technologies that are consistent with improved aerodynamic or engine performance resulting in reduced fuel burn/ CO2 emissions through a series of four tests and demonstrations.

Additional Information: Consists of the delivery at the target year, that if fully implemented would enable the target metric to be met. These Include: High-Speed Slotted Wing (2005); Turbulent Boundary Layer Control and highly loaded turbomachinery Demos (2008); full-scale panel structural validation on a Blended Wing Body configuration (2010); and an integrated technical assessment (2010).

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	1: Success		
2008	2: Success		
2010	3: Success		
2010	4: Success		

Measure: Decibel reduction in aircraft noise (from level of 1997 subsonic aircraft) through the development of a suite of technologies.

Additional Information: 1997 subsonic aircraft are the current state-of-the-art in the fleet. Metric is directly measured against FAA noise certification standards.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2002	5	5	
2009	10		
2022	20		

Measure: Validation of component technologies that is consistent with a 10-decibel noise reduction, through a series of three increasingly complex tests, culminating in an integrated technology assessment.

Additional Information: Each of the individual components will be first validated in a lab environment (2006), followed by a full scale test (2008), and final results will be determined by an integrated technology assessment (2009).

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2006	1: Success		

PART Performance Measurements

Program: Aeronautics Technology
Agency: National Aeronautics and Space Administration
Bureau: Aeronautics Research Mission Directorate
Type(s): Research and Development Competitive Grant

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	73%	67%	Effective

2008 2: Success

2009 3: Success

Measure: Percent reduction of the aviation fatal accident rate through the development of a suite of technologies (baseline is the average of accident statistics for US Civil Aviation for the period 1991 - 1996).

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2005	50		
2010	70		
2018	80		
2025	90		

Measure: Validation of component technologies that is consistent with reducing the aviation accident rate, through a series of seven evaluations and demonstrations culminating in an integrated technology assessment.

Additional Information: The steps include identification of a robust portfolio, completion of concept designs, evaluations, demonstrations, and integrated technology assessments.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2001	1: Success	Success	
2003	2: Success	Success	
2005	3: Success		
2005	4: Success		
2007	5: Success		
2009	6: Success		

PART Performance Measurements

Program: Aeronautics Technology
Agency: National Aeronautics and Space Administration
Bureau: Aeronautics Research Mission Directorate
Type(s): Research and Development Competitive Grant

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	73%	67%	Effective

2010 7: Success

Measure: Percent reduction of the vulnerabilities to the National Airspace System through the development and demonstration of technologies.

Additional Information: Reduction is in comparison to the 2003 air transportation system.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2009	35		
2016	60		
2025	90		

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	82%	100%	47%	Demonstrated

1.1 Is the program purpose clear?

Answer: YES

Question Weight 20%

Explanation: The Biological Sciences Research program (BSR) has a well-defined and focused purpose that is tied directly to NASA's vision and mission and the Biological and Physical Research strategy. The goals and objectives are clear and unambiguous to all stakeholders (Congress, the public and the Administration).

Evidence: The research conducted by NASA's Biological Sciences contributes to NASA's overall efforts to explore the Universe and Search for Life. The key goals of the OBPR Research Strategy are to provide the research necessary to answer the questions: How can we assure the survival of humans traveling far from Earth?; What must we know about how space changes life forms so that mankind will flourish?; and What technology must we create to enable the next explorers to go beyond where we have been? The OBPR Research Plan is available at: spaceresearch.nasa.gov/common/docs/OBPR_Research_Plan.pdf.

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES

Question Weight 20%

Explanation: In order to explore the universe with human crewmembers, a decision to proceed must be based on the assessment of risks. In order to assess and mitigate these risks, basic and applied research is needed. Today, we only have a limited understanding of gravity's effect on life at the molecular, cellular systems, and behavioral level. Scientists can now begin to extend this research at all levels of biological complexity to provide critical knowledge underlying the known human health risks of space flight. Other critical research within BSR addresses the technology needs that are associated with humans: life support, environmental monitoring and human factors.

Evidence: Without substantial progress in these areas, new missions with people will not be possible. In 2003, the Research Maximization and Prioritization Task Force (ReMAP) reviewed the content and rationale of the research being done by OBPR, and recommended priorities for ISS research. The report identifies two overarching programmatic goals: research enabling human exploration of space and basic research of intrinsic scientific interest. BSR elements were identified as essential to these goals. The ReMAP Final Report is available at: www.spaceresearch.nasa.gov/common/docs/remap/remap_final_report.pdf.

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES

Question Weight 20%

Explanation: BSR is a one of a kind program with long-term strategic goals that are not funded or managed by any other programs at the federal, state or local government levels, or by private industry. BSR has the unique responsibilities of providing critical knowledge underlying the known human health risks of space flight, developing the biological knowledge to assure that mankind will flourish, and developing the critical technologies for human exploration.

Evidence: BSR is the only comprehensive program in the U.S. designed to understand the impact of the space environment on biological systems and to develop countermeasures to these effects. The ReMAP report concluded that the program is "unique". NASA's BSR is the leader of scientific coordination with the other space agencies of the world engaged in this scientific endeavor. In order to leverage national resources, BSR actively seeks to collaborate with other Federal agencies and Institutes who may offer specialized expertise or have overlapping needs such that co-funding is appropriate. OBPR currently has 65 agreements with 35 Federal agencies/institutes.

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight: 20%

Explanation: NASA's BSR science strategy and technical approach are the product of a broad community (NASA and other Federal agencies, universities, industry, and International Partners). The program design is reviewed periodically by the National Academy and regularly by the NASA Advisory Committee. BSR program effectiveness and efficiency is further assured through competitions that fund independently peer reviewed research proposals by individual investigators.

Evidence: NASA's BSR science strategy and technical approach are reviewed by the National Academies of Science and NASA advisory groups. The NRC report "Review of NASA's Biomedical Research Program", 2000 examined the agency's entire biomedical program in order to assess the extent to which the program is consistent with previous NRC recommendations. Ongoing programmatic changes responding to REMAP (e.g., the OBPR Research Plan) are still being vetted. The feedback of the community as expressed by the Biological and Physical Research Advisory Committee, is that the program architecture is well designed. Full text of the NRC report is available at: <http://www.nap.edu/books/0309071267/html/>

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight: 20%

Explanation: BSR provides a targeted program to supply research products to agency customers (e.g., Office of Space Flight, NASA Chief Medical Officer). In addition, BSR selects research that is best aligned to meet the program goals. The program goals are vetted with the community (universities, civil service researchers, industry and international partners). All proposals are independently peer reviewed for scientific merit and analyzed for program relevance prior to funding. Additionally, NASA BSR coordinates with international space agencies to recommend new research needs.

Evidence: Prior to funding, all proposals relevant to the solicitation are subject to competitive peer review. Proposal success rates were 23% in FY02, indicative of selectivity in awards. Additionally, NASA BSR coordinates with other international space agencies to hold international workshops that review the current state of knowledge in specific scientific areas of interest and recommend research needs. Over time these international workshops have covered the scientific disciplines covered by BSR. These workshops were used as an input to NASA Research Announcements already released this year.

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 9%

Explanation: The new OBPR strategy contains a set of specific long-term performance measures that are based on OBPR's critical path roadmap and the OBPR research plan. The measures were derived from the OBPR 10 year Enterprise strategy, which was published earlier this year, and are reflected in the measures tab. Outcomes need to continue to be refined in following years to ensure that, to the extent possible, they can be measured and evaluated over time.

Evidence: To fulfill its primary role in the Agency's strategic plan for enabling Goal 9, extend the duration and boundaries of human space flight to create new opportunities for exploration and discovery, BSR has employed the Critical Path Roadmap (<http://criticalpath.jsc.nasa.gov/>) to identify and prioritize risks (55 in all) and to measure the change in risk probability and consequence. While some of the long term goals can be found in the FY04 President's Budget Submit, the newer, more outcome focused measures stem from the OBPR Research Plan (http://spaceresearch.nasa.gov/common/docs/OBPR_Research_Plan.pdf).

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight: 9%

Explanation: A key goal of the program is to conduct research on biological and physical processes to enable future missions of exploration. This goal must be accomplished before the end of ISS useful life. BSR has identified multiple ambitious 5 and 10 year targets for each performance goal in the OBPR Research Plan.

Evidence: The challenges to this goal are: limited access to space and the small number of research subjects. While the presence of a permanently orbiting Station crew represents unprecedented research opportunities, there is a substantial challenge in maximizing understanding from a small sample. The OBPR section of the NASA strategic plan, including specific targets and timeframes, will be published this fall. Development of these target roadmaps can be tracked at: <http://bioroadmap.arc.nasa.gov/roadmap.cfm>

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: NO Question Weight: 9%

Explanation: After the OBPR strategy is released this fall, the annual measures in NASA's Integrated Budget and Performance Document (IBPD) will be further revised to better reflect progress towards the long-term measures and goals.

Evidence: Current annual measures do not reflect quantified targets that support BSR's long-term outcomes. BSR is developing annual measures that adhere to their new strategy and are expected to have proper measures in place for FY 2005.

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: NO Question Weight: 9%

Explanation: After the OBPR strategy is released this fall, IBPD annual measures will be further revised to better reflect progress towards the long-term measures and goals. At present, it is difficult to gauge the ambitiousness of the BSR program annual research targets that reduce the probability and consequence of critical risks.

Evidence: The 2005 IBPD will include targets in all areas with quantifiable baselines that align with our new enterprise strategy and long term goals.

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: YES Question Weight: 9%

Explanation: Partners (NASA centers, contractors, private industry, private organizations, universities and international partners) are directly involved in planning and development of BSR long-term goals. As a result, they fully support and are committed to the achievement of these goals of the program. In addition, program grant solicitations explicitly include the program goals. Investigations are selected based on their relevance to long term goals and the investigators are required to submit annual progress reports, which program managers use to assess performance. They are also required to present their research in progress in workshops (e.g. The Biennial Bioastronautics Investigator Workshop).

Evidence: Partner support is demonstrated by Memoranda of Understanding (MOU) and interagency agreements with other federal agencies (NIH, NSF, DOE, DOD, etc), task level agreements with NASA centers, contracts and grants with industry and universities, and broad interest in research solicitations. NASA's Office of Space Flight and the Chief Medical Officer have signed the Bioastronautics Strategy which engenders the long term goals of the program. OBPR's Physical Science Research is a managing partner in the goals of the Space Radiation Health Program. Representatives from NASA centers, contractors, private industry and grantees are also involved in the development of the new enterprise strategy and long term goals of BSR, and are committed to achieving these goals. OBPR Space Act Agreements with Domestic Partners and International Partner Agreements are available from NASA Code U upon request.

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight: 9%

Explanation: NASA's BSR is regularly reviewed by independent groups (National Academy of Sciences, NASA advisory committees), which recommend the scientific strategy and provide evaluation on a regular basis. Feedback is provided on program effectiveness at addressing the research needs. Recommendations are used for program planning purposes, for grant solicitation and for goal setting.

Evidence: National Academies of Science reports include "A Strategy for Research in Space Biology and Medicine in the New Century" (1998) and "Safe Passage"(2001). NASAs advisory committee structure, the NRC, and a standing subcommittee the Biological and Physical Research Advisory Committee, provides recommendations three times a year on program direction. In 2003, the Research Maximization and Prioritization Task Force (ReMAP) reviewed the content and rationale of the research being done by OBPR, and recommended priorities for ISS research. The report identifies two overarching programmatic goals: research enabling human exploration of space and basic research of intrinsic scientific interest. BSR elements were identified as essential to these goals. The ReMAP Final Report is available at: www.spaceresearch.nasa.gov/common/docs/remap/remap_final_report.pdf

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: YES Question Weight: 9%

Explanation: Budget and Performance planning processes are integrated for the BSR theme. The FY04 President's Budget Submit (PBS) includes all direct and indirect full cost elements from FY04-08; execution of funds is conducted in full cost starting in FY04. It is expected that as BSR revises its strategy, any improved performance measures will track closely to budget requests.

Evidence: FY04 Integrated Budget and Performance Document (IBPD) for BSR theme can be found at <http://www.nasa.gov/pdf/1963main-bpr.pdf> For breakdown of full cost budget elements by BSR sub-component (Development/Operations/Research) by Center, see NASA Budget System Process 430 (FY04 PBS)

2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight: 9%

Explanation: The BSR is currently revising its strategy to include roadmaps with a limited number of specific, ambitious long-term performance goals and measurable outcomes. Annual performance goals are being written that will enable BSR to quantify progress toward achieving these long-term goals. External stakeholders have been involved extensively in this planning. The program used the recommendations of the ReMAP report to prioritize program goals within the strategy.

Evidence: The REMAP task force was created in response to OMB direction that NASA's Biological and Physical Reserach Enterprise "will conduct a rigorous prioritization exercise during the spring and summer of 2002 to prioritize the research questions being pursued. This prioritization will help focus resources on priority questions, increasing the speed and likelihood that they will be answered." ReMAP recommendations and prioritization can be found at: http://spaceresearch.nasa.gov/general_info/remap.html Draft versions of BSR enterprise strategy documents can be found at: <http://bioroadmap.arc.nasa.gov/roadmap.cfm>.

2.CA1 Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity? Answer: YES Question Weight: 9%

Explanation: Due to REMAP recommendations to continue development of the Plant Research Unit (PRU) and the Advanced Animal Habitat (AAH), science requirements are currently being analyzed for each, prior to renegotiation of their contracts. In response to Boeing cost growth for design and build of the Habitat Holding Racks, an independent review of the project was made, and various management actions were taken. Due to cuts in SSBRP budget in recent years, hardware development options were assessed using a bottoms-up review approach; an independent cost assessment of all major hardware was conducted, including parametric cost estimation.

Evidence: "Review of PRU Science Requirements" dated 14May03; "Review of AAH Science Requirements" dated 21 May 03; "Fundamental Biology International Space Station Replan: 60 Day Report" dated 6Feb02; "Space Station Biological Research Project (SSBRP) Independent Cost Assessment" dated 10Jan02; "Habitat Holding Racks Cost Assessment" dated Nov01; "Fundamental Biology SSBRP Budget Review Synopsis" dated 31May01.

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

2.RD1 **If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals?** Answer: YES Question Weight: 9%

Explanation: In order to evaluate potential shortcomings, OBPR conducts reviews, trade studies, and cost benefit analyses to identify and/or validate program approaches and potential benefits. These studies may be conducted either within the Agency, or by external independent organizations. BSR regularly sponsors competing approaches to specific problems, e.g. different types of countermeasures, or different organizational structures to optimize the utilization of the International Space Station. It is expected that in the future BSR will be able to better justify the cost/benefits between ground based and space based research, particularly in fundamental biology. BSR should also work towards evaluating their research productivity against NIH and NSF where applicable.

Evidence: An example is the study and determination of the best approach to optimize the utilization of the International Space Station. The following sequence of studies and reviews culminated in the decision to release a Request for Proposals for an ISS Research Institute.* October 1999 - Options for Managing Space Station Utilization, Swales Aerospace; * December 1999 - Institutional Arrangements for Space Station Research, National Research Council - report on NAS website; * August 2000 - International Space Station Operations Architecture Study, Computer Sciences Corporation; * June 2001 - NASA Internal Study; * February 2002 - International Space Station Payload Operations Concept and Architecture Assessment Study (POCAAS), Computer Sciences Corporation; * March 2003 - Utilization Management Concept Development Study - Final report and associated materials at the OBPR website.

2.RD2 **Does the program use a prioritization process to guide budget requests and funding decisions?** Answer: YES Question Weight: 9%

Explanation: BSR uses a risk management approach to guide budget requests and funding decisions related to the critical path roadmap. The recent prioritization developed by NASA in response to ReMAP task force guides budget requests and grant solicitation decisions. Grant funding decisions are guided by the peer review process which provides a scientific merit priority.

Evidence: The risk management prioritization process is documented in www.criticalpath.jsc.nasa.gov. ReMAP identified 8 areas of high priority research within BSR. The program has focused budget requests and funding on these priority areas. The high priority areas are: radiation health; behavior and performance; physiology; clinical/operational medicine; advanced environmental monitoring and control; advanced life support; cell and molecular biology; and organismal and comparative biology. http://spaceresearch.nasa.gov/general_info/remap.html

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

3.1 Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance? Answer: YES Question Weight: 8%

Explanation: Performance data are collected and evaluated on a monthly and quarterly basis from program elements to assess actual performance against plan. During monthly reviews with the Associate Administrator, the BSR theme Division Directors review these data, explaining any major variances and discuss the current status of all ISSRC hardware development associated with Cost, Schedule, and Technical performance areas using a "stoplight" chart with quantitative metrics associated with each color on the stoplight. Quarterly, there are detailed performance reviews with performing centers, and the Agency's Program Management Council. Bi-monthly meetings are held with our International Partners to monitor experiment development and implementation.

Evidence: Financial and Contract Status (FACS) Report, as well as the BRIO reporting system, provides monthly Obligations/Costing status; Quarterly performance reviews are held with implementing centers; Quarterly Program Management Council (PMC) meetings; OBPR Obligations/Cost Phase Plan (Initial plan is updated at Mid-Year); OBPR Monthly Reviews; OBPR weekly BOD (Board of Directors -AA, DAAs, DDs) meeting; Bi-weekly meetings with division scientists, program analysts, and representatives from External Relations and Office of Space Flight; Minutes of 27May03 Bi-monthly International Partner teleconference (Bioastronautics Research) per JSC letter (ISLSWG-03-MB-14) distributed by 5Jun03 e-mail; Minutes of 5May03 Bi-monthly International Partner teleconference (Fundamental Space Biology) per ESA fax dated 8May03; Open door policy for interaction with all levels of OBPR management.

3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: YES Question Weight: 8%

Explanation: The BSR theme's Division Directors, OBPR Deputy Associate Administrators, and OBPR Associate Administrator are held responsible for achieving key program results. Grantees are required to submit an annual progress report, which is reviewed by the technical officer at the respective grant implementing center. All Contracting activity is done in accordance with the FAR, which requires standard mechanisms to assure contract performance. Agreements with domestic partners (NIH, DOD, DOE, ACSM, AFAF, NCID-CDC, NOAA, USDA, and USGS - EDC) define responsibility for accountability. Implementing agreements with International Partners signed at the project level define roles & responsibilities, technical requirements, schedules, and regular reporting requirements (includes periodic reviews). Bi-monthly meetings are held with our International Partners to monitor experiment development and implementation.

Evidence: Performance Standards for OBPR DDs, DAAs, and AA; Grantees annual progress reports are included in OBPR task book, <http://research.hq.nasa.gov/taskbook.cfm>; Grant Proposal Evaluation Forms (ARC form is identified as "JAC 884", JSC form does not have a specific identifier) are filed at the Center Grants Office; Grants management process is in accordance with NPG 5800.1, "Grant & Cooperative Agreement Handbook"; See Boeing Contract (HHR) NAS8-50000, STAR Enterprises, Inc. Contract (AAH) NAS2-98024, PSI, Inc. Contract (CCU) NAS2-9600, and Orbitech Contract (PRU) NAS2-00080 for examples of cost, schedule, performance accountability within major hardware contracts; OBPR Space Act Agreements with Domestic Partners and International Partner Agreements are available from NASA Code U upon request; ; Minutes of 27May03 Bi-monthly International Partner teleconference (Bioastronautics Research) per JSC letter (ISLSWG-03-MB-14) distributed by 5Jun03 e-mail; Minutes of 5May03 Bi-monthly International Partner teleconference (Fundamental Space Biology) per ESA fax dated 8May03.

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 8%

Explanation: The BSR theme's annual appropriation is available for obligation for a two year time period during which they are fully obligated. At the beginning of the fiscal year obligation and cost monthly phasing plans are developed and used as the basis for tracking actual obligations and cost. Midway during the fiscal year these phasing plans are updated to include any replanning that may have occurred. During the monthly Associate Administrator's Program Reviews actual obligations and cost are reported against the plans and discussed. OBPR's goal is to have all funds obligated by the end of February of the second year. Funds not obligated are subject to reprogramming at the Associate Administrator's discretion. Exceptions are granted for problem procurement actions and minor funds cleanup. Unobligated balances are also considered when determining where to make cuts to fund Agency or Enterprise contingencies.

Evidence: 99.5% of PY02 funds were obligated by 4/30/03 and 48.1% of PY 2003 funds were obligated during the same time period. NASA Monthly FACS Report; Contractor monthly & quarterly reports (533's); SF-133 Report on Budget Execution and Budgetary Resources; FMS2108 Year-End Closing Statement; Annual NASA Accountability Report

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: YES Question Weight: 8%

Explanation: Performance against timing targets related to the Grant selection & award process is submitted on an annual basis to Code H (NASA Procurement). BSR uses contracting policies that require competitive sourcing and cost comparisons. OBPR is implementing Program and Project management processes consistent with NPG 7120.5B, NASA Program and Project Management Processes and Requirements. This implementation standardizes and streamlines program and project management processes across all OBPR divisions, including implementation of independent engineering and cost evaluations periodically throughout the life of a project. Improved efficiencies and cost improvements are sought through process improvement. (e.g., BRIC-C.elegans experiment that flew on STS-107)

Evidence: OBPR's Annual Report to Code H dated October 2002 regarding Grant selection & award process; Acquisition Strategy for Bioastronautics Consolidated Contract (Contract No.NAS9-02078) documents a 7% estimated savings. In FY04, this will amount to approximately \$560K cost savings (additional administrative cost savings are also expected); Customer Agreement No. KCA-1683 with State of Florida (for SERPL) - This new facility for pre and post flight biological sample processing at KSC (SERPL) was built in partnership between KSC and the State of Florida at a greatly reduced cost to BSR; For the BRIC-C.elegans experiment that flew on STS-107, the manifesting/certification time was reduced from 1.5 yrs to approx 1 month. This considerable acceleration from the usual flight process can be applied for future payloads to decrease costs. BRIC-C.Elegans experiment Flight manifesting/certification process for STS-107 followed the guidelines in "NSTS 21000 SIP-MDK, "Shuttle/Payload Standard Integration Plan for Middeck-Type Payloads".

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 8%

Explanation: The BSR program actively seeks to collaborate with other Federal agencies and institutions with related programs. Currently, BSR collaborates in accordance with Space Act Agreement partnerships with NIH, DOD, DOE, ACSM, AFAF, NCID-CDC, NOAA, USDA, and USGS - EDC.

Evidence: NPD 1050.1F "Authority to Enter into Space Act Agreements"; OBPR Space Act Agreements with Domestic Partners are available from NASA Code U upon request.

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

3.6 Does the program use strong financial management practices?

Answer: YES

Question Weight: 8%

Explanation: OBPR uses effective financial management practices in administering program funds. NASA is in the process of implementing the Integrated Financial Management (IFM) system and the Management Information System (MIS) to ensure stronger financial management practices.

Evidence: NASA Monthly FACS Report; Contractor monthly & quarterly reports (533's); SF-133 Report on Budget Execution and Budgetary Resources; FMS2108 Year-End Closing Statement; Annual NASA Accountability Report.

3.7 Has the program taken meaningful steps to address its management deficiencies?

Answer: YES

Question Weight: 8%

Explanation: OBPR has taken positive steps to create a balanced portfolio of program management positions and select personnel through competitive processes. Also, the Agency brought ISS research management to OBPR and established the ISS Program Scientist position. Hardware development management within the BSR theme includes a process of corrective action. For example, in response to Boeing cost growth for design and build of the Habitat Holding Racks, an independent review of the project was made, and various management actions were taken, including improvements to contract management & oversight.

Evidence: The recommendation for science leadership within the ISS Program was included in the IMCE report dated Nov 1, 2001. Direction to bring ISS research management within Code U was included in FY02 Appropriations Bill (HR2620). Reports on the Habitat Holding Rack are: "Fundamental Biology International Space Station Replan: 60 Day Report" dated 6Feb02; Space Station Biological Research Project (SSBRP) Independent Cost Assessment dated 10Jan02; "Habitat Holding Racks Cost Assessment" dated Nov01; and "Fundamental Biology SSBRP Budget Review Synopsis" dated 31May01.

3.CA1 Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?

Answer: YES

Question Weight: 8%

Explanation: BSR's Capital Assets are the Habitat Holding Racks (HHR) and the Human Research Facility (HRF) Racks. The BSR theme's annual Integrated Budget and Performance Document (IBPD) clearly identifies budget, performance, and schedule information needed to manage these Capital Assets. This document will be updated to reflect changes approved through the FY05 Budget Cycle and Agency Operating Plans.

Evidence: FY04 Integrated Budget and Performance Document (IBPD) for BSR theme can be found at "<http://www.nasa.gov/pdf/1963main-bpr.pdf>", see "Development" sections for HHR and HRF (pages SAE11-9 through SAE11-12); Agency Operating Plans.

3.CO1 Are grants awarded based on a clear competitive process that includes a qualified assessment of merit?

Answer: YES

Question Weight: 8%

Explanation: Grants are awarded in accordance with a clearly defined process which solicits via competition and ensures the quality of the BSR theme's research. Proposals are peer reviewed for scientific merit and analyzed for program relevance prior to funding. It should be noted that around 6% of program funds are earmarked for specific purposes.

Evidence: NPG 5800.1, "Grant & Cooperative Agreement Handbook"

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	82%	100%	47%	Demonstrated

3.CO2 Does the program have oversight practices that provide sufficient knowledge of grantee activities? Answer: YES Question Weight: 8%

Explanation: Grantees are required to submit an annual progress report, which is reviewed by the technical officer at the respective grant implementing center. If the report shows that satisfactory progress is being made, and the objectives of the grant proposal are being met, the grant would then be eligible for renewal.

Evidence: Grant Proposal Evaluation Forms (ARC form is identified as "JAC 884", JSC form does not have a specific identifier) are filed at the Center Grants Office; Grants management process is in accordance with NPG 5800.1, "Grant & Cooperative Agreement Handbook"

3.CO3 Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner? Answer: YES Question Weight: 8%

Explanation: Grantees annual progress reports are included in OBPR task book, which is available to the public.

Evidence: The OBPR task book contains project identification (with search capability) task abstract/ description, progress, and Earth benefits. OBPR task book, <http://research.hq.nasa.gov/taskbook.cfm>

3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality? Answer: YES Question Weight: 8%

Explanation: BSR established an appropriate external review process for all R&D activities that do not use competitive grants, such as congressional earmarks, research conducted in clinical programs, or directed research projects managed by NASA. It is OBPR policy that recipients of congressionally directed funding for equipment or construction prepare a proposal for acceptance by OBPR. Directed research projects are reviewed through the Non-advocate review process.

Evidence: OBPR letter dated 1 April, 2003, subj:"Processing Congressionally Directed Funding"; LSPD 00-01 Non-Advocate Review Process for Clinical and Operational Research Activities April 21,2000

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: SMALL EXTENT Question Weight 20%

Explanation: Given the recent revisions to the strategic direction of the program, progress towards these goals is difficult to ascertain. In addition, progress is significantly hampered by the current status of the Space Shuttle and Space Station. It will be difficult to make adequate progress until these issues are resolved and flight opportunities are available. However, BSR is has made some progress towards reducing the probability and consequence of risk as defined by the Critical Path Roadmap in FY03. Advances were made toward reducing spacecraft resupply logistics and major new enabling facilities were opened that are prerequisites for essential future research. Significant progress was made in the availability of hardware and capability for ISS flight research as well.

Evidence: Although marked progress has not been demonstrated, specific results from FY03 include testing of promising drugs that reduces bone loss and prevent kidney stones, experiments that examine bone loading during spaceflight, and a published review of data that examines the occurrence of heart arrhythmias in astronauts. New facilities include the NASA Space Radiation Research Laboratory (in partnership with the Dept of Energy) and a Bedrest facility (in partnership with NIH). The Advanced Life Support research has annual targets in the GPRA and publishes annual metrics(<http://advlifesupport.jsc.nasa.gov/>). These metrics show a year to year improvement in equivalent system mass (over ISS technology) that reaches a factor of 1.67 reported in FY02.

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: NO Question Weight 20%

Explanation: Given the lack of adequate annual performance measures, progress is impossible to evaluate.

Evidence:

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: LARGE EXTENT Question Weight 20%

Explanation: The program has improved its efficiencies by using the ReMAP report to prioritize research and to terminate low priority programs. Resources are strictly allocated to high priority programs. BSR adheres to NASA's procurement policies that enable increases in efficiency, such as the use of consolidated contracts to reduce management overhead costs. In addition, BSR's practices lead to continuous improvement in efficiency by examining processes and revising them to increase research throughput. For instance, to maximize utilization of ISS resources and generate the greatest science return from each flight opportunity, BSR has adopted a 'model specimen' approach based on previously successful biospecimen sharing projects.

Evidence: One major efficiency achieved this year was in the Bioastronautics Consolidated Contract. The estimated savings over the previous contract is 7% of the technical content (\$560K in FY 04) as documented in the acquisition strategy. Additional administrative savings are also expected. The 'model specimen' approach reduces the time from experiment selection to flight by 50%, which result in a proportionate cost savings. Details on the biospecimen program can be found at http://research.hq.nasa.gov/code_u/nra/current/AN-01-OBPR-04/index.html. The Remap Final Report is available at: www.spaceresearch.nasa.gov/common/docs/remap/remap_final_report.pdf.

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	82%	100%	47%	Demonstrated

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: NA Question Weight: 0%

Explanation: While there are no programs that are directly comparable, other National space agencies (including those from Russia, Japan, Germany, and France) have goals that partially overlap or are similar to NASA's goals. BSR meets regularly (semi-annually) with these agencies in multilateral and bilateral working groups to compare approaches and strategies. Lessons learned and best practices are applied within the context of the program. In addition, BSR needs to begin assessing their performance with other science based agencies such as NIH and NSF where appropriate. There remains a need to establish that the fundamental research projects yield highly regarded results and that the benefits are commensurate with the costs.

Evidence:

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results? Answer: SMALL EXTENT Question Weight: 20%

Explanation: Regular independent evaluations conducted by the National Academies of Science (NAS) confirm the importance and appropriateness of the BSR research agenda. However, the reviews tend not to focus on the effectiveness or results of BSR's program.

Evidence: The National Academies of Science through the Space Studies Board, National Research Council and the Institute of Medicine provides scientific guidance including "A Strategy for Research in Space Biology and Medicine in the New Century", 1998. and "Safe Passage", 2001. The NRC review of NASA's Biomedical Research Program (2000) provided evaluations in each of a number of BSR research areas. In general, the report commended the program direction, scope and research agenda. Full text of the report can be found at: <http://www.nap.edu/>. NASA's advisory committee structure, the NAC, and its standing subcommittee, the Biological and Physical Research Advisory Committee, provide recommendations three times a year on directions of the program.

4.CA1 Were program goals achieved within budgeted costs and established schedules? Answer: YES Question Weight: 20%

Explanation: BSR's Capital Assets are the Habitat Holding Racks (HHR) and the Human Research Facility (HRF) Racks. Program goals for development of these Capital Assets were met within the budgeted costs (including the established reserve levels) and schedules; funds have been costed as planned.

Evidence: FY04 Integrated Budget and Performance Document (IBPD) for BSR theme can be found at <http://www.nasa.gov/pdf/1963main-bpr.pdf>; NASA Budget System Process 430 (FY04 PBS); Obs/Cost performance against plan, monthly review; Certification of Flight Readiness for HRF1 (Oct00) & HRF2 (Aug02). Qualification test of HHR was completed 3/03 - ahead of schedule.

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	82%	100%	47%	

Measure: For defined classes of space flight, produce research results that reduce the probability and consequences of the 55 (prioritized) risks to human health and safety from the current risk baseline.

Additional Information: Understand human physiological reactions to reduced gravity and develop countermeasures by 2016 to assure survival of humans traveling far from Earth.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2016	55		

Measure: Use of ground and space-based research to lessen the risks related to long duration phenomena such as bone loss, psychological adaptation to isolation and confinement, and the biological effects of radiation as described in the Critical Path Roadmap. (Measures and targets to be refined)

Additional Information: Understand human physiological reactions to reduced gravity and develop countermeasures by 2016 to assure survival of humans traveling far from Earth. Progress toward accomplishing this performance goal will be reviewed by an advisory committee

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual

Measure: Produce research results that reduce spacecraft re-supply logistics by a factor of 3 by 2010 compared to the system baseline for ISS.

Additional Information: Measure tracks increased efficiency for low Earth orbit spacecraft logistics that enable exploration spacecraft design.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term

Measure: Reduce the projected mass of a life support flight system compared to the system baseline for the International Space Station. (New measure in FY 2004)

Additional Information: Measure tracks increased efficiency for low Earth orbit spacecraft logistics that enable exploration spacecraft design.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	50%		

Measure: Integrate biological effects of space environments with cell:cell interactions and organismal function by 2016.

Additional Information: Determine mechanisms underlying the ability of life to adapt and thrive in space environments.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term

PART Performance Measurements

Program: Biological Sciences Research
Agency: National Aeronautics and Space Administration
Bureau: Office of Biological and Physical Research
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	82%	100%	47%	Demonstrated

Measure: Solicit peer-reviewed ground-based research in all Fundamental Biology disciplines, plan for increased early ISS utilization for basic biology research in the next few years, and maintain an open, competitive and productive program in fundamental space biology.

Additional Information: Collect fundamental biological data on adaptation to space at all levels of organization (cellular, molecular, organismal). Progress toward accomplishing this performance goal will be assessed by advisory committees utilizing criteria of quality, relevance and productivity.

Year

Target

Actual

Measure Term: Annual

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	90%	64%	45%	Demonstrated

1.1 Is the program purpose clear?

Answer: YES

Question Weight 20%

Explanation: The Earth Science Applications program has a well-defined and focused purpose that ties directly to the NASA vision and mission, and the Earth Science Enterprise (ESE) strategic plan.

Evidence: The Earth Science Applications mission is "to expand and accelerate the realization of societal and economic benefits from Earth science, information, and technology." ESE works jointly with its national and international partners to develop this scientific understanding by employing space-based, airborne and in-situ data. The core of these data sets consist of products from ESE's 18 orbital missions containing approximately 80 instruments to develop solutions to applications of national importance.

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES

Question Weight 20%

Explanation: The Earth Science Applications program bridges the gap between Earth science research results and the use of observations and prediction capabilities in national and international decision support tools associated with weather, climate and natural hazards. The program also addresses the need for Earth science education.

Evidence: The following documents reinforce the benefits of using Earth system science results to serve society: (a) Review of NASA's Earth Science Enterprise Applications Program Plan (National Research Council); (b) The Science of Regional and Global Change: Putting Knowledge to Work (National Research Council); and (c) Blueprint for Change: Report from the National Conference on the Revolution in Earth and Space Science Education (National Science Foundation). National and international needs for Earth science education are outlined in the report "Revolution in Earth and Space Science Education".

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES

Question Weight 20%

Explanation: The Earth Science Applications program is the Nation's only program designed to systematically benchmark uses of NASA's remote sensing data and research results into decision support systems designed to support operational agencies and organizations.

Evidence: Memoranda of Agreement are executed with partners to ensure that duplication of efforts does not occur. Partnering organizations include federal agencies (FAA, USDA, USGS, DHS, FEMA, EPA, CDC, NIH, DOE, DOD, DOI), state organizations (NSGIC, ASA, AAGS) and other national and international organizations. A detailed listing and status of Earth Science Applications Program Memoranda of Agreement (MOAs) are maintained by ESE. (<http://www.earth.nasa.gov/eseapps/>).

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	90%	64%	45%	Demonstrated

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight 20%

Explanation: The Earth Science Applications program architecture and plan have been vetted with a broad stakeholder community (including representatives of the public, private, policy, academic, international, aerospace, and science sectors) over the past two years.

Evidence: The National Academy of Sciences and NASA ESE's Earth System Science and Applications Advisory Committee reviewed and endorsed the program design presented in the Earth Science Applications Strategy. Several external and NASA studies on socio-economic benefits resulting from the Earth Science Applications projects estimate potential annual benefits totaling approximately \$20 billion. Specific studies include: (a) "An Estimate of NASA/ESE Power Program Benefits to the U.S. from 2002 through 2017; and (b) 'The Socio-economic Benefits of Earth Science and Applications Research: Reducing the Risks and Costs of Natural Disasters in the United States'.

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight 20%

Explanation: The Earth Science Applications architecture and plan have identified twelve national applications (each with a partner federal agency) that can benefit from NASA science and technology.

Evidence: MOAs with partnering organizations effectively target the use of resources aimed at the benchmarking and improvement of the decision support tools owned by those organizations. Partnering organizations that further the use of Earth Science Applications program products include federal agencies (FAA, USDA, USGS, DHS, FEMA, EPA, CDC, NIH, DOE, DOD, DOI), state organizations (NSGIC, ASA, AAGS) and other national and international organizations. Unintended subsidies are avoided by clarifying roles and responsibilities in Memoranda of Agreement with partners. A detailed listing and status of Earth Science Applications Memoranda of Agreement (MOAs) are maintained by ESE. (<http://www.earth.nasa.gov/eseapps/>).

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight 10%

Explanation: Outcomes reflect NASA's responsibility for ensuring that NASA data and research is fully utilized and is translated into measurable improvement to existing products and programs. Once NASA data has been incorporated in decision support systems of national priority, outcomes that demonstrate direct benefit to society (including measures such as lives saved due to improved hurricane forecasting and economic benefits associated with improved agricultural efficiency) are typically the responsibility of partner agencies. As the program matures, NASA needs to continue to improve measures to address the value added of incorporating NASA data (i.e., measure quality of products versus quantity). NASA also needs to develop metrics that better encompass outcomes resulting from the education and outreach portions of the program.

Evidence: Three long-term performance measures are presented in the Measures tab.

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	90%	64%	45%	Demonstrated

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight:10%

Explanation: Each of the Earth Science Applications program's 12 National Applications (e.g., air quality, public health) has developed or is developing a specific roadmap that lay out plans through 2012 supporting the outcome performance measures. The "ambitiousness" of the targets should be more readily apparent as the program matures and can assess the time and effort necessary to develop products.

Evidence: Each roadmap has discrete, mid-term performance goals. The goals include specific, quantifiable targets and timeframes. For example, in aviation safety, the present WX Visualization System is a discrete, stand-alone weather product, with little satellite sounding data or imagery. The 2012 performance measure is for a WX Visualization System that is fully integrated with SVS, WARP, and ITWS in-cockpit graphical WX displays featuring real-time weather information with global coverage. Roadmaps have been completed for most of the applications and are available from the Applications program office. Once finalized, they will be available through the program website.

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight:10%

Explanation: Specific annual performance measures demonstrate progress towards achieving the long-term goals and measures. As the program matures, NASA needs to develop measures to addresses efficiency and the value added of incorporating NASA data (i.e., measure quality of products versus quantity). NASA also needs to develop metrics that better encompass outcomes resulting from the education and outreach portions of the program.

Evidence: Specific annual performance measures directly supporting the long-term goals are included in the Measures tab.

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight:10%

Explanation: Annual performance goals are designed to demonstrate progress against the baselines in the roadmaps by meeting specific targets. The "ambitiousness" of the targets should be more readily apparent as the program matures and can assess the time and effort necessary to develop products.

Evidence: Baselines and targets are specified in the program's roadmaps. The systems engineering approach being used in the evaluation of decision support systems for each of the national applications contains a fundamental concept of decision support system (DSS) baselining from which to measure improvement. The baselines consist of the respective DSS State 1's (current) shown in the Roadmaps. The Roadmaps also show the necessary steps to progress from the State 1 to State 2 (benchmarked/improved) of the DSSs with the infusion of earth science and technology research results.

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: NO Question Weight:10%

Explanation: The Earth Science Applications program partners (Federal agencies, NASA Centers, private sector, universities, international organizations, and others) are directly involved in planning and establishing the program's goals and objectives, and design and implement programs of work supporting our common objectives. However, the large percentage of earmarked funds (over 25 percent) indicate that NASA has little control over a substantial number of partners. In addition, while grants may be focused on the priority applications, it is not clear how grantee performance ties back into NASA's performance measures.

Evidence: In NASA's FY 2003 Operating Plan, nearly \$20M of ESA funds of a \$78M total budget are Congressionally directed grants and transfers.

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	90%	64%	45%	

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight: 10%

Explanation: Earth Science Applications program plans and activities are evaluated on a regular basis by the National Academy of Sciences and the Earth System Science and Applications Advisory Committee to ensure effectiveness and relevance to needs. Results of these reviews are the basis for revision and update of all Earth Science Applications program activities and plans.

Evidence: Scientific and programmatic progress and performance for the Earth Science Applications program is presented to the ESSAAC and the National Academy of Sciences on a periodic basis ('Review of NASA's Earth Science Enterprise Applications Program Plan'). An NRC review of NASA's Aviation Safety Program is underway assessing how NASA and the FAA collaborate to leverage R&D into operations. In addition, an integral part of the Program is the evaluation and measurement of DSS improvements by the partner agency. Following the completion of the benchmarking process, the enhanced/upgraded DSS i.e., State 2 is evaluated against the State 1 (i.e., original state) of the same DSS to measure the enhanced operational status. This type of evaluation will be conducted in the context of each National Applications once benchmarking is completed.

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: YES Question Weight: 10%

Explanation: NASA's IBPD provides the budget request and performance targets on a full-cost basis. Detailed budgets are being developed for each application of national priority to identify critical elements leading to measurable success. Once these are completed, NASA should fully integrate these into the budget requests.

Evidence: The IBPD can be found at www.nasa.gov/about/budget/. Detailed budgets have been developed for most of the National Applications.

2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight: 10%

Explanation: NASA's Earth Science Enterprise, which manages the Earth Science Applications program, updates its Strategic Plan every three years. This process is presently under way as the Program and Enterprise align with the new NASA Vision and Mission. The Earth Science Applications program reviews and updates its program strategic plan on an annual basis. Any strategic planning deficiencies are identified and corrected as part of the update process.

Evidence: The National Academy of Sciences has reviewed Earth Science Applications program strategic planning, and identified areas for improvement ('Review of NASA's Earth Science Enterprise Applications Program Plan'). Management action was taken to improve the areas identified in the NAS Report. These can be seen through the development of the road maps and program plans.

2.CA1 Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity? Answer: NA Question Weight: 0%

Explanation: The Earth Science Applications program does not fund acquisition of capital assets.

Evidence:

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	90%	64%	45%	

2.RD1 **If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals?** Answer: YES Question Weight:10%

Explanation: The Earth Science Applications program continually evaluates its efforts with respect to the relative potential benefits of alternatives in identifying opportunities for enhancing partners' operations.

Evidence: Alternative approaches to enhancement of partnering agencies' systems are evaluated as part of the joint project design process in each National Application area. In addition, alternative approaches to accomplishing the partner's goals are normally evaluated during the conduct of socio-economic benefits studies such as the those referenced in the answer to 2.1 ('NASA/ESE Power Program Benefits' and 'Reducing the Risks and Costs of Natural Disasters in the United States'). In addition, the joint National Applications Projects with partner agencies inherently compare alternative approaches to enhancing the DSS.

2.RD2 **Does the program use a prioritization process to guide budget requests and funding decisions?** Answer: YES Question Weight:10%

Explanation: The Earth Science Applications program uses a prioritization process that draws on internal and external reviews to guide budget requests and funding decisions.

Evidence: Overall program priorities (e.g., selection of the 12 National Applications), criteria for selection, and programmatic direction are presented in the Earth Science Applications Strategy. The NAS endorsed this prioritization in their review of the program strategy. The more detailed priorities reflected in the roadmaps and program plans are determined jointly with the partner organization and become the basis for solicitations. There are three Strategies (Earth Science Applications, Education, and Outreach), 12 roadmaps for the national applications and 18 Program Plans.

3.1 **Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?** Answer: YES Question Weight: 9%

Explanation: The Earth Science Applications program routinely collects relevant technical and programmatic performance information. As the program matures, in order to demonstrate results through the process of baselining and benchmarking, NASA will rely on the collection of extensive performance data.

Evidence: The Earth Science Applications program continually monitors progress against the national applications roadmaps and annual performance goals. Progress is also reviewed in Enterprise-level "Focus Area Reviews." In those areas where NASA has started to demonstrate results (e.g. hurricane forecasting and wildland fire management), extensive performance data has been collected (see http://www.esad.ssc.nasa.gov/background_documents.asp)

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	90%	64%	45%	

3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: YES Question Weight: 9%

Explanation: Federal managers and partners are required to meet annual performance standards.

Evidence: Performance standards are included in personnel performance evaluation criteria (example: Individual Performance Plans) and in contracts with outside sources. For example, Cooperative Agreements have defined milestones that must be met by the Principal Investigators (PI's) in order for the PI's to receive payment. These milestones are measured against performance metrics that are part of the Cooperative Agreements and approved by the NASA Program Managers in order to release further funding. Similarly, contracts have deliverables that must be approved by the Contracting Technical Officer (COTR) before payment is released to the organization.

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 9%

Explanation: The Earth Science Applications program obligates its funding in a timely manner and spends it for the purpose as appropriated by Congress.

Evidence: On average, the Earth Science Applications program obligates approximately 85% of its authorized annual budget within the fiscal year for which funds are provided. One hundred percent of funds are obligated over the two years available for obligation. Enterprise and Agency-wide controls ensure that funds are spent for the intended purpose.

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: NO Question Weight: 9%

Explanation: The Earth Science Applications program does not have adequate efficiency measures that aptly demonstrate efficiencies and cost effectiveness in program execution. However, they are moving forward on emphasizing competitive sourcing to achieve program goals and are expected to demonstrate efficiency improvements as a result in future years. The Earth Science Applications program goal for competitive sourcing is 80%.

Evidence:

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 9%

Explanation: The Earth Science Applications program strategy is based on engaging in partnerships to contribute systems solutions to national priorities.

Evidence: The Earth Science Applications program is an integral component of Administration and interagency collaborations including the Climate Change Science Program, the Climate Change Technology Program, National Blueprint for Aviation, National Agenda on Disaster Management, Geospatial One Stop and the Blueprint for Revolution in Earth and Space Science. The Program Plans, National Application Success Stories and 2002 Year in Review are evidence of success that have come out of collaboration with other organizations.

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	90%	64%	45%	

- 3.6 Does the program use strong financial management practices?** Answer: YES Question Weight: 9%
- Explanation: The Earth Science Applications program uses the Agency's financial management practices in administering program funds, and is free from material internal control weaknesses.
- Evidence: Sound financial performance is evidenced by the Agency's unqualified audit opinion on our FY 2002 financial statements. The integration of budget and performance is defined through the IBPD as the basis for planning. As previously stated in Block 3.4, the Business Division also reviews and presents the Program/Financial Status to ESE Management on a Monthly basis.
- 3.7 Has the program taken meaningful steps to address its management deficiencies?** Answer: YES Question Weight: 9%
- Explanation: Program management is evaluated on the basis of the ability of the program to meet its performance objectives with the resources available. Deficiencies in performance are corrected through adjustments in management strategy.
- Evidence: The Earth Science Applications program addressed management deficiencies through a restructuring in 2002 that led to the Science for Society architecture and the development of a structured budget aligned with Enterprise and Agency goals. That restructuring marked a shift in focus of the program that resulted in new top level management and a revised strategic plan.
- 3.CA1 Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?** Answer: NA Question Weight: 0%
- Explanation: The Earth Science Applications program does not fund acquisition of capital assets.
- Evidence:
- 3.CO1 Are grants awarded based on a clear competitive process that includes a qualified assessment of merit?** Answer: NO Question Weight: 9%
- Explanation: Substantially less than 95% of funds are awarded on a clear competitive process both due to Congressional direction and other sole source activity.
- Evidence: As indicated previously, over 25% of ESA funding is Congressionally directed.
- 3.CO2 Does the program have oversight practices that provide sufficient knowledge of grantee activities?** Answer: YES Question Weight: 9%
- Explanation: Program managers have a sufficient understanding of grantees' use of funds.
- Evidence: Close contact with funding recipients is maintained through site visits, required reports, Principal Investigator meetings, and discipline-oriented meetings. Also, major meetings of professional societies provide the opportunity to hear results as presented to the community, and place them in the context of work done by others under a broad range of sponsorship. Each center conducts Project Level Reviews to ensure that performance by the grantee meet expectations.

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	90%	64%	45%	

3.CO3 Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner? Answer: NO Question Weight: 9%

Explanation: While the program collects grantee performance data through annual reports, there is no comprehensive system that is both easily accessible to the public and meaningful on both the individual grantee and program-wide scale.

Evidence:

3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality? Answer: NO Question Weight: 9%

Explanation: The Earth Science Applications program allocates funding using a broadly competitive peer review process and employs sole-source procurements only on the basis of a demonstrated unique expertise or capability. However, over 25% of program funds are earmarked for specific purposes and not subject to any review.

Evidence: In NASA's FY 2003 Operating Plan, nearly \$20M of ESA funds of a \$78M total budget are Congressionally directed grants and transfers. Within the remaining funds, competitive solicitations include the Research, Education and Applications Solutions Network (REASoN) and GLOBE Cooperative Agreement Notices (CANs); the Solid Earth and Natural Hazards (SENH), New Investigators Program (NIP) and Graduate Fellowship Program (GFP) NASA Research Announcements (NRAs); and NASA Center Contractor Support.

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: LARGE EXTENT Question Weight: 34%

Explanation: The restructured Earth Science Applications Program is on track to achieve its long-term goals, however, the program is only been in its current iteration since January 2002 and to date has focused primarily on establishing the framework necessary to achieve the long-term goals.

Evidence: The Earth Science Applications program has signed MOUs with key Federal partners that have defined steps toward assimilating NASA Earth science research results into decision support tools owned and operated by the partners. Successful projects in disaster management (wildfire tracking with the USFS and hurricane prediction with NOAA) and aviation safety (volcanic ash plume tracking with the FAA and NOAA) are representative contributions of the Earth Science Applications program. (<http://www.earth.nasa.gov/eseapps/>)

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: LARGE EXTENT Question Weight: 33%

Explanation: The program is making progress on the annual targets listed. It should be noted, however, that the program has recently revised its strategic direction of the program as well as created more meaningful annual performance measures. The program did achieve most of their performance goals identified through GPRA.

Evidence: Successful projects in disaster management (wildfire tracking with the USFS and hurricane prediction with NOAA) and aviation safety (volcanic ash plume tracking with the FAA and NOAA) are representative contributions of the Earth Science Applications program. The Earth Science program (of which Earth Science Applications is a part) achieved 29 of 31 2002 performance goals for a 94% success rate (reference 2002 Performance and Accountability Report).

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	90%	64%	45%	

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: NO Question Weight: 33%

Explanation: There are no indicators to suggest that the program has demonstrated improved efficiency or cost-effectiveness over the prior year.

Evidence:

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: NA Question Weight: 0%

Explanation: There are no other programs that which provide a good basis for comparison. Programs including NOAA's National Centers of Environmental Prediction (NCEP); DoE Laboratories e.g., Pacific Northwest Research Center and Oakridge; EPA Office of Research; and on the international level, the Global Monitoring Environmental System (GMES) are all being looked at as a source of "lessons learned".

Evidence:

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results? Answer: NA Question Weight: 0%

Explanation: An independent evaluation conducted by the National Academies of Science confirmed the effectiveness of the program strategy. However, due to the programs relatively recent origin, there have been limited independent evaluations documenting results.

Evidence:

4.CA1 Were program goals achieved within budgeted costs and established schedules? Answer: NA Question Weight: 0%

Explanation: The Earth Science Applications program does not fund acquisition of capital assets.

Evidence:

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	90%	64%	45%	Demonstrated

Measure: By 2012, benchmark improved performance from the assimilation of observations (geophysical parameters, climate data records) provided from 25% of the remote sensing systems deployed on NASA Earth observation research satellites. (1.2.1)

Additional Information: Incorporation of more types of NASA data into existing systems and the resulting benefits (demonstrated through baselining the performance of the existing system and benchmarking improved performance).

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
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Measure: Benchmark improved performance from the use of observations from 5 remote sensing systems to serve decision support to national interests in homeland security and international environmental and economic security. (4ESA5)

Additional Information: Various security related decision support tools will be baselined and benefits of incorporating a variety of NASA data demonstrated through benchmarking the improved performance.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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Measure: Benchmark improved performance from the assimilation of observations and predictions resulting from NASA Earth Science research in 12 decision support systems serving national priorities and the missions of Federal agencies.

Additional Information: Incorporation of NASA data into a wide range of existing systems and the resulting benefits (demonstrated through baselining the performance of the existing system and benchmarking improved performance).

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2012	12		

Measure: Benchmark improved performance to at least 2 national decision support systems using NASA results, including the Air Quality Index provided by EPA and USDA's reservoir monitoring tools. (New measure in FY 2004)

Additional Information: EPA and USDA decision support tools will be baselined and the benefits of incorporating NASA data demonstrated through benchmarking the improved performance.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	2		

PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
100%	90%	64%	45%	

Measure: By 2012, benchmark improved performance from the assimilation of 5 specific types of predictions resulting from Earth Science Model Framework (ESMF) of 22 NASA Earth system science models. (1.2.2)

Additional Information: Incorporation of a greater number of NASA Earth Science predictive model results into existing models (demonstrated through baselining the performance of the existing system and benchmarking improved performance).

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
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Measure: Benchmark improved performance from the use of predictions from 2 NASA Earth system science models in the President's initiative of illegal logging within the CARPE program and maritime use of ocean predictions with the Navy. (New measure in FY 2004)

Additional Information: Navy and CARPE program support tools will be baselined and the benefits of incorporating NASA predictive models demonstrated through benchmarking the improved performance.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	2		

Measure: Cross Cutting Solutions: Expand DEVELOP (Digital Earth Virtual Environment and Learning Outreach Project) workforce development program to at least 5 additional states and benchmark improved performance from the use of NASA research results for water and energy decision support tools. (4ESA2: Outcome 1.2.1, 1.2.2, 1.2.3)

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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Measure: Cross Cutting Solutions: Competitively select at least 5 solutions projects for the Research, Education, Applications solutions Network (REASoN) program to serve national applications through projects that support agriculture, public health and water quality decision support tools. (4ESA3: Outcome 1.2.1, 1.2.2, 1.2.3)

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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PART Performance Measurements

Program: Earth Science Applications
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Results Not
100%	90%	64%	45%	Demonstrated

Measure: Cross Cut Solutions: Verify and validate at least two commercial remote sensing sources/products for Earth science research including DigitalGlobe Quicksat and OrbImage Overview 3 high resolutions optical imagery. (4ESA4: Outcome 1.2.1)

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

1.1 Is the program purpose clear?

Answer: YES

Question Weight 20%

Explanation: NASA's mission states that the agency aims to 'understand and protect our home planet ' as only NASA can'. To achieve this mission NASA pursues Earth System science questions for which NASA technology and space-based observations can make a defining contribution. NASA works with the science and engineering communities, as well as other Federal agencies and international programs, to develop and demonstrate new observing capabilities from space, and pioneer the use of these data to further science goals.

Evidence: NASA's authorizing legislation (Space Act of 1958) establishes NASA as the civilian agency to exercise control over U.S. aeronautical and space activities. Among the objectives of the Space Act for NASA are conducting space activities to expand knowledge of the Earth. In addition, amendments to the Space Act and the Clean Air Act mandate that NASA monitor the Earth's Upper Atmosphere (above the tropopause) and report to Congress on the level of stratospheric ozone depletion. NASA Earth System Science (ESS) fulfills its mandates by employing a strategy (Earth Science Enterprise (ESE) Strategy, October 2003) that pursues a hierarchy of science questions. At the highest level these questions are: how is the Earth System changing, how can we predict changes, and what are the consequences of these changes for life on Earth.

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES

Question Weight 20%

Explanation: The program addresses specific, identified national needs in several areas including: the causes and consequences of climate change; improvements in the reliability and extension of weather forecasts; and the monitoring and eventual prediction of natural hazards such as floods, volcanic eruptions, and earthquakes. NASA's role is to develop and make first use of new observing and research capabilities to understand the underlying processes, provide objective scientific information to researchers and decision-makers, and transition mature capabilities and results to operational users.

Evidence: National needs in the areas of climate, weather, and natural hazards, along with the need for NASA participation, are summarized in the following documents: Strategic Plan for the U.S. Climate Change Science Program (CCSP) (www.climatescience.gov); U.S. Weather Research Program (USWRP) Vision Document (http://box.mmm.ucar.edu/uswrp/program_overview/overview.html); Reducing Disaster Vulnerability Through Science & Technology; report of the Subcommittee on Disaster Reduction of the National Science and Technology Council (<http://sdr.gov/>).

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES

Question Weight 20%

Explanation: NASA, as directed by Congress in NASA's Authorization Act, has the unique responsibility to conduct activities in space to expand Earth System science. NASA ensures coordination with other agency efforts through the USGCRP/CCSP, USWRP and the National Disaster Reduction Committee.

Evidence: Through interagency and international working groups, NASA conducts joint planning to ensure that observing capabilities are fully leveraged. The largest component of ESS is coordinated via the congressionally mandated U.S. Global Change Research Program (USGCRP) and the Climate Change Science Program (CCSP). ESS research and observations are an integral part of the interagency CCSP strategic plan released in the summer of 2003. As a specific example, NASA is working with other agencies to implement the U.S. Carbon Cycle Science plan (<http://www.carboncyclescience.gov/planning.html#plan>). NASA is also key participant in the recent efforts to coordinate Earth observation both nationally and internationally.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

1.4 **Is the program design free of major flaws that would limit the program's effectiveness or efficiency?** Answer: YES Question Weight 20%

Explanation: The program design is built on a systematic, end-to-end approach that seeks to develop new technologies and data sets that contribute to improved predictive capability in research and operational forecast models. Program design encompasses interdisciplinary research, advanced technology development, development and deployment of global observing capabilities, scientific information product generation, and data assimilation and modeling. Although there have been some successes, a key opportunity to increase effectiveness in the future lies in improving the U.S. Government's ability to fully exploit research results and transition critical data sets and technologies to other agencies to maintain on a long-term basis.

Evidence: The ESE Strategy (www.earth.nasa.gov/visions/index.html) describes the end-to-end approach. New missions are undertaken to provide global measurements where measurement by conventional means is difficult or impossible. For example, the Aquarius mission will provide global data on ocean surface salinity in 8 days, whereas the previous 100 years of ship-based observations have only covered a portion of the globe. A major element of ESS program strategy is to transition mature research measurements to operational systems, making way for the development of new measurement capabilities. Transition of essential measurements from Terra and Aqua to the National Polar-orbiting Environmental Satellite System (NPOESS) will occur via the NPOESS Preparatory Project. In addition, NASA has formed a partnership with the National Oceanic and Atmospheric Administration (NOAA) and the European space programs for the transition of ocean altimetry measurements, and is working with the NPOESS program office and the U.S. Geological Survey on the transition of Landsat-type data collection.

1.5 **Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly?** Answer: YES Question Weight 20%

Explanation: The program is designed to target key Earth system science questions, and to provide Earth science data sets and model results to researchers, operational users and decision-makers. The rigor by which the ESS program is designed, structured, managed and funded ensures that resources reach only the intended beneficiaries. The six science focus areas guide the activities of the ESS and provide the context through which specific research objectives are formulated, science investigations are solicited, and missions that address them are planned. Missions and all other ESS tasks are broken down into discrete work breakdown structure (WBS) -style activities, and funds are issued at that level.

Evidence: ESS implementation is organized around six science focus areas that address the purposes described in 1.2 above (described in the ESE strategy at www.earth.nasa.gov/visions/index.html). In terms of disseminating ESE observations and research results, data sets from NASA ESE missions are made available in standard formats to researchers and other users at <http://gcmd.gsfc.nasa.gov/>. Selected higher level data products are posted at <http://www.esipfed.org/>.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 9%

Explanation: NASA's goals in pursuing Earth System science are to: 1) develop and demonstrate new space-based observing capability by implementing technological advances ' performance is measured by the new capability provided and successful deployment of space assets and data acquisition; 2) provide global Earth System data and information ' performance is measured by data distribution and data utilization statistics; 3) pioneer the use of space observations in answering priority science questions and improving understanding and prediction of the Earth system ' performance is measured with peer reviewed publications, citation index, new modeling capability, prediction improvement etc. Outcome-based performance measures are difficult, if not impossible, to construct as NASA's responsibility lies in getting information and technology to users who can then incorporate these into predictive models used to forecast hazardous weather events, assess climate change, etc., so output measures are often used as a proxy.

Evidence: See Measures tab.

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight: 9%

Explanation: Referring to the measures in 2.1, (1) ESS has development schedules for the EOS transition missions, and for the solicitation of new exploratory missions and advanced technologies which are driven by Research Plan requirements; (2) ESS has work underway to plan both the evolution of NASA's data and information management approach based on dialog with the science and applications communities; (3) ESS has developed roadmaps for each of its six science focus areas identifying research objectives and milestones for scientific assessments.

Evidence: Targets and timeframes for long-term measures are in the program's IBPD and in the detailed roadmaps for each of the six science focus areas (<http://earth.nasa.gov/roadmaps>).

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight: 9%

Explanation: For each long-term goal, the program has identified 3-6 annual performance measures. Again, outcome-based performance measures are difficult, if not impossible, to construct as NASA's responsibility lies in getting information and technology to users who can then incorporate these into predictive models used to forecast hazardous weather events, assess climate change, etc.

Evidence: See Measures tab.

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight: 9%

Explanation: Although many of the performance measures are new, baselines and targets have been established where possible.

Evidence: The ESS programs use traditional project management tools as schedule control, earned value and independent assessment to measure the degree of success being exhibited toward meeting ambitious development targets. Within the IBPD, all development projects list baseline vs. actual milestone dates, technical performance specs and costs.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: YES Question Weight: 9%

Explanation: Program partners' support for the overall goals of the program, and performance relating to these goals, is measured, reported, and assessed. ESS engages partners through the solicitation process and through interagency agreements which are geared towards the annual and long-term goals of the program.

Evidence: The evaluation criteria in ESE solicitations reference Science Focus Areas and science questions. For basic research grants, the solicitation explicitly includes the program goals (e.g. http://research.hq.nasa.gov/code_y/nra/current/NRA-02-OES-06/index.html). Grant applications and progress reports provide sufficient means for the program manager to assess performance and continuing relevance (e.g. <http://lcluc.gsfc.nasa.gov/products/results.asp?type=3>). For all other contracted activities, the contracts specify the performance required and means of assessing performance. Through regularly scheduled science focus area reviews program managers assess how well focus areas are adhering to program goals. Mission reviews are conducted to assess not only performance but progress towards annual and long-term program goals.

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight: 9%

Explanation: ESS program plans and activities are evaluated on a regular basis by the National Academy of Sciences (NAS) and the Earth System Science and Applications Advisory Committee (ESSAAC) to ensure effectiveness and relevance to needs. The U.S. Global Change Research Program (USGCRP), and now the CCSP, is repeatedly reviewed by the National Academy of Sciences. The National Academy reviews meet the quality, scope and independence requirements of the PART and are used to assess many of the Governments R&D programs.

Evidence: Scientific and programmatic progress and performance for the ESS program are presented to the FACA-chartered ESSAAC on a semiannual basis (http://www.earth.nasa.gov/visions/ESSAAC_minutes.html), and by the NAS on a periodic basis (e.g. <http://www4.nas.edu/webcr.nsf/ProjectScopeDisplay/SSBX-L-03-05-A?OpenDocument>, <http://www.nap.edu/books/NI000352/html/index.html>). Results of these reviews are the basis for revision and update of all ESS program activities and plans. For discrete missions, independent reviews are held that include but are not limited to: Non-Advocate review, Flight readiness and launch readiness reviews, operational readiness review. National Academy Reviews on the interagency USGCRP and CCSP include Global Environmental Change: Research Pathways for the Next Decade (1998) <http://books.nap.edu/catalog/6264.html>; The Science of Regional and Global Change: Putting Knowledge to Work (2001), <http://books.nap.edu/catalog/10048.html>; and Implementing Climate and Global Change Research (2004), <http://books.nap.edu/catalog/10635.html>.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

2.7 **Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget?** Answer: YES Question Weight: 9%

Explanation: Beginning in fiscal year 2006, the ESS budget request will be the outcome of a rigorous bottoms up formulation process whereby the requirements are aligned to the six science focus areas. NASA's full cost budgeting align the institutional and program resource needs and reflect a direct relationship between workforce planning at the centers and Enterprise strategic plans.

Evidence: Budget requests for mission formulation, development and mission operations are derived from assessments of annual performance and estimates of resources required to complete the mission and produce the scientific measurement. The resource requirements are clearly stated in full cost. NASA's Integrated Budget and Performance Document (IBPD) displays important status data for each mission, lists budget requirements for life cycle cost, and identifies the specific long-term outcomes and annual performance goals enabled by that mission. The ESS has a crosswalk from science focus area budget to Agency budget structure and is currently in process of transitioning to management structure based upon the six Focus Areas. In addition, NASA is one of few agencies to receive a "green" rating from OMB for budget and performance integration.

2.8 **Has the program taken meaningful steps to correct its strategic planning deficiencies?** Answer: YES Question Weight: 9%

Explanation: Strategic planning deficiencies are identified and addressed through a series of regular updates and reviews to the decadal plan. The strategic planning process engages the full range of participants of the enterprise, and involves sequenced generation of an overall strategic plan and several component strategies (research, applications, technology, education, data management). NASA has taken numerous steps to correct those deficiencies identified both through external review as well as those identified internally.

Evidence: The ESE Strategy draft was reviewed by both the Advisory Committee and the National Research Council's (NRC) Space Studies Board (SSB). The SSB, in particular identified numerous shortcoming in the plan both in terms of the strategy itself and how the document was presented, some of which were remedied in the final plan. Exchange of letters between ESE and ESSAAC and between ESE and SSB on the ESE Strategy are available upon request. To address some of the shortcomings identified, the ESS program is moving towards restructuring and managing by science focus area, with formal reviews of progress and challenges in each Focus Area once each year. Budget cross-cuts by focus area are prepared for their use in trade-off assessments. NASA has also engaged the NRC to develop a decadal survey with recommended priorities for science questions and measurements.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

2.CA1 **Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity?** Answer: YES Question Weight: 9%

Explanation: The analysis of alternatives to implement NASA's goals in Earth system science begins with the development and broad vetting of science goals, the science questions, and the six science focus areas. Concepts and alternatives for achieving the goals of these focus areas are analyzed and summarized in six focus area roadmaps, which identify the measurement and modeling capabilities needed, and provide a framework for assessing technical readiness, budget profile options and tradeoffs, and other implementation considerations (e.g., launch vehicle requirements, implied cumulative data rate). The broad science and aerospace industry community is then invited to propose mission alternatives to meet the goals of the roadmaps through open and competitive solicitations. After selection, mission implementation is guided by NASA-wide policy.

Evidence: Mission proposals are analyzed for both their scientific merit and their technical, cost and management approaches by scientific and technical peers from inside and outside of NASA. Implementation of the capability after selection follows a gated product development process as described in NASA Procedural Requirements NPR 7120.5B, which includes major external reviews at significant stages of the development process. Through implementation, the ESS program constantly assesses program performance and the risk associated with different courses of action. A recent example of was the decision to fly the High-Resolution Dynamics Limb Sounder (HIRDLS) instrument on Aura at less than 100 percent versus risk a total mission delay that would result in a major impact to other elements of the program.

2.RD1 **If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals?** Answer: YES Question Weight: 9%

Explanation: The ESS program continually evaluates its efforts with respect to the relative potential benefits of alternatives in the process of implementing the program's roadmaps, in part to determine if roadmap progress can be achieved using results produced outside of NASA. New satellite missions are proposed because the global data sets required can be obtained in no other way and, together with in situ networks, contribute to a global observation strategy as called for under the Global Observation Summit.

Evidence: Examples of NASA coordination with other programs include the interagency Committee on Earth Observation Satellites (CEOS, <http://www.ceos.org/pages/overview.html>) and the interagency working groups coordinating U.S. government research in each of the focus areas of the CCSP (<http://www.usgcrp.gov/usgcrp/ProgramElements/default.htm>). Documents that state requirements for satellite remote sensing in an integrated surface/in situ/satellite context include those found in the Global Climate Observing System (<http://www.wmu.ch/web/geos/groshome.html>), and the integrated Global Observing Strategy (<http://pc.unesco.org/igospartners/>).

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

- 2.RD2 Does the program use a prioritization process to guide budget requests and funding decisions?** Answer: YES Question Weight: 9%
- Explanation:** Within each science focus area are activities that indicate the specific scientific advances to be pursued in the near and mid-term. These questions form the framework for identification of specific missions, technology tasks and science NRAs. Estimates of the costs of these activities are then used to guide budget requests and funding decisions. Repeated management and scientific peer reviews ensure that each mission and scientific grant provides data and knowledge in a cost effective manner.
- Evidence:** The roadmaps generated for the six science focus areas provide a set of desired long-term outcomes, and identify the critical inputs that are needed in order to accomplish the desired long-term goals (<http://earth.nasa.gov/roadmaps>). The ESE Research Strategy (http://www.earth.nasa.gov/visions/researchstrat/Research_Strategy.htm) further describes the criteria used to set priorities. For the first time, the FY 2006 budget formulation process has been managed by science focus area. This will enable clear communication of the prioritization both within and between science focus area. In addition, as some 90 percent of the ESS budget is categorized as CCSP funding, NASA's budget is guided by the priorities established in the CCSP strategic plan.
- 3.1 Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?** Answer: YES Question Weight: 8%
- Explanation:** The ESS program collects relevant technical and programmatic performance data on a monthly basis. This information is used to assess monthly progress, annual progress toward meeting long-term outcomes, and can be used to develop risk mitigation strategies, adjust priorities, or make resource allocations.
- Evidence:** The program conducts monthly and quarterly reviews to gather and analyze performance data. Each flight mission and data program activity is reviewed monthly for cost versus plan, schedule movement, reserves, mass and power margins, estimate to complete assessments often with the aid of earned value assessment. Performance data collected on the GIFTS mission indicated that the project would have to exceed the cost cap in order to complete the instrument. Management action was taken and the effort has been terminated and rescoped to finish out remaining technology development. In terms of research grants, the Research Program Managers review the annual grantee reports and assess the accomplishments of the grantee against the original proposal. The results of the Program Manager's assessment are used to determine if continued funding is warranted.
- 3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results?** Answer: YES Question Weight: 8%
- Explanation:** Federal managers and partners are required to meet annual performance standards, schedules and costs, and are rated through a number of formal mechanisms and requirements. Depending on their performance as measured by these efforts, partners and managers are subject to awards, such as mission extensions, or penalties, such as diminished program participation or funding cuts.
- Evidence:** All employee performance plans for managers include elements tied to the program's strategic plans. Managers can receive a fail grade on their performance ratings if they do not satisfactorily meet cost, schedule or performance metrics. Award fee reviews are performed on contracts and past performance evaluations are integral in Announcement of Opportunity (AO) criteria. All grants and cooperative agreements are subject to deliverables and milestones that must be met in order to receive funding renewal.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 8%

Explanation: The ESS program obligates its funding in a timely manner and spends it for the purpose as appropriated by Congress.

Evidence: On average the ESS Program obligates approximately 85% of its authorized annual budget within the fiscal year for which funds are provided (NASA's funds are appropriated for a two-year period). One hundred percent of the ESS budget appropriated and authorized by the U.S. Congress is obligated over the two years available and is spent for its intended purpose as described in the IBPD and updated through the operating plan to Congress. Enterprise and Agency-wide controls ensure that funds are spent for the intended purpose.

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: YES Question Weight: 8%

Explanation: The program has the appropriate incentives and procedures in place to assure efficiency and effectiveness in program execution.

Evidence: IT improvements are used throughout the program to improve the flow of data and make information more available to the public and scientific community. NASA's move to full cost management is providing the ESS with a complete understanding of the cost of doing business across the NASA institution, the first step in reducing and controlling costs as well as how efficiently the institution is supporting the program. All activity carried out in the program is either openly competed or selected after comprehensive peer review, and performance is monitored on at least an annual basis. Competition and regular contract review cycles assure that initial vendors selected perform in a cost-effective way, and experienced program/project management assures continued performance. The most effective method by which contractors/grantees are motivated to achieve cost effectiveness and efficiencies is through the fee review (contracts) and peer review (grants) processes. Several times a year, depending upon contract stipulations, a panel reviews the contractor's progress and assigns it a grade which determines how much fee the contractor will earn for that review period.

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 8%

Explanation: NASA's space-based assets are a critical part of an effectively coordinating observing capability. To promote the utilization of these observations in accomplishing shared goals, NASA participates in joint planning and implementation efforts, joint initiatives, and jointly funded center and grant announcements.

Evidence: NASA program officials serve as CCSP principals and participate in the interagency working groups tasked with coordinating efforts and developing joint interagency plans, milestones and deliverables (e.g., synthesis and assessment reports). NASA participates in the USWRP developing common goals and coordinating efforts. The NASA-NOAA joint satellite data assimilation center is a jointly funded effort. NASA is also a member of the National Oceans Partnership Program (NOPP). NOPP has developed a strategic plan and works on Broad Agency Announcements (BAAs) to achieve shared objectives with multi-agency funding. The establishment and implementation of the Global Data Assimilation Experiment (GODAE) is a successful NOPP coordination effort. In addition, Close international coordination is carried out both bilaterally (e.g., Ocean Topography with France, Global Precipitation Mission with Japan) and through the Committee on Earth Observation Satellites (<http://www.ceos.org/pages/overview.html>).

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

3.6 Does the program use strong financial management practices?

Answer: NO

Question Weight: 8%

Explanation: The most recent Independent Auditor report identified four material weaknesses, two of which are repeats, as well as noncompliance with the Federal Financial Management Improvement Act.

Evidence: NASA's FY 2003 Performance and Accountability Report includes the communication from the NASA Inspector General and the report of the Independent Auditor. In addition, the GAO has published numerous reports identifying shortcoming in NASA's new financial management system as well as its financial management processes (most recent is GAO-04-754T released on May 19, 2004).

3.7 Has the program taken meaningful steps to address its management deficiencies?

Answer: YES

Question Weight: 8%

Explanation: Review structures have been changed and a major enterprise-wide retreat series has been held to improve overall management. Shift to focus area management is proving to lead to better communication and coordination across functional areas. Results of the CAIB report, an organizational climate survey performed by the Hay Group, and One NASA efforts are all leading to a re-assessment of management and leadership.

Evidence: The program review structure has been changed to emphasize science focus areas without overlooking the need to periodically assess projects and flight programs. These Focus Area reviews are scheduled monthly and are led by the Deputy AAs for the Earth Science Enterprise. Agency-wide, NASA is in the process of implementing an integrated financial management system and is working to improve contract management and use of financial data.

3.CA1 Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?

Answer: YES

Question Weight: 8%

Explanation: NASA's management procedures require that NASA programs and projects clearly define and document the capabilities or characteristics that are expected, including specific milestones to demonstrate progress towards completion, and clearly identify who is responsible and authorized to make management decisions based on whether milestones are being met. The Strategic Management Handbook defines the responsibilities of management officials for the processes. Responsibilities for oversight, insight, and execution of programs/projects are specifically assigned to officials at various levels of Agency management.

Evidence: Under NASA Procedural Requirements NPR 7120.5B, the key management documents used to plan and control programs and projects are the Formulation Authorization Document (FAD), the Program Commitment Agreement (PCA), the Program Plan, and the Project Plan(s). While not exhaustive the following documentation is available. FADs are available for NPP, GPM, LDCM, OSTM, GIFTS. PCAs are available for the EOS and Earth Explorer, GOES, POES programs. Project Plans (final and/or draft) are available for NPP, Calipso, Cloudsat, Aura, Glory, GPM, OSTM, GIFTS. Missions in formulation (OCO, Aquarius, Hydros, LDCM) do not yet have Project Plans. Level one requirements are in place for: Calipso, Cloudsat, Aura, NPP, Glory, GPM, OSTM, GIFTS, POES and GOES.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality? Answer: YES Question Weight: 8%

Explanation: Nearly all activities (as well as competitive grants) are selected either competitively or through peer-reviewed proposals. By nature of the peer review process, a quality outcome is assured. The technology infusion activity eliminates a great deal of technology-related risk before proceeding with development and many of the funded technology tasks find their way into concepts in future AOs. The program is managed as per NPR 7120.5B, NASA program and project management processes and requirements. Included in the development process are a series of reviews which serve to demonstrate that the baseline requirements are properly established and met. Verification methods include test, analysis, independent verification and validation, demonstration and inspection.

Evidence: Most activity is selected in response to fully open competition through Announcements of Opportunity, NASA Research Announcements, and Cooperative Agreement Notices (<http://research.hq.nasa.gov/Formats.cfm>). Mail and/or panel review is used for solicited as well as the small fraction of unsolicited research. The Earth System Science Pathfinder (ESSP) projects, the major source of either planned or on-going ESS missions, begin as announcements of opportunity, and are 100% competed and peer-reviewed. Once these projects are awarded and begin the definition process, they are subject to a risk mitigation phase in order to retire technical risk and ensure program quality before going into full development. During development, review boards comprising contractor and NASA personnel conduct Preliminary Design Review (PDR), the Critical Design Review (CDR) and the Design Certification Review (DCR). This certifies that the "design-to" baseline is established and meets requirements.

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: LARGE EXTENT Question Weight: 20%

Explanation: With the launch of Aura, the deployment of the first series of the Earth Observing System is complete. New missions to extend the essential data records from EOS are in development or formulation, including plans for transition to operational systems to secure long-term data continuity (e.g., NPP and NPOESS). The program has also completed development of EOSDIS ' the largest 'e-science' system in the world, distributing tens of millions of data products per year. The program has increased the percentage and absolute dollar investment in scientific research to exploit these new capabilities and has worked both to expand the universe of partners utilizing NASA data and observations as well as transition those data sets that are integral to building long-term environmental records.

Evidence: Missions on orbit and in development are shown at http://www.earth.nasa.gov/ese_missions/schedule.html, EOSDIS data is available to all users at <http://gcmd.gsfc.nasa.gov/>, Roadmaps for each Science Focus Area are available at www.earth.nasa.gov/roadmaps. GPRA Performance Reports documenting progress against established performance measures, as well as budget information, are available at: <http://ifmp.nasa.gov/codeb/library/reports.htm>, Highlights of recent scientific & programmatic progress are available at www.earth.nasa.gov/introduction/review/index.html. One example of a scientific result having significant impact in the decision / policy making can be found at <http://pubs.giss.nasa.gov/abstracts/2000/HansenSatoR.html>.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: LARGE EXTENT Question Weight: 20%

Explanation: The Earth System Science Theme has achieved its annual performance goals established in previous Performance Plans and has demonstrated progress in the annual goals identified in the PART.

Evidence: The 2003 Performance and Accountability report identifies progress on annual goals. Where baselines and targets have been established for new measures, progress is indicated on the "Measures" tab.

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: LARGE EXTENT Question Weight: 20%

Explanation: A key area of activity with regard to efficiencies has been in the area of mission operations. NASA's re-engineering and consolidation efforts in this area have led to documented cost savings and efficiencies. The program has also completed development of EOSDIS ' the largest 'e-science' system in the world, distributing tens of millions of data products per year. A contract for sustained operations and maintenance has been awarded and is resulting in large efficiencies in the way data is processed and archived.

Evidence: ESS has been successful in making mission operations more efficient through numerous re-engineering efforts. Examples: The UARS ground system has been reengineered to support what is known as a Traceability Mission. Costs went from \$21M in FY01 to \$2.5M in FY03 while continuing to provide accurate comparisons with other instruments. ESS established a joint working group with space science operating missions that reviewed space utilizations under the Consolidated Space Operations Contract. This effort returned 40,000 square feet of space to NASA's Goddard Center for reuse for new missions and projects and forced the elimination of approximately 30 CSOC positions that were located on site for a savings of over \$2M. The TRMM mission is presently being reengineered to lower ops costs by 50% through the implementation of automation capabilities in the TRMM mission ops center. This activity is a demonstration of new technology that is planned to be implemented on the TERRA, Aqua, and Aura missions in FY05.

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: NA Question Weight: 0%

Explanation: No other U.S. program studies the Earth system through comparable development and deployment of new technologies for civil earth observation from orbit.

Evidence:

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results? Answer: SMALL EXTENT Question Weight 20%

Explanation: Independent evaluations are conducted at regular intervals by a FACA advisory committee (ESSAAC), and episodically by the NRC. The former are broad in scope while the latter tend to probe specific items in depth. The U.S. Global Change Research Program (USGCRP), and now the CCSP, has been repeatedly reviewed by the National Academy of Sciences as have Earth observing programs from a government-wide standpoint. It should be noted many of these evaluations tend to emphasize strategic direction versus program impact and effectiveness. Frequently, reports, while indicating that NASA's science and remote sensing capabilities are making an important contribution, have questioned the Government's ability to successfully capitalize on its research investment as well as adequately prioritize research to support broader interagency goals. The NRC review of the NASA strategy, in particular, indicated that work remains in piecing together roles and responsibilities so that NASA R&D can be utilized by the broader community.

Evidence: ESSAAC minutes and recommendations, as well as material presented to ESSAAC by NASA, are accessible at http://www.earth.nasa.gov/visions/ESSAAC_minutes.html. Reviews by the NRC are available via the National Academy Press website; for example, their review of the ESE Research Strategy is accessible at <http://www.nap.edu/books/NI000352/html/index.html>, Implementing Climate and Global Change Research: A Review of the Final U.S. Climate Change Science Program Strategic Plan is at <http://books.nap.edu/catalog/10635.html> and Satellite Observations of the Earth's Environment: Accelerating the Transition of Research to Operations is at <http://books.nap.edu/catalog/10658.html>

4.CA1 Were program goals achieved within budgeted costs and established schedules? Answer: LARGE EXTENT Question Weight 20%

Explanation: ESS program goals were largely achieved within budget and established schedules. However, discrete missions have had challenges maintaining cost and schedule baselines.

Evidence: The development tab of the IBPD has baseline information on specific missions. The record at the Theme level has been one of work performed within budget and schedule. ESS has been able to make trades within the program to cover overruns and delays and has been able to minimize the negative impacts on other projects.

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

Measure: Of the total number of current observations developed by NASA, bring x% to a demonstrable operational state.

Additional Information: Demonstrates the successful hand-off of NASA technologies and data sets to operational agencies.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
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Measure: As validated by external review, and quantitatively where appropriate, demonstrate the ability of NASA developed data sets, technologies, and models to enhance understanding of the Earth system leading to improved predictive capability in each of the six science focus area roadmaps.

Additional Information: Supports the following long-term goal: Pioneer the use of space-based Earth observations in answering priority science questions in the ESE Research Plan (which contribute to national plans for climate, weather and natural hazards) to improve understanding and prediction of Earth system variability and change.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
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Measure: At least Eighty-five percent of NASA's Research grants are peer-reviewed and competitively awarded.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	85%	82%	
2005	85%		
2006	85%		

Measure: Number of days to award research grants, as determined by the time from receipt of proposals to issuance of the selection announcement.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	250	250	
2005	225		
2006	203		

PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

Measure: Continue to develop and deploy advanced observing capabilities and acquire new observations to help resolve key science questions; progress and prioritization validated periodically by external review. (New measure in FY 2005)

Additional Information: Supports the following long-term goal: Develop and deploy new space-based observing capabilities to meet research Earth System Science requirements, including US Global Change Science Program goals, and fulfill the US commitment to the Global Earth Observation System of Systems.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
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Measure: Keep 90% of the total on-orbit instrument complement functional throughout the year.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	90%	91%	
2005	90%		
2006	90%		

Measure: Successfully launch new satellite capabilities within 110% of baselined cost and schedule.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	110%	>110%	
2005	110%		
2006	110%		

Measure: Mature two to three technologies to the point where they can be demonstrated in space or in an operational environment and annually advance 25% of funded technology developments one Technology Readiness level (TRL).

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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PART Performance Measurements

Program: Earth System Science
Agency: National Aeronautics and Space Administration
Bureau: Earth Science Enterprise
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	83%	60%	Effective

Measure: For current observations, reduce the cost of acquiring and distributing the data stream to facilitate adoption by operational community.

Additional Information:

Year Target Actual **Measure Term:** Annual

Measure: Develop and implement, with domestic and international partners, an information systems architecture that facilitates the distribution and use of earth science data and focuses on interoperability, integration, and interfacing with other data systems and services. Progress will be evaluated periodically by external review, including ESE's FACA advisory committee and subcommittee (s).

Additional Information: Supports the following long-term goal: Evolve the Earth System Science data and information system (including EOSDIS) with new information technologies and approaches while engaging the science user community to provide the remote sensing portion of Earth information systems of the future as envisioned by the NRC and others.

Year Target Actual **Measure Term:** Long-term

Measure: Increase the number of distinct users of NASA data and services.

Additional Information:

Year Target Actual **Measure Term:** Annual

Measure: Improve level of customer satisfaction as measured by a baselined index obtained through use of annual surveys.

Additional Information:

Year Target Actual **Measure Term:** Annual

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

1.1 Is the program purpose clear?

Answer: YES

Question Weight 20%

Explanation: The purpose of the NASA Education program derives from NASA's mission statement, which includes the goal "to inspire the next generation of explorers, as only NASA can." The goal of the Education program is to inspire and motivate students to pursue careers in space-related disciplines and science, technology, engineering, and mathematics (STEM) disciplines broadly, using NASA's unique mission, facilities, and people to provide opportunities for students and teachers to gain direct experiences. The ultimate purpose of our education program is to prepare students to enter the NASA-related workforce. A secondary goal is to inform members of the general public about the importance of space exploration and demonstrate the value of space research.

Evidence: NASA Strategic Plan 2003; NASA Strategy for Education

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES

Question Weight 20%

Explanation: Preparing highly qualified students for science and engineering careers is imperative if the United States is to succeed in innovation. Preparing the teachers who will influence those students is equally imperative. The No Child Left Behind Act identifies the need to enhance achievement, while international comparisons in STEM subjects demonstrate that U.S. students do not achieve to international standards in science and mathematics. A scientifically literate citizenry is also critical to lend support to policy decisions involving science and technology. NASA's Education Program works to address all of these needs. The program also extends substantial support to underrepresented and underserved communities, using half of the program's resources to serve these populations.

Evidence: Science & Engineering Indicators (NSF), No Child Left Behind Act, Trends in International Mathematics & Science Survey (TIMSS), Executive Order 12999

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES

Question Weight 20%

Explanation: On the whole, NASA's Education Program fills a unique niche by providing educators and students the opportunity to gain direct experiences using our state-of-the-art equipment and facilities. For example, students conduct research on the KC-135 and develop payloads to be launched on sounding rockets. At the same time, many of the grants programs are similar to the type of research support that other federal agencies (e.g., Dept. of Education, Dept. of Energy, National Science Foundation) award. It is not entirely clear that all NASA education programs are conducted, as NASA's mission statement asserts, 'as only NASA can.' In addition, some programs, such as the Faculty Awards for Research, duplicate the research grants already offered by other NASA program offices.

Evidence: NASA Strategic Plan 2003; NASA Strategy for Education

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight 20%

Explanation: The NASA Education Program has an appropriate design to meet its goals. The Program consists of research grants, research opportunities at NASA field centers, and programs conducted at K-12 schools, museums, and other civic centers. The programs address the needs of students, teachers, and people at all stages of their careers and lives. The program also supports underrepresented and underserved populations. NASA has tended to allow education programs to proliferate over the years without taking measure of the unique need for each program and the performance of similar, existing programs. This practice means the agency could be supporting programs that are ineffective or serve a need that is no longer compelling. Fortunately, the agency is committed to improving this issue.

Evidence: NASA Education Program Evaluation Review Report (NEPER); NASA Education Evaluation Review. The Education Programs has recently begun comprehensive program reviews and has established criteria by which new programs will be evaluated before being initiated and on a periodic basis. The main objective of this review process is to identify and eliminate redundancies, programmatic weaknesses, and gaps in the portfolio and make commensurate budget decisions.

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight 20%

Explanation: NASA's Education Program is designed to provide continuous support to students in STEM disciplines from elementary through university. NASA also provides support to teachers, university faculty, & other educators at all levels. Resources are directed toward these purposes. Approximately half of the Program's funds are dedicated to support for underrepresented and underserved populations. The heavy emphasis and classification of programs as "minority" and "non-minority" potentially could be limiting the Program's overall effectiveness by not reaching all segments of society in proportion to demographics.

Evidence: In FY03, 3.1 million people directly participated in NASA education programs, including 723,000 K-12 teachers, 59,000 higher education faculty, 2.1 million K-12 students, and 103,000 students in higher education.

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight 13%

Explanation: The Education Program has developed several long-term measures for GPRA reporting requirements. A subset of these measures is counted among the PART long-term measures. OMB will work with NASA to refine existing measures and develop others needed to adequately cover the program's performance.

Evidence: See objectives 6.1, 6.2, 6.3, 6.4, 7.1 and their associated outcomes documented in the NASA Education Enterprise Strategy

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight 13%

Explanation: The NASA Education Enterprise Strategy documents ambitious targets and timeframes for specific long-term performance measures. An example target is increasing student participation in NASA programs by 20% by 2008. The program still needs to identify baselines as well as targets for its PART measures that are under development. OMB will work with NASA on measures that reach beyond 2008.

Evidence: Education Strategy - outcomes

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight: 13%

Explanation: The Education Program has developed several annual measures for GPRA reporting requirements as a means of demonstrating progress toward achieving its long-term goals. OMB will work with NASA to establish and/or improve annual targets in support of its long-term PART measures as well as appropriate efficiency measures.

Evidence: Education Strategy - Annual Performance Goals

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: NO Question Weight: 13%

Explanation: Ambitious annual targets have been developed and are documented in the NASA Education Strategy. Baselines have not yet been established for all program outcomes since the Education Program was established as a major NASA division in FY03. The program still needs to identify baselines as well as targets for its PART measures that are under development.

Evidence: Education Strategy; Evaluation database reports; Data have been consistently collected & saved since 1996

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: YES Question Weight: 13%

Explanation: Grant guidelines require grantees to show alignment with Enterprise goals and objectives. Progress is monitored through progress reports and submission of evaluation data tied to Enterprise goals. Grantees identified by Congressional earmarks are required to submit proposals that show alignment with strategic goals and with operating principles to the extent possible. The NASA education strategy is a consensus document developed with input from a broad range of stakeholders. The Enterprise exemplary program criteria are used to assess alignment to Enterprise strategy.

Evidence: Grant Guidance; Education Strategy; NRAs, Program Announcements, Cooperative Agreement Notices

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight: 13%

Explanation: Independent, standards-based evaluations are essential to the research & evaluation strategy. Some independent evaluations that have been conducted or are underway include the comprehensive NASA Education Program Evaluation Review (NEPER), conducted in FY02, a review of the Aerospace Education Services Program (being conducted by the Evaluation Center at Western Michigan University), a review of NASA Explorer Schools (currently being conducted by the Research & Evaluation Department at Wheeling Jesuit University), the Space Grant College & Fellowship Review Panel (completed by a peer review panel of NASA), the American Customer Satisfaction Index (complete), and the Space Sciences education program (being conducted by Lesley University). Evaluations that meet relevant standards for scientific research are planned for each of the four NASA education strategic initiatives; only one (the NASA Explorer Schools program) is currently underway. A comprehensive, external evaluation of the education portfolio will be conducted in FY05.

Evidence: Office of Education evaluation plan; Education Strategy; NEPER report; Explorer Schools Evaluation Progress Report; Space Grant Review Results, ACSI

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: NO Question Weight:13%

Explanation: The Education Enterprise has not yet explicitly linked budget requests to accomplishment of performance goals. The current budget structure and budget justifications for Education do not offer visibility into the programs the budget supports; there is poor linkage between the programs, their funding, and the results they yield. However, the Enterprise has implemented an annual review process, assessing programs against established Exemplary Program Criteria. NASA plans to phase out programs that do not meet review standards. The program review intends to support budget decisions in the FY06 budget cycle.

Evidence: Exemplary Program Criteria

2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight:13%

Explanation: Six program operating principles now serve as the criteria by which decisions are made to initiate, continue, or terminate programs. Programs that scored below a target criterion in NASA's 2003 evaluation of education programs were required to submit an improvement or corrective action plan to correct identified weaknesses. The plan must be reviewed & approved or the program is subject to termination. Another action being taken is to conduct longitudinal analyses of program participants so we can assess students' progress & their career choices, as affected by participation in NASA programs.

Evidence: Evaluation of NASA Education Programs report

3.1 Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance? Answer: NO Question Weight:10%

Explanation: An evaluation strategy was developed & is being implemented in FY04. The plan specifies that performance data on individual programs will be collected in a single data system. Data are intended to be continually collected & reported annually for all programs, including those operated by key partners. All programs are required to submit data; however, not all programs have been consistent in doing so, and the reliability & completeness of the data needs to improve. Annual program reviews are conducted to assess programs against exemplary program criteria. Programs not in alignment with Enterprise strategies and objectives are required to implement improvement plans & are subject to cancellation if sufficient progress is not made. Additionally, a research & evaluation plan is being implemented with the intent to institutionalize evaluation, linking performance information to management. Currently, not all programs perform their own evaluations.

Evidence: NASA Education Program Evaluation Review Report, submitted to OMB 10/1/03; ERASMUS; NASA Education Evaluation Data System

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: NO Question Weight: 10%

Explanation: Accountability for cost, schedule, and performance is lacking. To address the issue, an annual program review, first conducted in FY03, has been established to ensure that programs & program managers are accountable for achieving exemplary program standards. Program managers were required to submit improvement or corrective action plans based on scores from the FY 2003 review. Unacceptable plans resulted in program terminations. Programs must submit progress reports. NASA's performance planning process for employees links performance with the Agency Strategic Plan through specific elements in program managers' performance plans. One major program, the Space Grant College & Fellowship program, holds grantees accountable for achievements via annual reviews and a comprehensive evaluation conducted every five years. The third five-year evaluation has just concluded, & as a result some programs were placed on probation and some state grants will be recompeted. However, on balance, these activities do not sufficiently define accountability for cost and schedule.

Evidence: Exemplary Program Criteria; Research & Evaluation Plan; Agency Performance Planning documents; grant/contract solicitations with past performance as evaluation factor

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 10%

Explanation: Funds are largely obligated in a timely manner and spent for the intended purposes. For all programs, managers review proposals, maintain regular communications, and evaluate progress reports to ensure funds are spent according to plan and for intended purposes. The exception is that funds are not obligated in a timely manner for Congressionally-directed projects because frequently proposals are not received from the recipients of directed Congressional appropriations in a timely manner. All unsolicited proposals, including directed appropriations, are reviewed against Agency criteria (merit, strategic alignment, & cost) as well as Education Enterprise operating principles. However, directly appropriated projects must be awarded regardless of merit review, ensuring the proposal is at least minimally acceptable. New financial controls are being put in place at the Enterprise level to allow tracking of program expenditures at Centers.

Evidence: POP guidance, program financial plans; IBPD; obligation/cost plans; SF272s (Federal Cash Transaction Reports) for grantee reporting of costs; procurement management system

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: NO Question Weight:10%

Explanation: The program uses certain methods to achieve program cost effectiveness but does not measure efficiencies. The e-NASA initiative greatly expands Internet use as a program delivery & management technique and is expected to greatly lower the cost per participant in NASA education programs, thus achieving improvements in cost effectiveness. In addition, all programs are peer reviewed and competitively selected, with the exception of directed Congressional appropriations. Many of our programs, notably Space Grant, collect data on the amount of funds leveraged by the NASA funding, and these data are reported into our education evaluation data system. We do not, however, formally measure efficiency in program execution at this time. In FY02 we attempted to develop methods to calculate reasonable return on investment; this pilot was not successful, primarily because the nature of NASA's education programs make it difficult to estimate program results in financial terms, but we will explore alternative methods to compute return on investment.

Evidence: Exemplary program criteria; E-NASA Plan; Return on Investment report.

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight:10%

Explanation: NASA is participating actively in the President's Mathematics & Science Initiative as well as the Mathematics & Science Partnerships with the Department of Education and NSF. We have participated in the past in FCCSET & currently with NSTC. We regularly invite other agencies such as Dept. of Ed. & NSF to collaborate. An MOU with NSF to collaborate on evaluation activities has been used as the basis for several collaborative evaluation activities. Internally, the Education Enterprise collaborates closely with the science & technology enterprises & assigns staff to liaison positions with each. Liaison staff are responsible for ensuring that the education activities of the S&T enterprises conform to enterprise operating principles. Further, S&T education programs are reviewed as part of the Enterprise review process.

Evidence: Department of Education Mathematics & Science Plan; MOU with NSF for evaluation studies; MUREP/MIE with NSF

3.6 Does the program use strong financial management practices? Answer: NO Question Weight:10%

Explanation: Current practices do not justify a Yes on this question. NASA had four material weaknesses including controls reconciling fund balance with Treasury, ability to provide an audit trail to support financial statements and controls over property, plant and equipment. As a result of these material weaknesses, NASA is not in compliance with the Federal Financial Management Improvement Act (FFMIA). These weaknesses pervade every program in the agency. Errors in full cost budgeting of funds within Education also contributes to the "no" for this question. To improve the situation, the Enterprise will enhance staffing levels in its financial management unit and implement new controls at the program level.

Evidence: FY 2003 independent audit by PriceWaterhouseCoopers; IFMP; FY2002 Accountability Report

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

3.7 Has the program taken meaningful steps to address its management deficiencies? Answer: YES Question Weight:10%

Explanation: Organizationally, the Education Enterprise was created to achieve efficiencies by merging several NASA organizations that conducted education programs. Four divisions were created to oversee program segments (Elementary/Secondary, Higher Education, Informal Education, Educational Technology). A program review process was conducted for the first time in FY03. Program deficiencies were identified and improvement plans formulated. Action plans have been implemented. The Enterprise has also taken action to improve coordination with the S&T enterprises by establishing a liaison officer to coordinate the education activities & by making S&T programs subject to an annual review process. Regarding financial management, the Education Enterprise plans to enhance staffing levels in the financial management area; an action team from the Comptroller's Office is currently conducting an analysis of financial management practices & will make recommendations for additional improvements.

Evidence: Education Enterprise organization; education strategy

3.CO1 Are grants awarded based on a clear competitive process that includes a qualified assessment of merit? Answer: NO Question Weight:10%

Explanation: The Education Enterprise makes awards on a competitive basis to the extent possible. Considerable attention is paid to expanding the pool of qualified potential awardees. The largest program component, Space Grant, has just completed a rigorous program evaluation, & the results were used to re-compete underperforming grantees. However, both the Space Grant and EPSCoR programs make awards as legislatively directed to either all states (Space Grant) or a specific set of states identified as receiving a small share of federal R&D funds (EPSCoR). Directed congressional appropriations are reviewed using both Agency criteria (strategic alignment, merit, & cost) as well as education-specific criteria, but selection cannot be competitive since Congress specifically mandates the awards. For FY04, there are 45 directed appropriations totaling \$62.5 million--almost 37% of the Education Enterprise budget. None of these Congressionally-directed projects are competitively selected; however, the Education Enterprise is transitioning all other education program funding to a competitive basis.

Evidence: Peer review boards convened for all grant applications (solicited and non-solicited).

3.CO2 Does the program have oversight practices that provide sufficient knowledge of grantee activities? Answer: YES Question Weight:10%

Explanation: The Education Enterprise uses several methods to monitor grantee activities. These include tracking of financial data through regular reporting methods, meetings with program participants, site visits, and review of program data, including the annual program review. In general, the program has a high level of understanding of the work performed by our grantees. Not every grant is formally reviewed annually.

Evidence: NASA Education Evaluation Information System; Research and Evaluation Plan

3.CO3 Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner? Answer: NO Question Weight:10%

Explanation: Data are collected on both an ongoing & an annual basis, but only summary programmatic information is available on the Education Enterprise web site. Some data are reported at a high level through the Performance Accountability Report (PAR). Data are available for most program components. Basic grant information is available through the FACS system and in published documentation.

Evidence: NASA Education Evaluation Information System; Performance Accountability Report

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: SMALL EXTENT Question Weight 20%

Explanation: The Program's achievement of most of its annual goals as articulated in the FY04 performance plan supports progress toward its long-term goals. However, most of Education's long-term measures are new this year and baselines and incremental annual targets toward reaching those goals are not yet defined. It therefore remains to be seen whether the program is on course toward achieving its long-term goals.

Evidence: FY2004 Accountability Report; FY2003 Strategic Plan; NEPER; NASA Education Program Evaluation report to OMB

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: SMALL EXTENT Question Weight 20%

Explanation: As documented in the FY04 Performance Accountability Report, NASA achieved most of its annual performance goals associated with the accomplishment of each of the five education objectives. However, the Education Program has yet to establish baselines for its goals, so the meaning of the results is not clear.

Evidence: FY2004 Accountability Report

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: SMALL EXTENT Question Weight 20%

Explanation: While NASA has not tracked this specific type of data in the past for education, NASA has reorganized & consolidated its education programs & anecdotal reports indicate that efficiencies are being achieved. The educational technology program found that 85% of its activities acquired independent funding to sustain activity. Several programs, including Space Grant and Classroom of the Future, have leveraged substantial matching funds & external support, which enhances efficiency & cost-effectiveness. The Space Grant program averages approximately a 2:1 ratio of leveraged funds to NASA funds. The Agency is working to maximize education investments in a smaller number of programs, thereby avoiding duplication. Also, the agency needs to better maximize investments in post-secondary programs by filling critical needs by making job offers to program participants.

Evidence:

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: LARGE EXTENT Question Weight 20%

Explanation: Unique in the federal science and technology education portfolio due to its focus on space education, NASA's education program nonetheless has performed well compared to other federal education programs that have been evaluated with the PART recently. While there are private programs that fulfill similar purpose and goals, no performance data were readily available for comparison. The NEPER panel of external education experts, chartered by NASA in close consultation with OMB, reviewed the program in 2001 & concluded that "the NASA Education Program is effective at reaching its goals within NASA's appropriate role."

Evidence: 2005 PARTs; NEPER Report

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results?

Answer: SMALL
EXTENT

Question Weight 20%

Explanation: A few independent evaluations have indicated that the Education Enterprise is effective and achieving results to some extent. The NEPER panel, composed of independent experts in education & evaluation, concluded in 2001 that NASA's education program is, "effective at reaching its goals." A study of the Minority University Research & Education Program was conducted during the same time frame with similar results. The NEPER study, however, examined the program at a high, aggregated level rather than performing a detailed analysis of the program and concluded that NASA needed to document actual program outcomes. Several other independent reviews are being conducted now (Explorer Schools, the Aerospace Education Services Program, Classroom of the Future); evaluators indicate positive results thus far, but these studies have not yet been completed.

Evidence: NEPER Report, MUREP Evaluation Report, external evaluation plans

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

Measure: Percentage of higher education program participants who have participated in NASA elementary or secondary programs

Additional Information: This measure rates the effectiveness of the "pipeline" system the education program has established.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2005			
2006			
2007			
2008			
2009			

Measure: Number of people reached via e-education technologies per dollar invested

Additional Information: This measure expresses the extent of NASA's educational reach through Internet technologies

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2005	Under dev		
2006	Under dev		
2007	Under dev		
2008	Under dev		
2009			

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

Measure: Degree to which NASA engages the informal education community with NASA science and technology

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2005			
2006			
2007			
2008			
2009			

Measure: Percentage of programs that have developed and annually measure their effectiveness using performance metrics relating to NASA's mission and education goals

Additional Information: This measure assesses the degree to which the program is accountable for its achievements and has the information it needs to make management decisions

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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Measure: Percentage of grants awarded on a competitive basis

Additional Information: This measure assesses the degree to which the education program awards grants based on competitions of merit

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Under dev		
2006	Under dev		
2007	Under dev		
2008	Under dev		

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

Measure: Percentage of grantees that annually report on their accomplishments
Additional Information: This measure assesses the degree to which the program holds grantees accountable for progress in the work for which they receive grants

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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Measure: Percentage increase in number of elementary and secondary student participants in NASA instructional and enrichment activities
Additional Information: This measure assesses the reach of elementary and secondary education programs to students

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Base	???	
2005	105% base		
2006	110% base		
2007	115% base		
2008	120% base		

Measure: Percentage increase in number of elementary and secondary educators utilizing NASA content-based STEM materials and programs in the classroom
Additional Information: This measure assesses the degree to which teachers are using NASA educational materials

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Base	???	
2005	105% base		
2006	110% base		
2007	115% base		
2008	120% base		

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

Measure: Level of student learning about science and technology resulting from elementary and secondary NASA education programs
Additional Information: This measure assesses the degree to which select NASA education programs have an impact on student knowledge about science and technology

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
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Measure: Level of student interest in science and technology careers resulting from elementary and secondary NASA education programs
Additional Information: This measure assesses the degree to which NASA education programs have an impact on student career interests

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
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Measure: Number of higher education institutions that align their NASA research and development activities with STEM teacher preparation departments to improve STEM teacher quality
Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	87		
2005	5%		
2006	5%		
2007	5%		
2008	120% base		

PART Performance Measurements

Program: Education
Agency: National Aeronautics and Space Administration
Bureau: Education Enterprise
Type(s): Competitive Grant

Section Scores				Rating
1	2	3	4	Adequate
100%	75%	40%	40%	

Measure: Percentage of new NASA employees that participated in a NASA education program

Additional Information: This measure assesses the degree to which NASA education programs promote and facilitate student interest in working with NASA

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2005			
2006			
2007			
2008			

Measure: Percentage of NASA higher education student participants who are studying or working in space-related fields five years after their involvement has ended and claim their NASA education experience influenced or reinforced their career decisions

Additional Information: This measure assesses the degree to which NASA education programs have a lasting impact on student academic and career paths

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2005	Under dev		
2006	Under dev		
2007	Under dev		
2008	Under dev		

Measure: Percentage of underrepresented and underserved student participants in NASA higher education programs who are studying or working in space-related fields five years after their involvement has ended and claim their NASA education experience influenced or reinforced their career decisions

Additional Information: This measure assesses the degree to which NASA education programs have a lasting impact on student academic and career paths

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

1.1 Is the program purpose clear?

Answer: YES Question Weight 20%

Explanation: The Mars Exploration Program (MEP) has a well-defined and focused purpose that ties directly to the NASA vision and mission, and the Space Science Enterprise strategic plan. The goals and objectives are clear and unambiguous to all interested parties (Congress, the Administration, and the public).

Evidence: MEP's purpose can be found in the Solar System Exploration Roadmap, which describes the activities of both the Mars and Solar System Exploration themes. The Roadmap describes the programs' goals and objectives and their linkages to both Enterprise and Agency Strategic Plans. The MEP exploration strategy is defined by three program Objectives: (1) Understand the current state and evolution of the atmosphere, surface, and interior of Mars; (2) Determine if life exists or have ever existed on Mars; and (3) Develop an understanding of Mars in support of possible future human exploration. Each objective is the subject of several Research Focus Areas, representing key areas of scientific emphasis. Identified within each of these Research Focus Areas are investigations that indicate the specific near-and mid-term scientific advances to be pursued. Finally, the specific missions that collect data for the investigations are identified.

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES Question Weight 20%

Explanation: Mars likely possessed a climate conducive to the development of life at some point in its past and may have habitable zones capable of supporting primitive life forms (e.g., bacteria) to this day. As such, Mars represents a leading target in the scientific search for life beyond Earth. The scientific and technical approaches utilized by the MEP represent the science and the technical communities' best strategy in the search for life at Mars. The approaches also relate directly to understanding and predicting the environmental evolution and habitability of planet Earth and to future educational needs, especially inspiring in the American public a spirit of excitement about scientific exploration. The importance and specific interest that MEP addresses is endorsed by the National Research Council as documented in "New Frontiers in the Solar System Survey: An Integrated Exploration Strategy."

Evidence: The National Academy of Sciences reviewed the MEP as part of its Decadal Survey to help NASA prioritize the missions and science objectives for the next ten years. The SSE Roadmap, of which MEP is a part, was created to achieve the vision set out by the Decadal Survey and reaffirmed that the MEP's investigation of whether Mars ever harbored any kind of life contributes to NASA's overall efforts to explore the universe and search for life.

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES Question Weight 20%

Explanation: MEP is a unique and one-of-a-kind program with a long-term science goal that is not being funded or managed by anyone other entity (i.e., Federal, state, or local government; private industry).

Evidence: The MEP is the world's only comprehensive program designed to collect and interpret such a broad panoply of scientific knowledge concerning another planet, while setting the context to answer whether life exists beyond Earth. There is no committed International Mars Program after the European Space Agency's (ESA) Mars Express, and ESA's Mars program (Aurora), which includes the French and Italian space agencies, is still in a very early stage and is geared toward the eventual human exploration of Mars. NASA is participating in Japan's Nozomi mission, which will arrive at Mars in January 2004. However, Japan has not committed to Mars missions beyond Nozomi. Also, there is no redundancy between the National Science Foundation's (NSF) astronomical science objectives and the MEP science objectives. NSF science objectives focus on ground-based planetary astronomy, while MEP/NASA Space Science Enterprise science objectives are generally pursued via space-based investigations.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight: 20%

Explanation: MEP's science strategy and technical approach are the product of a broad community (NASA and other Federal agencies, universities, industry, and international partners) that has been intimately involved for several years. The products have been reviewed by the National Academy of Sciences and NASA advisory committees. It is the consensus of the community that the program architecture is optimally designed to answer the key questions consistent with NASA and the Space Science Enterprise strategic plans. It should be noted that MEP does not have sufficient funding (within its approved baseline budget, the FY 2004 President's Budget) to completely answer its approved science objectives.

Evidence: Reviewers believe MEP has achieved scientific/infrastructure/programmatic resiliency/efficiencies. Contingencies ensure critical paths are unobstructed. MEP doesn't rely on international partners to achieve objectives. France's cancellation of a program through which NASA anticipated testing future Mars technologies will not prevent NASA from meeting these objectives. One technology (search and rendezvous) will be demonstrated on the Mars Telecomm Orbiter; the other technology (network science) will be included in the next decade Mars program through partnership with ESA or competed opportunities. MEP is risk attentive (measurements lost in mission failure would be recovered by future missions) and will be responsive to discoveries. Scout missions can augment/complement program objectives and recover key measurements. MEP also shares lessons between missions and validates critical technologies on precursor missions. Strategic plan/roadmap/program plan/Program Commitment Agreement provide basic structure, contingency plans, decision points, and resource requirements for effective/efficient program implementation.

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight: 20%

Explanation: The rigor with which MEP is designed, structured, managed and funded ensures that resources reach only the intended beneficiaries and will address the program's purpose directly. The three science objectives for MEP as outlined in the SSE Roadmap guide the activities of the MEP and provide the context through which specific research objectives are formulated, science investigations are defined, and missions that address them are planned. Missions are broken down into discrete work breakdown structure-style activities, and funds are issued at the mission level and below. These funds may not be spent on anything other than the purpose for which they were issued.

Evidence: The scientific purpose of each mission is well documented and is linked to specific Enterprise and Agency goals and objectives (as documented in MEP Integrated Budget and Performance Document [IBPD], the Solar System Exploration Roadmap, and the Enterprise Strategic Plan). Funds are issued to the appropriate entity at the mission level or below. Above a certain level, Federal law prohibits the redirection of resources issued for one program to another program without express Congressional approval. In addition, NASA has adopted a full cost management system, which instills additional rigor in properly targeting and managing its funds. Finally, a revised financial system and a new computer tracking system (Integrated Financial Management [IFM]) will enable all Agency programs to ensure that each program dollar is properly directed and expended.

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 10%

Explanation: MEP long-term PART measures focus on outcomes and meaningfully reflect the program's purpose.

Evidence: MEP has six specific long-term performance measures. Four are outcome measures, one of which addresses program management while the other three address scientific outcomes, the purpose of MEP. Two of the performance measures are outputs, and they address accomplishment of key project milestones and technological activities.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight:10%

Explanation: MEP has ambitious targets and timeframes for its long-term measures.

Evidence: MEP's scientific measures aim for an annual rating of "green," signifying excellent progress, by an external advisory committee. These measures will be assessed for the program's duration. MEP's program management long-term measure aims for 100% compliance with NASA's management guidelines and will also be assessed for the program's duration. The development and technology milestone measures include a series of annual targets the program is expected to meet each year.

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight:10%

Explanation: MEP has specific annual performance measures that demonstrate progress toward achieving the program's long-term goals.

Evidence: MEP's annual performance measures support and indicate progress toward addressing its six long-term measures. Each of the long-term science measures is supported by annual measures that address various facets of the scientific questions encapsulated in the long-term measures. The program management long-term measure is supported by three annual measures that serve as indicators of effective program management: adherence to baseline cost, baseline schedule, and a competitive awards regime.

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight:10%

Explanation: MEP has baselines and ambitious targets for its annual measures.

Evidence: The program management annual measures have targets intended to note whether costs and schedule are followed closely and the majority of project funds are competed. The scientific annual measures all aim for ratings of "green," signifying excellent progress, by an external advisory committee.

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: YES Question Weight:10%

Explanation: The MEP partners (NASA Centers, JPL, contractors and other private organizations, universities, international organizations, and other Federal agencies) are directly involved in planning and establishing the program's goals and objectives. As a result of this process, they fully support and are committed to the achievement of both the annual and long-term goals of the program.

Evidence: MEP goals/objectives were developed by the Mars Exploration Payload Analysis Group & include contributions by NASA Centers, JPL, contractors, universities, international organizations, & other Federal agencies. Goals/objectives are reviewed/updated every 2-3 years to reflect new data & knowledge. MEP enforces mutual understanding of goals/objectives by using Letters of Agreement & Memoranda of Understanding with international partners/Federal agencies, contracts/grants with industry/universities, & task-level agreements w/JPL. Each mission includes a Program Plan/Level 1 Agreement between NASA HQ & NASA centers (JPL included) to document technical deliverables/science requirements. MEP conducts award fee/mid-year performance/ad hoc reviews to determine & verify partners' sustained commitment. Independent review boards conduct contract and program reviews with some frequency. The Space Science Strategic Plan/Solar System Roadmap are distributed to all partners to ensure familiarity w/long-term science goals. Regular interactions among partners in meetings fora, teleconferences & reviews ensure partners understand/work toward MEP goals.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight: 10%

Explanation: The MEP is in the early implementation stages of the new (post-1999 failures) Mars exploration architecture and has been reviewed by independent groups (National Academy of Sciences, NASA advisory committees, National Research Council), which concurred with the scientific strategy and implementation approach. Evaluation of program performance will be accomplished by integrating inputs from several groups, each with varying degrees of independence and differing emphases.

Evidence: The Mars Exploration Program Advisory Group (MEPAG), a body of world expert scientists and technologists who provided the scientific analysis and basis for the goals and objectives of the MEP, is also a critical forum for assessment of MEP progress towards achieving these goals. Scientific and programmatic progress and issues related to the MEP are presented to the FACA-chartered Space Science Advisory Board on a quarterly basis (via the Solar System Exploration Subcommittee). Scientific and programmatic results are measured against the GPRA metrics on an annual basis. In addition, the MEP director has chartered a senior group of technical, scientific, and management experts who meet twice a year to discuss strategies, progress and technical plans. Additionally, in 2000-01 the NAS Committee on Planetary and Lunar Exploration (COMPLEX) conducted an independent scope and quality evaluation of the program up through the 2005 Mars Reconnaissance Orbiter. The COMPLEX report, together with the SSE Decadal Survey, influenced Mars program planning and implementation for this decade, and particularly the Mars Next Decade program (beyond 2009) missions.

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: YES Question Weight: 10%

Explanation: MEP long-term performance goals, or outcomes, reflect the cumulative effect of annual activities. The degree to which these outcomes are realized is dependent upon the degree to which the annual performance goals are achieved. This assessment is validated by external reviews. MEP goals and objectives are directly linked to specific missions. Budget requests for each mission are dependent upon the successful completion of the current year's planned activities and the future requirements. The life-cycle cost requirements for each mission, now stated in full cost mode, are included in the Integrated Budget and Performance Document. The budget requests are directly tied to near and long term performance goals in terms of specific missions to be launched on specific launch opportunities through the decade from 2001 to 2009. The budget includes other elements such as technology, research and analysis, and education and program outreach necessary to support the objectives of the program.

Evidence: MEP long-term performance goals are directly linked to both Enterprise and Agency strategic goals and objectives (see Space Sciences Strategic Plan and Agency Strategic Plan). In addition, the SSE Roadmap tracks objectives down to specific missions. Budget requests for each mission are derived from assessments of annual performance and estimates of resources required to complete the mission. The resource requirements are clearly stated and are now stated in full cost mode. The Integrated Budget and Performance Document displays important status data for each mission, lists the budget requirements for life cycle cost, and identifies the specific long-term outcomes and annual performance goals supported by each mission. To be consistent with scientific investigation and programmatic options for the next decade, planning for technology investments to support MEP missions beyond this decade is still in progress. Options for the next decade of MEP missions are to be completed and finalized for the FY06 budget process.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

2.8 **Has the program taken meaningful steps to correct its strategic planning deficiencies?** Answer: YES Question Weight: 10%

Explanation: MEP has a system for identifying and correcting deficiencies in its strategic planning process.

Evidence: Experts involved with MEP for many years periodically review MEP's progress & offer advice/counsel. This process leads to update/revision of the Space Science Enterprise Strategic Plan, which is then reviewed by the NAS. This update occurs every 3 years. The Solar System Exploration Subcommittee reviews MEP strategies, missions, & objectives. Deficiencies or corrective actions to strategic planning activities are incorporated into the Solar System Exploration Roadmap & ultimately the Integrated Budget & Performance Document. In 2001, NAS's Committee on Planetary and Lunar Exploration (COMPLEX) assessed the restructured MEP and found that NASA's previous strategic plan wasn't adequately addressing the "life" question. The present strategic plan & mission priorities addresses those concerns. Also, COMPLEX & the Solar System Exploration Decadal Survey recommended a more aggressive approach to sample return & long-lived network science, both of which are addressed in next-decade plans. The program plan has definitive dates for all missions this decade & decision points/contingencies for the pathways/missions of next decade.

2.CA1 **Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity?** Answer: YES Question Weight: 10%

Explanation: The MEP regularly conducts analyses of alternatives including tradeoffs between cost, schedule, risk, and performance goals. Independent review teams examine missions throughout their life cycles to evaluate their ability to satisfy requirements and meet commitments. The analyses of alternatives substantiate reviewers' recommendations for proceeding with, modifying or terminating the program or project, or for enhancing overall technical and programmatic performance.

Evidence: Approval of management documents used to plan and control programs/projects depends on successful completion and independent review of tradeoffs. A Governing Program Management Council has primary responsibility for evaluating the cost, schedule and technical content of the program/project to assure that NASA is meeting its key commitments. Actions or changes to the program/project resulting from these independent reviews and evaluations will be incorporated into these documents. Examples of tradeoffs made within MEP in 2002-03 include: (1) assessment of cost benefits for the Mars Global Surveyor mission extensions; (2) assessment of multiple design approaches to validate target costs for missions such as the 2009 Mars Telesat Orbiter and Mars Science Laboratory; and (3) re-alignment within MEP following cancellation of international components and development of plans for recovery of the science.

2.RD1 **If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals?** Answer: NA Question Weight: 0%

Explanation: MEP is a basic research program; therefore, this question is not applicable to MEP.

Evidence:

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

2.RD2 **Does the program use a prioritization process to guide budget requests and funding decisions?** Answer: YES Question Weight: 10%

Explanation: MEP is completely integrated with the Agency and Enterprise goals and objectives. Independent outside organizations review the program and help set scientific priorities in line with these goals and objectives. These scientific priorities are then assigned to missions and are used to guide the budget requests and funding decisions. Repeated management and scientific peer reviews ensure that each mission provides data in a cost effective manner.

Evidence: The NAS reviewed MEP in its Decadal Survey to help NASA prioritize missions and science objectives for the next ten years. Independently, COMPLEX assessed the restructured MEP during the 2000-01 timeframe, providing feedback to MEP management. The SSE/MEP Roadmap was created to achieve the vision set out by the Decadal Survey. This roadmap links objectives to Research Focus Areas (RFA), RFAs to scientific investigations, and investigations to specific missions. MEP's strategy is defined by 3 program objectives: (1) Understand the current state/evolution of the atmosphere, surface, and interior of Mars; (2) Determine if life exists/has ever existed on Mars; (3) Develop an understanding of Mars in support of possible future human exploration. All existing and future MEP missions will support one/two/all MEP strategic objectives, which are consistent with NAS recommendations. Mission life cycle costs are the basis for budget requests and funding decisions. Frequent reviews of these science outcomes by outside independent bodies (such as the NAS and the NAC) as well as NASA staff ensure that priorities are reflected in budget requests and funding decisions.

3.1 **Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?** Answer: YES Question Weight: 8%

Explanation: On a monthly basis MEP collects relevant technical and programmatic performance data from key performance partners. Information is used to assess progress, develop risk mitigation strategies where needed, and to adjust priorities, make resource allocations, or take other appropriate management actions.

Evidence: The Space Science Enterprise reviews performance data monthly. Programs over a certain \$ value must exercise a contractor-owned, Agency-approved earned value system; NASA financial analysts study results. NAC subcommittees annually review MEP's progress toward achieving long-range outcomes. NAS inputs, including Decadal Surveys/targeted reviews, are integrated into roadmaps & Enterprise Strategy. NASA has initiated full cost mgmt & an integrated financial mgmt system for completeness & greater insight into its finances. Data collected monthly from key program partners include technical, schedule, & financial status. Such data showed the 2003 Mars rovers had significant technical & mass risks. Schedule/mass/cost were traded to keep the rovers on track for launch in summer 2003. Lander structures were built of composites to save mass, deviating from Pathfinder heritage & requiring significant qualification. The aggressive schedule & resource management proved essential to preserving technical & schedule viability. A potential flaw in the composite-wound propellant tanks was discovered late, but this control allowed a switch to titanium tanks & maintain schedule.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: YES Question Weight: 8%

Explanation: All MEP Federal managers and program partners (contractors, subcontractors, PIs, universities) are held accountable for their cost, schedule, and performance results.

Evidence: Every manager is required to develop a formal personal performance plan with his or her supervisor. This plan consists entirely of critical elements, at least one of which must be linked to the Agency's Strategic Plan or the organization's operating plan or goals. Although the program's performance may be evaluated on a more frequent basis, the program manager's performance is formally evaluated twice yearly. Bonuses and promotions are dependent upon the manager making positive progress toward meeting the goals of the program. JPL is held accountable for the successful implementation of the program. JPL's subcontractors (Ball Aerospace, Lockheed Martin, universities, and others) are held accountable for the timely delivery and quality of products. NASA uses award fees to incentivize JPL performance, and JPL also uses such fees to incentivize its contractors. Partners, including JPL, who fail to perform as required may likewise find their participation reduced or terminated.

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 8%

Explanation: MEP obligates its funding in a timely manner and ensures that they are spent for their intended purpose as appropriated by Congress.

Evidence: Annual NASA R&D funds are available for obligation for two years and are fully obligated by the end of the period. Operating plans for the program year are submitted to Congress and revised as needed over the two-year time period. Internally, obligation and cost plans are developed, compared to actual spending, and reviewed monthly by all levels of the program. The NASA Procurement Management System is the primary system used to provide monthly reporting of all obligations and costs. These are tracked against unique project numbers (UPNs) traceable to contractor and institutional source documents. Contractor and government accounting systems are audited periodically to ensure compliance with government standards. On average, MEP has been obligating about 97% of its authorized annual budget. For further details, please see: NASA's monthly FACS report, contractor monthly & quarterly reports (533s), SF133 (report on budget execution and budgetary resources), FMS2108 year-end closing statement, and NASA's annual Performance and Accountability Report.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: YES Question Weight: 8%

Explanation: MEP has effective management procedures in place to ensure the efficient use of dollars spent on program execution.

Evidence: MEP has policies to incentivize competitive outsourcing, best value procurement practices, and employee performance and productivity improvements. Information Technology is used extensively. Efficiency/effectiveness are generally measured in the timely delivery of scientific products addressing the Strategic Plan and are consistent with Level 1 requirements and agreements. Competitive selection and process is imposed throughout MEP, and MEP uses this competitive process to promote cost efficiencies and effectiveness. NASA Research Announcements for MEP base and focused technologies have been released in a timely fashion. Incentive and award fee evaluation is used to motivate contractors (JPL/others) to achieve cost and efficiencies effectiveness in program execution. MEP uses the following NASA uniform efficiency metrics to measure efficiencies and cost effectiveness: (1) Each development project will complete its current phase within 10% of total life-cycle cost; (2) Each research project will allocate 75% of funding competitively; (3) MEP will complete all missions within 10% of baseline schedule.

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 8%

Explanation: The MEP collaborates and cooperates, where reasonable and practicable, with other NASA programs and/or Federal agencies where shared or similar goals and objectives might permit a more efficient use of resources while increasing the scientific and/or technological return. MEP also continues to seek science collaboration with international partners where it is possible and beneficial to the U.S. taxpayer.

Evidence: MEP coordinates and collaborates with NASA's Aerospace Technology Enterprise to facilitate enabling and enhancing technology maturation and infusion. MEP continues to work closely with the Space Flight Enterprise to ensure the availability of launch services and with the Biological and Physical Research Enterprise for "Safe on Mars" measurements. MEP maintains an ongoing collaborative relationship with its international partners at the program and project level for planning and coordination. MEP has a new collaborative effort with the MIT/Lincoln Laser Optical Communciation Technology demo to fly on the 2009 Mars Telesat Orbiter. MEP will team with Project Prometheus and the Dept. of Energy to develop the Multi-Mission radioisotope thermal generator that will be included in the 2009 Mars Science Laboratory. Currently MEP is partnered with Italy for the Sharad instrument to fly on the Mars Reconnaissance Orbiter.

3.6 Does the program use strong financial management practices? Answer: YES Question Weight: 8%

Explanation: NASA will be operating in full cost accounting starting in FY04 and is implementing an Integrated Financial Management System (IFMS). JPL, the primary manager of MEP, has been operating in full cost mode since its early years.

Evidence: Since JPL manages approximately 90% of the MEP, most of the MEP has been operating in a full cost management mode rather than what has traditionally been referred to as "business as usual." Under full cost, service pool and G&A costs will be managed and allocated in appropriate amounts to the direct costs of the programs they support. This assures that the full cost, not just the direct costs, of a program is actively managed. In addition, a very powerful computer-based tool now supports the Integrated Financial Management System (FMS), greatly enhancing its ability to track, integrate, and account for all costs and financial resources.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

3.7 Has the program taken meaningful steps to address its management deficiencies? Answer: YES Question Weight: 8%

Explanation: NASA has many means of noting management deficiencies, and any deficiencies that are uncovered are subsequently remedied. The Space Science Enterprise, which manages MEP, has a well-structured process in place to conduct monthly and annual performance reviews. MEP is evaluated and management deficiencies are noted through budget formulation and execution processes. The MEP director has frequent contact with directors of implementing organizations for MEP projects to discuss and mitigate any management deficiencies. In addition, there is a long tradition of inviting independent bodies to review programs for various deficiencies, including management and propose solutions to any problems. Lessons-learned workshops are conducted to alert management to the kinds of mistakes that have been made under similar circumstances in the past so as to avoid repeating them in the future.

Evidence: MEP has addressed the deficiencies/imparted all the recommendations identified by the Mars Program Independent Assessment Team (MPIAT) after the '99 Mars failures. Recommendations included establishing: (1) a dedicated, single interface at NASA HQ for MEP responsible for all requirements, decisions, & budgets, which reports to the AA for Space Science; (2) a program office at JPL w/stature reporting directly to the JPL director; (3) a Flight Project Directorate, where Mars and other major flight projects get attention by the institution; and (4) a policy to provide telemetry during critical events. Intimate institutional involvement, open communication, & peer reviews determined that the 2003 rovers could not be completed on schedule w/o exceeding approved baseline budget. Technical/budget reviews resulted in programmatic changes to ensure mission success. Budget analysts and planners were added to provide early problem detection, metrics were added to monitor workforce health/safety, and incompressible test lists were generated to ensure the integrity of products. These lessons learned are being implemented in the 2005 mission.

3.CA1 Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals? Answer: YES Question Weight: 8%

Explanation: During the more traditional phases of MEP programs, the hardware development and launch, a program will develop and maintain a clearly defined list of deliverables, along with the required performance characteristics, costs and schedule goals. Progress is measured by traditional methods such as earned value, schedule accomplishment, independent assessments, etc., in order to determine whether the limited window for launch can be met and whether the cost is exceeding predetermined limits. The results of these assessments and reviews impact program management decisions.

Evidence: Opportunities to send missions to Mars exist about every 26 months. In order to meet the tight launch windows, a clearly defined list of hardware and software deliverables, along with required performance characteristics and costs and schedule must be developed, documented, maintained and followed. These documentations are found in the Program Commitment Agreement, the Program Plans and the Project Plans. The program manages carefully to the information contained within these documents; allowing requirements creep and schedule slip might prove disastrous to a mission's ability to launch. There is also usually a hardware delete list in case the program has been spending too much money or has been losing schedule and must take action to get back on schedule and budget. Any indications that the program may exceed total life cycle costs by 15% are automatic grounds for cancellation consideration.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

3.CO1 Are grants awarded based on a clear competitive process that includes a qualified assessment of merit? Answer: YES Question Weight: 8%

Explanation: NASA, including MEP, awards 100% of its grants according to a rigorous and well-defined system of competition and reviews that ensures that only the most meritorious proposals are selected for award.

Evidence: All grants selected for funding by NASA are broadly competed through the NASA Research Announcement process. Grant proposals must relate directly to both Agency and Enterprise goals and objectives. All proposals are peer-reviewed by experts comprising a mix of scientific disciplines and are selected on merit. NASA also utilizes an electronic mailing list as part of its outreach efforts. This mailing list includes virtually the entire population of those who might wish to participate in the grant process.

3.CO2 Does the program have oversight practices that provide sufficient knowledge of grantee activities? Answer: YES Question Weight: 8%

Explanation: NASA, including MEP, has an oversight practice that provides sufficient insight into and knowledge of grantee activities.

Evidence: NASA has an oversight practice that provides sufficient insight into and knowledge of the grantee's activities. Discipline scientists take the results of the grant peer reviews and make selections as to whom grants will be awarded. These scientists then monitor the progress of the grant toward meeting its stated goals for the duration. Formal annual reports are provided by grantees, and expenditures are tracked at a cumulative level. The discipline scientists have sufficient insight into the performance of the grantees to understand what the grantees do with the resources that are allocated to them. Officially, the grantees are required to submit annual progress report before the next increment of funding is released to them.

3.CO3 Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner? Answer: YES Question Weight: 8%

Explanation: NASA, including MEP, collects grantee performance data and makes them available to the public in a manner that is both useful and meaningful.

Evidence: Formal progress reports, which are a required output of each research and analysis activity funded under the MEP, are submitted on an annual basis. The NASA lead scientist, together with appropriate discipline scientists review the progress reports before recommending continuation of the research activity or not to the procurement officers before funding is released to the grantees. The results of grants-based research are broadly disseminated to the public through the use of science forums, publications, NASA press releases and news conferences, museum displays, educational materials, and NASA's web site. NASA is currently working to develop an evolving database that will post grantees' annual reports on the Internet. The database is scheduled to become available to the public by calendar year 2004. In addition, some of the highlights from the grantee annual reports are published in the "Space Science: Supporting Research and Technology (SR&T) Program Highlight" brochure.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality? Answer: YES Question Weight: 8%

Explanation: MEP allocates funding using a broadly competitive process and will only sole-source projects on the basis of a demonstrated unique expertise or capability.

Evidence: MEP advocates full and open competition at all levels to the greatest extent possible. Sole-sourcing of any major mission component can only be exercised on the basis of a demonstrated unique expertise or capability. MEP competes at least 75% of its budget through full and open competition. Detailed explanations/breakdown on competition among the MEP elements can be found in the MEP Integrated Budget and Performance Document.

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: YES Question Weight: 20%

Explanation: The majority of MEP's long-term PART measures are new this year; moreover, most of them will be works in progress for the duration of the program's existence. Nonetheless, MEP has made significant progress towards addressing its long-term scientific, program management, development and technology goals.

Evidence: MEP has made significant progress towards addressing its long-term goals. NASA's FY02 Performance and Accountability Report indicates that the Space Science Enterprise, of which the MEP is a significant part, achieved 100% of its GPRA annual performance goals. The MEP's long-term performance goals or outcomes are linked to those of the Enterprise and contribute considerably to their achievement. Since the long-term performance goals reflect the cumulative effect of annual activities, and the degree to which long-term performance measures are being achieved is determined by the degree to which annual performance goals are being met, the MEP can be said to have demonstrated significant progress toward achieving its long-term performance goals. Mars Global Surveyor completed its 1st extended science mission successfully and started its second extension. Odyssey has returned more high quality mapping data than anticipated. The Mars Exploration Rovers launched in summer 2003.

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: LARGE EXTENT Question Weight: 20%

Explanation: The program has achieved its performance goals consistent with its annual performance goals.

Evidence: MEP has achieved its annual performance goals to a large extent. NASA's FY02 Performance and Accountability Report indicates the Space Science Enterprise, of which MEP is part, achieved 100% of its GPRA annual performance goals. MEP annual performance goals are linked to the Enterprise's strategic goals and objectives and contribute significantly to their achievement. The Enterprise's 100% achievement of annual performance goals includes MEP's achievement of its annual performance goals. MEP projects in development are averaging a 12% cumulative and 4% FY2003 overrun over baseline life cycle cost. 75% of the MEP FY03 budget will be allocated through open peer-reviewed competition. Both MGS and Odyssey have produced outstanding scientific results.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: LARGE EXTENT Question Weight: 20%

Explanation: Implementation of the restructured program has just started with a successful Mars Odyssey mission. All key elements are in place for future missions to continue returning science data with increased efficiencies and cost effectiveness.

Evidence: Consistent with NASA uniform efficiency measures (projects will complete current phase within 10% of total life-cycle cost; projects will allocate 75% of funding competitively; and all missions will be completed within 10% of baseline schedule), MEP has continued to demonstrate improved efficiencies and cost effectiveness in achieving its program goal. Missions in operation to date are demonstrating better than one order of magnitude improvement in capability in Mars orbit. The program has and will continue to demonstrate better mechanisms for cost estimation, continuous cost monitoring, control, and risk mitigation strategies. A cost efficiency for Mars Global Surveyor and Mars Odyssey combined operations is about 25%; this cost efficiency is achieved through sharing of the flight operation team. Mars Odyssey's returned data volume is twice the amount planned: 127Gbyte verses 155Gbyte planned for the entire prime mission, and it has only completed 48% of prime mission.

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: NA Question Weight: 0%

Explanation: The MEP is the world's only comprehensive Mars exploration program; therefore, its performance cannot be compared with any other programs.

Evidence: See explanation.

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results? Answer: LARGE EXTENT Question Weight: 20%

Explanation: Independent evaluations conducted by the National Academy of Sciences for the purpose of assisting the Space Science Enterprise with strategic plans confirm the effectiveness and quality of the program. Advisory committees to the Agency also confirm program effectiveness.

Evidence: The National Academy of Sciences and NASA advisory committees have reviewed the MEP. Consensus is that MEP has achieved significant scientific, infrastructure, and programmatic resiliency and efficiencies within available resources. See the National Academy of Sciences' Solar System Exploration Decadal Survey for detailed information. In addition, the Mars Program Independent Analysis Team chaired by T. Young reviewed the MEP at the Space Science Enterprise's request for technical resiliency and to make sure that all their concerns had been addressed. The committee agreed that MEP had incorporated all its recommendations and had adequate technical and scientific resiliency. Observations were presented to NASA's Governing Program Management Council on June 26, 2001.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

4.CA1 **Were program goals achieved within budgeted costs and established schedules?**

Answer: LARGE
EXTENT

Question Weight 20%

Explanation: Under the restructured Mars Exploration Program approved in 2000, MEP goals have generally been achieved within budget costs and established schedules. The exception is the 2003 Mars Exploration Rovers.

Evidence: The 2003 Mars Exploration Rovers (MER) experienced schedule difficulty that led to a cost overrun of 17% of initial life cycle cost. All other MEP missions (Mars Global Surveyor, 2001 Mars Odyssey, Mars Express, Mars Reconnaissance Orbiter) are either within budget or underrunning their initial baseline cost and schedule. Two MEP international missions to be launched in 2007 were terminated due to lack of commitments from the international partners.

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

Measure: Compliance with NASA Procedures and Guidelines (NPG) 7120.5B

Additional Information: This measure tracks NASA's performance in managing MEP in accordance with Agency implementing strategies.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term (Efficiency Measure)
Ongoing	1		

Measure: Percentage of budget allocated through open, peer-reviewed competition.

Additional Information: On average, MEP projects in development will not slip from their baseline schedules by more than 10% cumulatively or 5% annually.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual (Efficiency Measure)
2003	<10%, <5%	0%, 0%	
2004	<10%, <5%		

Measure: Progress in determining the characteristics and dynamics of the interior of Mars

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Green		

Measure: Progress in determining whether life exists or has ever existed on Mars

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
Ongoing	Green		

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

Measure: Progress in investigating the character and extent of prebiotic chemistry on Mars

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Green		

Measure: Progress in searching for chemical and biological signatures of past and present life on Mars

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Green		
2005			
2006			

Measure: Progress in understanding Mars in support of possible future human exploration

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
Ongoing	Green		

Measure: Progress in identifying and studying the hazards that the Martian environment will present to human explorers

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Green		

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

Measure: Progress in inventorying and characterizing Martian resources of potential benefit to human exploration of Mars

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green		Annual

Measure: Accomplishment of key development activities.

Additional Information: * Successfully land at least one Mars Exploration Rover (MER); Successfully complete Level One Requirements for the MER mission; Successfully complete the 2005 Mars Reconnaissance Orbiter Assembly, Test, and Launch Operations Readiness Review

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Achieve *		Annual

Measure: Accomplishment of key technology activities in support of Mars exploration

Additional Information: **** Complete laser communication demonstration concept review; Release instrument Announcement of Opportunity (AO) for the 2009 Mars Science Laboratory

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	****		Long-term

Measure: Progress in understanding the current state and evolution of the atmosphere, surface, and interior of Mars

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
Ongoing	Green		Long-term

Measure: Progress in characterizing the present climate of Mars and determining how it has evolved over time (** NASA's external advisory committee will rate NASA's performance against this measure as "green" [on a green-yellow-red "stoplight" scale], signifying NASA's successful achievement of this goal.)

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green**		Long-term

PART Performance Measurements

Program: Mars Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

Measure: Cumulative and annual percentage baseline cost overrun on spacecraft under development (*** On average, MEP projects in development will not exceed their baseline costs by more than 10% cumulatively or 5% annually.)

Additional Information: On average, MEP projects in development will not exceed their baseline costs by more than 10% cumulatively or 5% annually.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual	(Efficiency Measure)
2003	<10%, <5%***	12%, 4%		
2004	<10%, <5%***			

Measure: Percentage of budget allocated through open, peer-reviewed competition

Additional Information: On average, MEP will allocate the target level of funding competitively.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual	(Efficiency Measure)
2003	>75%	66%		
2004	>75%			

PART Performance Measurements

Program: Mission and Science Measurement Technology
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	91%	83%	54%	Effective

1.1 Is the program purpose clear?

Answer: YES Question Weight 20%

Explanation: The Mission and Science Measurement Technology (MSM) Theme addresses Goal 10 in the NASA Strategic Plan, which is to "Enable revolutionary capabilities through new technology." The objectives of the MSM Theme are to improve the capability to accurately assess and manage risk in the synthesis of complex systems, to create system concepts and demonstrate technologies that enable new scientific measurements, and to develop breakthrough information and communications systems to increase our understanding of scientific data and phenomena. The primary customers of the MSM Theme are the NASA Enterprises, which depend on MSM to develop crosscutting technologies for their future missions.

Evidence: MSM Theme objectives are described in the NASA Strategic Plan, and in the MSM Theme Integrated Budget and Performance Document (IBPD)

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES Question Weight 20%

Explanation: The MSM Theme fills the critical role of identifying basic research products, developing and integrating these products into mission-oriented technologies, validating them against mission needs, and then infusing them into NASA missions and processes, resulting in lower risk and greater science return.

Evidence: The MSM role in identifying , developing, and transitioning technology products for NASA's future mission needs is clearly defined in the MSM IBPD, and the IBPD's of the three programs that make up the MSM Theme: the Computing, Information, and Communications Technologies (CICT) Program develops breakthrough computing, information, and communication systems to increase our understanding of scientific data and phenomena; the Engineering for Complex Systems (ECS) Program develops the capabilities to assess and manage risk in the synthesis of complex systems; the Enabling Concepts and Technologies (ECT) Program defines new system concepts and develops new technologies to enable new science measurements.

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES Question Weight 20%

Explanation: The MSM Theme develops technologies that focus on first-of-a-kind and few-of-a-kind NASA mission applications across multiple classes of missions and Enterprises. This type of wide ranging effort to develop advanced technology can only be managed and funded by the government. Next year's PART will assess whether the MSM program has reduced overlaps reported by the NRC (e.g., in MEMS/ nanotechnology) and clarified relationships with technology development programs in other enterprises.

Evidence: The MSM Theme coordinates its research programs with DoD by participating in the Space Technology Alliance, and by partnering with other government agencies such as the Air Force, the Defense Advanced Research Projects Agency, and the National Oceanic and Atmospheric Administration to jointly develop and leverage new technologies. The MSM Theme involves external peer reviewers from other government agencies, universities, and academia to periodically review its research activities to insure that duplication of effort is minimized.

PART Performance Measurements

Program: Mission and Science Measurement Technology
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	91%	83%	54%	Effective

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight: 20%

Explanation: MSM Programs have been effective in developing advanced technologies and inserting them into NASA missions. To increase the success rate of technology infusion, MSM has actively engaged the NASA Enterprises to help in program formulation and management. This will insure that the program remains effective and relevant to customer needs.

Evidence: The implementation process for MSM programs has been redesigned in the past year to provide a closer working relationship with the NASA Enterprises. The MSM Theme established a Technology Executive Board (TEB), which consists of representatives from the Enterprise customers. The TEB provides guidance on overall program content and direction. MSM will co-fund the transition of mature technologies to the Enterprises to insure that these technologies will be used in NASA missions.

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight: 20%

Explanation: The MSM Programs consist of well-defined projects that target the development of specific technologies to meet specific objectives. The NASA Enterprises, who are the beneficiaries of MSM technologies, provide guidance on the formulation of these projects, and on the allocation of resources.

Evidence: The IBPD's of the MSM programs outline the objectives, long-range performance goals, and resource allocations to the projects. Each project has an annual Project Plan that defines the organization, technical approach, milestones, and resource allocation to performing organizations.

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 9%

Explanation: Each program in the MSM Theme has specific long-range performance goals that focus on definite outcomes.

Evidence: The long-range performance goals and associated outcomes are documented in the Technical Commitment section of the IBPD and in the PART.

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight: 9%

Explanation: Performance targets are revolutionary capabilities for enabling currently unachievable missions and order-of-magnitude improvements in system performance. Each project has near-term technical milestones that demonstrate progress toward achieving long-range program objectives.

Evidence: Annual technical milestones for assessing progress over the next 5 years are defined in project plans. The technical milestones are tied to long-range performance objectives in the IBPDs of the MSM programs. The IBPDs show a schedule for maturing major technology products to specific Technology Readiness Levels (TRLs).

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight: 9%

Explanation: The MSM Theme has Annual Performance Measures that are used to assess progress towards achieving the long-range performance goals.

Evidence: The Annual Performance Measures are documented in the Performance Measures section of the IBPD, as GPRA indicators in the NASA Performance Plan, and in the PART

PART Performance Measurements

Program: Mission and Science Measurement Technology
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Moderately
100%	91%	83%	54%	Effective

- 2.4 Does the program have baselines and ambitious targets for its annual measures?** Answer: YES Question Weight: 9%
- Explanation: Performance goals have a target and a minimum success criteria relative to an initial baseline .
- Evidence: Technology Readiness Levels (TRLs) are used to assess the progress of technology development. Baseline TRLs for major technology products are established in the program IBPDs to indicate the current state of maturity.
- 2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program?** Answer: YES Question Weight: 9%
- Explanation: MSM performing organizations include NASA Centers, performance-based industry contractors, university grantees, and occasionally personnel from other government agencies. Each of these participants have specific documented roles in achieving the program goals, and participate in annual planning efforts by sub-projects of the program.
- Evidence: Roles of performing organizations are documented in Project Plans. MSM NASA Research Announcements have Research Focus Areas that proposers must include in their proposals to show linkage to long-term program goals.
- 2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need?** Answer: YES Question Weight: 9%
- Explanation: The MSM Theme is reviewed for technical quality by the National Research Council (NRC), for program relevance by the Aerospace Technology Advisory Council (ATAC), and for program performance by the NASA Independent Program Assessment Office (IPAO). Reviews are held every year, with the reviews rotating among Quality, Relevance, and Performance every 3 years.
- Evidence: The last NRC review was conducted from June, 2002 through April, 2003. The last ATAC review was conducted in May, 2003. The ATAC reports their findings to the Associate Administrator for Aerospace Technology. The IPAO conducted a Non-Advocate Review of ECS Program in April, 2003. Performance reviews of the ECT and CICT Programs are planned.
- 2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget?** Answer: YES Question Weight: 9%
- Explanation: The MSM Theme submits an Integrated Budget Performance Document (IBPD) with each year's budget request that defines annual and long-term performance goals and the resources required to achieve these goals. However, it is not clear that the MSM program provides adequate insight into why MSM's performance/resource mix is appropriate, particularly in terms of why each of the MSM programs gets the percentage of funding it receives and what the taxpayer can expect to get for that funding. Next year's PART will review this area to determine whether progress has been made.
- Evidence: The linkage of performance goals to annual budget requests are documented in the MSM IBPD.

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2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight: 9%

Explanation: The MSM Theme has established a Technology Executive Board that consists of representatives from the NASA Enterprises who provide guidance on strategic technology needs, which is used for program planning. The MSM Theme has also initiated several efforts to ensure that MSM projects better support NASA needs, to increase the percentage of MSM work that undergoes external peer review, and to enhance transition of technologies into the NASA enterprises.

Evidence: Strategic technology needs provided by the NASA Enterprises are used for annual program planning. Long-range and annual performance goals are formulated to address these strategic technology needs. The performance goals are documented in the MSM IBPD.

2.CA1 Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity? Answer: NO Question Weight: 9%

Explanation: No analyses have been done at the Theme level on tradeoffs across the programs involving cost, schedule, risk, and performance. Each program internally evaluates a wide range of alternative technologies and approaches for achieving long-term objectives.

Evidence: The NRC has reviewed the technical approaches and analyses of the MSM programs. The NRC made recommendations for changes that the programs are implementing. The NRC findings and recommendations are documented in their interim report.

2.RD1 If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals? Answer: YES Question Weight: 9%

Explanation: MSM evaluates a wide range of alternative technologies and approaches and compares these to other government and industry programs with similar goals.

Evidence: Many MSM activities involve collaborative research with DoD, NSF, other government agencies, and industry. These partnerships allow comparison and assessment of alternative approaches that maximize potential benefits.

2.RD2 Does the program use a prioritization process to guide budget requests and funding decisions? Answer: YES Question Weight: 9%

Explanation: The MSM Theme has a technology assessment process to identify and prioritize mission-enabling technologies and guide program investment decisions. The Technology Executive Board has identified high-priority technology areas for the MSM Theme to address, and the MSM Theme has used these priorities to select topics for new research announcements.

Evidence: The TEB has identified high-priority technology areas for the MSM Theme to address. These high-priority areas were used to formulate new projects in FY05, and to select the topics for NRAs issued in FY04.

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3.1 Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance? Answer: YES Question Weight: 8%

Explanation: MSM programs collect technical accomplishments, schedule status, and financial status every month from key program partners. The programs use this information to develop risk mitigation strategies, adjust priorities, make resource allocations, or take other appropriate management actions.

Evidence: MSM projects report status quarterly to their respective NASA Center Program Management Councils. MSM Program Managers report monthly to the MSM Theme Director. The MSM Theme Director reports quarterly to the NASA Program Management Council. Monthly program status is tracked with the NASA ERASMUS database.

3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: YES Question Weight: 8%

Explanation: All MSM program managers and partners (contractors, subcontractors, universities) are held accountable for their performance

Evidence: MSM programs are managed by NASA Headquarters. The program managers designate NASA Centers to manage projects within each program. The project managers are held accountable for the success of their respective projects. Project plans signed by the program manager, the project manager, and the director of the performing NASA Center are required every year. MSM programs conduct annual reviews of all tasks. Cost, schedule, and performance evaluations are used by program management to determine whether tasks are continued, modified, or terminated.

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 8%

Explanation: MSM obligates its funding in a timely manner, and spends it for the purpose as appropriated by Congress.

Evidence: MSM has financial metrics imposed and enforced by NASA's Aerospace Technology Enterprise, which it routinely meets. These metrics are 100% Obligation by the end of the Fiscal Year, and 83% Costing by the end of the Fiscal Year. In addition, The Aerospace Technology Enterprise requires 100% costing by the end of each Calendar Year. Programs in non-compliance are adjusted downward during the next fiscal year to compensate. 100% of the MSM budget appropriated and authorized by the U. S. Congress is spent for its intended purpose. Agency-wide controls ensure that funds are spent for the intended purpose.

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3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: NO Question Weight: 8%

Explanation: Although MSM has effective management procedures in place to ensure the efficient use of dollars spent on program execution, it does not track any overall efficiency metrics.

Evidence: MSM competes the majority of its work through two primary mechanisms. The first mechanism uses competitive NASA Research Announcements (NRAs) on a periodic basis to award research tasks in a highly competitive manner which includes cost and performance as metrics. The second mechanism uses competitive industry outsourcing contracts that provide performance-based onsite contractors to the various NASA Centers. These performance-based contracts are periodically re-competed in order to ensure cost effectiveness in performing the required work.

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 8%

Explanation: MSM initiates the development of high-payoff crosscutting technologies and matures them to the laboratory proof-of-concept stage. The technologies are then transitioned into the focused technology development and validation programs of the NASA Enterprises for mission insertion. MSM works closely with these other NASA programs to insure that new technologies will be picked up and used by the Enterprises. Next year's PART will assess MSM's response to NRC recommendations that it improve the connectivity of its research with other research efforts within and outside of NASA.

Evidence: The Technology Executive Board (TEB) coordinates MSM programs with programs in other NASA Enterprises. MSM partners with Enterprise technology programs such as the Astrobiology Science and Technology Exploration Program, the Mars Technology Program, the In-Space Propulsion Program, the New Millennium Program, and the Instrument Incubator Program.

3.6 Does the program use strong financial management practices? Answer: YES Question Weight: 8%

Explanation: MSM uses effective financial management practices in administering program funds. MSM programs track monthly obligations and cost status against spending plans, and financial status is reported in monthly reviews to the NASA Program Management Council.

Evidence: NASA is in the process of installing an Integrated Financial Management (IFM) system to ensure strong financial management practices by all programs. Most of the NASA Centers, along with NASA HQ, have transitioned to the IFM System.

3.7 Has the program taken meaningful steps to address its management deficiencies? Answer: YES Question Weight: 8%

Explanation: MSM programs are responding to recommendations from a 2002-2003 review by the National Research Council (NRC). The NRC review identified areas in which MSM could improve its management practices and MSM has taken numerous steps to implement recommended improvements.

Evidence: To address the NRC recommendations, MSM is increasing external peer review of its programs, establishing clear metrics for each technology development task, implementing a technology assessment process to prioritize and guide investment decisions, increasing the percentage of high risk revolutionary technologies in its portfolio, and providing greater stability and continuity in its programs. The status of these recommended changes was reported to the NRC at a follow-up review in April 2003.

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- 3.CA1 Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?** Answer: YES Question Weight: 8%
- Explanation:** MSM has clearly defined deliverables in terms of performance milestones with cost and schedule goals. Performance against these milestones is used to actively manage the program.
- Evidence:** The MSM IBPD establishes Theme and program-level deliverables, performance milestones, and cost and schedule goals. Project-level goals are established in the project plans. Performance against these milestones and goals are reported monthly, and records are maintained in the NASA ERASMUS database.
- 3.CO1 Are grants awarded based on a clear competitive process that includes a qualified assessment of merit?** Answer: YES Question Weight: 8%
- Explanation:** MSM programs allocate funding for exploratory research activities using broadly competitive solicitations that select performers based on an assessment of technical merit.
- Evidence:** MSM competes the majority of its work through two primary mechanisms. The first mechanism uses competitive NASA Research Announcements (NRAs) on a periodic basis to award research tasks in a highly competitive manner which includes cost, performance, and technical excellence as metrics. Approximately 50% of total funding is awarded through openly-competed peer-reviewed solicitations. The second mechanism uses competitive industry outsourcing contracts which provide performance-based onsite contractors to the various NASA Centers. These performance-based contracts are periodically re-competed in order to ensure cost effectiveness in performing the required work.
- 3.CO2 Does the program have oversight practices that provide sufficient knowledge of grantee activities?** Answer: YES Question Weight: 8%
- Explanation:** MSM provides significant oversight of its grantees in order to track progress and to ensure continued relevance to program objectives.
- Evidence:** MSM selects external grants through competitive NASA Research Announcements (NRAs). Grantees are partnered with a NASA Center to provide oversight and to ensure that the work will be successfully infused into NASA applications. Annual status reviews and periodic site visits are conducted of grantee activities. Continued funding of multi-year activities is contingent upon good performance.
- 3.CO3 Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner?** Answer: YES Question Weight: 8%
- Explanation:** MSM collects grantee performance data during annual reviews and makes that information available to the public through program research portfolio web sites.
- Evidence:** Performance data measured against proposed task plans are collected at least annually during sub-project workshops, and made available to the public through research portfolio web sites (e.g., <http://is.arc.nasa.gov>)

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Section Scores				Rating
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- 3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality?** Answer: NO Question Weight: 8%
- Explanation: MSM's funding that is directed to NASA Centers is not generally allocated using a broadly competitive process based on merit and the program has no compelling justification for using other means to allocate the funding. MSM does conduct internal progress reviews and is externally reviewed by high-level expert groups. The MSM program is working to increase the percentage of research activities awarded through external peer review.
- Evidence: MSM is externally reviewed for quality by the National Research Council (NRC), and the Aerospace Technology Advisory Committee (ATAC). Annual status reviews are conducted on all research activities. If adequate progress has not been demonstrated after 3 years, unpromising avenues of research are terminated and funding is reinvested in new activities. MSM programs are implementing NRC recommendations to make greater use of external peer review of research at NASA Centers.
- 4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals?** Answer: LARGE EXTENT Question Weight20%
- Explanation: MSM programs are on track to meet most of their long-range performance goals. Some goals may not be accomplished within the planned schedule due to unexpected technical difficulties that occasionally arise in the course of pursuing the development of high-risk technologies.
- Evidence: Progress toward achieving long-range goals is measured by accomplishment of Annual Performance Goals (APGs). MSM successfully achieves greater than 80 percent of its APGs.
- 4.2 Does the program (including program partners) achieve its annual performance goals?** Answer: LARGE EXTENT Question Weight20%
- Explanation: MSM successfully achieves greater than 80 percent of its annual performance goals. This is a high level of accomplishment for development of new high-risk technologies.
- Evidence: MSM successfully achieved 21 of 25 GPRA indicators in FY02, or 84%. These results are documented in the 2002 NASA Performance Report.
- 4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year?** Answer: NO Question Weight20%
- Explanation: The MSM Program does not track any overall efficiency metrics.
- Evidence:
- 4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals?** Answer: NA Question Weight: 0%
- Explanation: No comparable programs exist within NASA. Comparison with other government long-term technology development programs in the Department of Defense and the Department of Energy proved infeasible because of the differences in the program goals and structure.
- Evidence:

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4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results?

Answer: LARGE
EXTENT

Question Weight 20%

Explanation: MSM programs are evaluated by the National Research Council (NRC) every 3 years, and by the Aerospace Technology Advisory Council (ATAC) every 6 months.

Evidence: Both the NRC and ATAC reviews indicated that MSM programs were effective, and made recommendations for improvement. These recommendations are being implemented, and status is reported back to the reviewing bodies. The interim report of the NRC review panel gave the MSM programs an overall grade of "B" for technical merit and effectiveness. This report is publicly available.

4.CA1 Were program goals achieved within budgeted costs and established schedules?

Answer: LARGE
EXTENT

Question Weight 20%

Explanation: MSM achieves its program goals within budgeted costs and schedules to an extent that is appropriate for exploratory research and development of new ideas that may not always result in useful technology products.

Evidence: MSM typically successfully completes greater than 80 percent of its annual performance goals as documented in the NASA Performance Report. There are no cost overruns for MSM programs because unpromising avenues of research are terminated after 3 years if no progress has been demonstrated and the funding is reinvested in new activities.

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Measure: Number of missions that use tools developed by Mission and Science Measurement Technology to understand and manage risk throughout their life cycle.

Additional Information: Risk profiles will serve as a starting point for generating risk exposure baselines for agency missions and support more sophisticated and comprehensive measures as they become feasible and mature

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2010	2		

Measure: Number of distributed or collaborative applications impacting NASA Enterprises implemented on heterogeneous computing and communications architectures.

Additional Information: Measure is cumulative.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	1		
2005	3		

Measure: Number of key/new risk factors addressed in the conceptual designs of new Enterprise missions that to date have either been completely omitted (such as organizational risk) or poorly represented (such as software risks).

Additional Information: Key risk factors are (1) human and organizational; (2) software; (3) system interfaces; (4) appropriate trade-space coverage; (5) seamless access to historical risk data

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2006	3		

Measure: Number of technologies co-funded by other NASA Enterprises for insertion into missions, or transitioned into Enterprise technology programs.[New measure]

Additional Information: Intent of this measure is to demonstrate program effectiveness

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	8		
2005	10		

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1	2	3	4	Moderately
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2006 12

2008 16

Measure: Percentage of research funding subject to external peer review prior to award [New measure]

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual	(Efficiency Measure)
2004	45			
2005	50			
2006	55			

Measure: Number of technology assessments performed on Enterprise mission concepts

Additional Information: Technology assessments are used to identify and prioritize mission-enabling technologies, to establish system-level performance goals for each technology, and to guide program investment decisions. Measure is cumulative.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	4		
2005	6		
2006	8		
2007	10		

Measure: Number of new scientific measurement capabilities demonstrated in a laboratory environment or test that have not been previously reported in peer-reviewed technical literature.

Additional Information: New measurement capabilities are scientific observations that are not currently achievable with state-of-the-art technologies. Measure is cumulative.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	3		

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2005	4
2006	5
2007	6

Measure: Number of automated reasoning, intelligent data understanding, or human centered computing technologies demonstrated in a test environment that is representative of an Enterprise mission application.

Additional Information: Demonstrations will be conducted in coordination with a customer Enterprise. Measure is cumulative.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	4		
2005	6		

Measure: Increased spacecraft data rate return for NASA missions.

Additional Information: Measure is maximum data rate demonstrated ready for flight applications. Demonstrations will be conducted in coordination with a customer Enterprise. In measures, G=Gbps, M=Mbps, E=near Earth, L = Lagrange points, D = Deep space (5 astronomical units).

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	1G @E; 1M @D		
2006	1 G @ L; 3 M @D		
2009	10 M @D		

Measure: Number of new bio, nano, or information technologies demonstrated in a test environment that is representative of an Enterprise mission application.

Additional Information: Demonstrations will be conducted in coordination with a customer Enterprise. Measure is cumulative.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	1		
2005	3		

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Section Scores				Rating
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100%	91%	83%	54%	Effective

2006

5

PART Performance Measurements

Program: Solar System Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

1.1 Is the program purpose clear?

Answer: YES

Question Weight 20%

Explanation: The Solar System Exploration Program (SSE) has a discretely defined purpose that relates directly to the NASA vision and mission statements. Its goals and objectives are clear and unambiguous to all interested parties (Congress, the Administration and the public), and are linked to specific elements of both the Space Science Enterprise and the NASA Strategic Plans.

Evidence: SSE developed a Roadmap which describes the program's goals and objectives and their linkages to both Enterprise and Agency Strategic Plans. The SSE exploration strategy is defined by five program objectives. Each objective is the subject of several Research Focus Areas, representing key areas of scientific emphasis. Identified within each of these research focus areas are investigations that indicate the specific near-and mid-term scientific advances to be pursued. Finally, the specific missions that collect data for the investigations are identified. The Integrated Budget and Performance Document (IBPD) and the Space Science Enterprise Strategic Plan also provide clear rationales for the program.

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES

Question Weight 20%

Explanation: SSE is a quest to explore the formation and evolution of our solar system and the Earth within it, seek the origins of life and its existence beyond Earth, and chart our destiny within the solar system. The SSE program will examine potentially habitable environments, search for life, and attempt to understand how solar system processes affect the future of Earth and humanity.

Evidence: The National Academy of Sciences reviewed the SSE Program as part of its Decadal Survey to help NASA prioritize solar system missions and science objectives for the next ten years. The SSE Roadmap was created to achieve the vision set out by the Decadal survey and reaffirmed the importance that the SSE has in understanding the formation and evolution of the Earth and its inhabitants as well as in the search for life beyond the confines of this planet. The Solar System Exploration Survey prepared by the Space Studies Board of the National Research Council further validates the need for an integrated solar system exploration strategy.

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES

Question Weight 20%

Explanation: While the National Science Foundation conducts astronomical studies of the solar system, its work is conducted from ground-based assets. Some universities also conduct limited studies of the solar system, including studies funded in part or in total by NASA. There are no other efforts by any federal, state, local or private entity in the U.S. of the magnitude and scope of NASA's SSE program. SSE is a unique, one-of-a-kind program that seeks to achieve both near and long-term science goals by studying solar system objects and phenomena in situ.

Evidence: The SSE program utilizes multiple space missions to collect a broad spectrum of scientific data. SSE also pursues and develops both enabling and enhancing technologies to provide new capabilities to collect data and achieve unique scientific advances. No other program directed at solar system exploration supports such a broad panoply of published goals and objectives.

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1.4 **Is the program design free of major flaws that would limit the program's effectiveness or efficiency?** Answer: YES Question Weight 20%

Explanation: The scientific design of the SSE program and its ability to effectively and efficiently achieve its goals has been optimized by considering and incorporating the advice and counsel of a broad community of experts who have been intimately involved for a number of years. These experts are from NASA and other federal agencies, universities, industry and our International partners. SSE strategies, missions and objectives are also reviewed and prioritized by the National Academy of Sciences, NASA advisory committees, and the Solar System Exploration Subcommittee. The hardware/software development part of the program is subjected to a series of formal design reviews to ensure that the "design-to," "build-to," and "as-built" baseline requirements are properly established and met. In addition, lessons-learned workshops are conducted to prevent any previous mistakes from being repeated.

Evidence: The SSE Roadmap, which lays out direction for ten years, results from optimization to ensure the program's optimal design. The science community advises to ensure use of efficient and effective approaches to achieve program goals. The Roadmap is updated to reflect discoveries, lessons learned, or changes in the Space Science Enterprise Strategic Plan. Incorporated into hardware/software development are Preliminary Design Review (PDR), Critical Design Review (CDR) & Design Certification Review (DCR). Contractor & NASA personnel verify the "design-to" baseline meets requirements, the detailed design is suitable, the "build-to" baseline is established, and each "as-built" system satisfies final performance requirements. Confirmation review is conducted between PDR and CDR & identifies schedule & cost risk, determines their manageability w/in limits of program reserves, & informs commitment to continue program funding. This review ensures the most effective management approach is used. The PI approach--preferable for simple, low-cost missions--isn't used for expensive, extended-development programs.

1.5 **Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly?** Answer: YES Question Weight 20%

Explanation: The rigor with which the SSE program is designed, structured, managed and funded ensures that resources will reach only the intended beneficiaries and will address the program's purpose directly. The five science objectives outlined in the SSE Roadmap guide the activities of the SSE and provide the context through which specific research objectives are formulated, science investigations are defined, and missions that address them are planned. Missions are broken down into discrete work breakdown structure-style activities, and funds are issued at the mission level and below. These funds may not be spent on anything other than the purpose for which they were issued.

Evidence: The scientific purpose of each mission is well documented (see the IBPD and the Strategic Plan) and is linked to specific Enterprise and Agency goals and objectives. Funds are issued to the appropriate entity at the mission level or below. Above a certain level, Federal law prohibits the redirection of resources issued for one program to another program without express Congressional approval. In addition, the Agency has adopted a full cost management system, which instills additional rigor in properly targeting and managing its funds. Finally, a revised financial system and a new computer tracking system will enable all Agency programs to ensure that each program dollar is properly directed and expended.

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2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 10%

Explanation: SSE long-term PART measures focus on outcomes and meaningfully reflect the program's purpose.

Evidence: SSE has seven specific long-term performance measures. Five are outcome measures, one of which addresses program management while the other four address scientific outcomes, the purpose of SSE. Two of the performance measures are outputs, and they address accomplishment of key project milestones and technological activities.

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight: 10%

Explanation: SSE has ambitious targets and timeframes for its long-term measures.

Evidence: SSE's scientific measures aim for an annual rating of "green," signifying excellent progress, by an external advisory committee. These measures will be assessed for the program's duration. SSE's program management long-term measure aims for 100% compliance with NASA's management guidelines and will also be assessed for the program's duration. The development and technology milestone measures include a series of annual targets the program is expected to meet each year.

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight: 10%

Explanation: SSE has specific annual performance measures that demonstrate progress toward achieving the program's long-term goals.

Evidence: SSE's annual performance measures support and indicate progress toward addressing its seven long-term measures. Each of the long-term science measures is supported by annual measures that address various facets of the scientific questions encapsulated in the long-term measures. The program management long-term measure is supported by three annual measures that serve as indicators of effective program management: adherence to baseline cost, baseline schedule, and a competitive awards regime.

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight: 10%

Explanation: SSE has baselines and ambitious targets for its annual measures.

Evidence: The program management annual measures have targets intended to note whether costs and schedule are followed closely and the majority of project funds are competed. The scientific annual measures all aim for ratings of "green," signifying excellent progress, by an external advisory committee.

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Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: YES Question Weight: 10%

Explanation: SSE partners (NASA Centers, JPL, contractors, universities, International organizations and other Federal agencies) are directly involved in planning and establishing the program's goals and objectives. Consequently, they fully support and are committed to the achievement of both the annual and the long-term goals of the program. Both regularly scheduled and ad hoc reviews provide management insight into whether SSE partners are adhering to and supporting the program's goals and objectives. Partners who fail to exhibit proper support can be terminated from the program.

Evidence: SSE goals are made clear to partners. Partners are involved in establishing goals and objectives and therefore understand them from the start. SSE missions document their goals, objectives, technical deliverables and data drops in program plans and commitments, signed agreements between NASA HQ and the lead NASA center. These documents are available to all partners. SSE uses instruments available to government agencies to enter agreements with other entities to obtain commitments to working toward and reporting on progress in achieving the annual and/or long-term goals of the program. Letters of Agreement and Memoranda of Understanding have been signed with major international partners and other Federal agencies. Contracts and grants with industry and universities have been signed, and task-level agreements between SSE and JPL and other NASA centers have also been reached. SSE conducts award fee reviews, mid-year performance reviews and ad hoc reviews to determine and verify partner commitment. Independent contract and programmatic reviews are conducted routinely.

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight: 10%

Explanation: The SSE's effectiveness and program relevance are subjected to regular reviews and evaluations by the National Academy of Sciences, NASA advisory committees and the Solar System Exploration Subcommittee. Annual performance toward achieving stated outcomes is both determined and validated by annual external reviews. In addition, every three years, a broad community of experts from NASA, other federal agencies, universities, industry and international partners evaluates SSE and offers strategic advice and counsel that leads to a revision of the Space Science Enterprise Strategic Plan.

Evidence: The National Academy of Sciences reviewed the SSE Program as part of its Decadal Survey to help NASA prioritize missions and science objectives for the next ten years. The SSE Roadmap was created to lay out an effective path to achieve the vision set forth in the Decadal Survey. Independent external reviews by the NASA Advisory Council (NAC) are conducted annually to evaluate progress toward meeting scientific outcomes. The latest findings are found in the FY2002 Performance and Accountability Report. In addition, the NAC, the SScAC and the SSE Subcommittee meet three times per year to conduct reviews of science and program implementation strategies. Finally, every three years, the major reviews and contributions by a broad community of experts lead to the revision and publication of the Space Science Enterprise Strategic Plan. This plan incorporates any and all SSE program improvements, enhancements and changes in strategy.

PART Performance Measurements

Program: Solar System Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: YES Question Weight: 10%

Explanation: SSE long-term performance goals reflect the cumulative effect of annual activities. The degree to which these outcomes are realized is dependent upon the degree to which the annual performance goals are achieved. This assessment is validated by external reviews. SSE goals and objectives are directly linked to specific missions. Budget requests for each mission are dependent upon the successful completion of the current year's planned activities and the future requirements. The life-cycle cost requirements for each mission, now stated in full cost mode, are included in an integrated budget and performance document.

Evidence: SSE long-term performance goals are directly linked to both Enterprise and Agency strategic goals and objectives (see Space Science Enterprise and Agency Strategic Plans). In addition, the SSE Roadmap tracks objectives down to specific missions. Budget requests for each mission are derived from assessments of annual performance and estimates of resources required to complete the mission. The resource requirements are clearly stated, and are now stated in full cost mode. The Integrated Budget and Performance Document displays important status data for each mission, lists the budget requirements for life-cycle cost, and identifies the specific long-term outcomes and annual performance goals supported by that mission.

2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight: 10%

Explanation: The SSE program regularly reviews its strategic planning and utilizes a number of different mechanisms to determine and correct any deficiencies.

Evidence: Experts review SSE's progress, leading to revision every three years of the Space Science Enterprise Strategic Plan, which the National Academy of Sciences then reviews. SSE strategies, missions, and objectives are also reviewed by the Space Science Advisory Committee and SSE Subcommittee. Changes in strategic planning are incorporated into the SSE Roadmap and Integrated Budget and Performance Document. Recently, the Space Science Enterprise, including SSE, reviewed risk mitigation and cost reduction strategies to determine whether and where to make strategic changes. It was decided to extend mission phases A & B to retire technical risk. By allowing long-pole technology to mature before incorporating it into a project, risk is reduced and cost growth avoided. Extension of phase A allows a project to carry multiple contractors for longer, resulting in a clear design winner among competitors or more mature design options. A cancellation review of Deep Impact led to a requirement that all projects have unencumbered reserves at least equal to 25% of estimated phase C/D costs before being implemented.

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100%	100%	100%	74%	

2.CA1 **Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity?** Answer: YES Question Weight: 10%

Explanation: When a program/project is formulated, its concepts, technology requirements, operations concepts, internal management controls, budget and institutional requirements are evaluated by independent bodies. During this period of formulation, design trade studies are conducted in order to reconcile trade-offs between competing performance factors. Programs/projects are subjected to independent reviews throughout their life-cycle to evaluate their ability to meet commitments. Included in these reviews are recommendations for proceeding with, modifying or terminating the program or project, or for enhancing overall technical and programmatic performance.

Evidence: On October 10, 2002, the Deep Impact Termination Review was conducted (see NASA Office of Space Science report of same name) because the approved cost cap was going to be violated. Project cost, schedule, technical, risk and performance goals were examined. On November 13, 2002, the Deep Impact Project Report to OSS was presented. Continuation of the project would be based on project performance and completion of the following changes: a new JPL Deep Impact Project Manager; a realistic project schedule and budget leading to a launch that meets all science objectives within the cost cap; a weekly review board to evaluate problems and progress; a review of manpower and accomplishments; and the renegotiation of the Ball award fee agreement with, at a minimum, a letter of intent signed by the management at the University of Maryland, Ball and JPL. Since some issues had not been completely addressed and some new ones arose, a follow-up termination review was held February 21, 2003 (see Deep Impact Project Delayed Launch Plan Presentation to NASA HQ). The result was a one-year delay and numerous changes.

2.RD1 **If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals?** Answer: NA Question Weight: 0%

Explanation: This question is not applicable for basic research programs.

Evidence:

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Section Scores				Rating
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100%	100%	100%	74%	

2.RD2 **Does the program use a prioritization process to guide budget requests and funding decisions?** Answer: YES Question Weight: 10%

Explanation: The SSE program is completely integrated with the Agency and Enterprise goals and objectives. Independent outside organizations review the program and help set scientific priorities in line with these goals and objectives. These scientific priorities are then matched to research focus areas, which represent key areas of scientific emphasis. Within each research focus area are investigations that indicate the specific scientific advances to be pursued in the near- and mid-term. The investigations form the framework for identification of specific missions. Estimates of the costs of these missions are then used to guide budget requests and funding decisions. Repeated management and scientific peer reviews ensure that each mission provides data in a cost effective manner.

Evidence: The National Academy of Sciences reviewed SSE as part of its Decadal Study to help NASA prioritize missions and science objectives for the next ten years. The SSE Roadmap links objectives to specific missions. Mission life cycle costs form the basis for budget requests and funding decisions. Independent and NASA reviews of prioritized science outcomes ensure priorities are assigned to budget requests and funding decisions. The May 29, 2003, Space Studies Board (SSB) letter review of the 2003 Space Science Enterprise Strategy discusses responses to previous SSB advice by indicating that for SSE, the linkage between proposed programs and SSB recommendations was clear. In order to enable future outer planet exploration, SSE's Project Prometheus is following SSB's recommendations by reinvigorating the radioisotope thermal generator program and developing advanced nuclear electric power and propulsion. Comporting with the Decadal Survey, overall SSE R&A funding is near 25% of the overall flight mission budget and is projected to stay at this level for the next several years.

3.1 **Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?** Answer: YES Question Weight: 8%

Explanation: The SSE program collects relevant technical and programmatic performance data on a monthly basis. This information is used to assess monthly progress, annual progress toward meeting long-range outcomes, and can be used to develop risk mitigation strategies, adjust priorities, or make additional resource allocations.

Evidence: The Space Science Enterprise conducts monthly reviews to gather performance data. All programs over a certain monetary size are required to employ a contractor-owned, Agency-approved earned value system; NASA analysts study the results. Independent groups annually review SSE's progress toward achieving long-range performance outcomes. NASA has initiated full cost management and an integrated financial management system to conduct financial affairs with a greater degree of precision and performance. Performance data collected on Deep Impact indicated the project was going to exceed the cost cap. Two termination reviews were held. SSE and the Space Science Enterprise learned a lesson that led to a new requirement for future missions: Deep Impact had been confirmed for implementation in May 2001 with inadequate unencumbered reserves. OSS will not repeat that mistake in future mission selections nor will any mission now in the study phase without significant unencumbered reserves totaling 25% of Phase C/D be confirmed for implementation.

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3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: YES Question Weight: 8%

Explanation: Federal managers and program partners are held accountable for cost, schedule and performance results through a series of formal procedures and requirements. Federal managers who fail to demonstrate the required level of performance are subject to a variety of disciplinary actions, including reassignment or termination. Partners who likewise fail to demonstrate the required level of performance may find their level of participation in the program either diminished or terminated.

Evidence: Every manager is required to develop a formal personal performance plan with his or her supervisor. This plan consists entirely of critical elements, at least one of which must be linked to the Agency's Strategic Plan or the organization's operating plan or goals. Although the program's performance may be evaluated on a more frequent basis, the program manager's performance is formally evaluated twice yearly. Bonuses and promotions are dependent upon the manager making positive progress toward meeting the goals of the program. Should he or she fail to do so, corrective actions ranging from counseling, reassignment or, in extreme cases, termination may result. Partners who fail to perform as required may likewise find their participation reduced or terminated.

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 8%

Explanation: Annual NASA R&D funds are available for obligation for two years and are fully obligated by the end of the period. Operating plans for the program year are submitted to Congress and revised as needed over the two year time period. Internally, obligation and cost plans are developed, compared to actual spending, and reviewed monthly by all levels of the program. The NASA Procurement Management System is the primary system used to provide monthly reporting of all obligations and costs. These are tracked against unique project numbers (UPNs) traceable to contractor and institutional source documents. Contractor and government accounting systems are audited periodically to ensure compliance with government standards.

Evidence: The percent of FY02 SSE funds obligated by the end of FY02 varies by UPN, but ranges from a high of 99.7% to a low of 71.3%. Most UPNs are in the mid to upper 90% range. Only three UPNs have obligation rates in the 70% range, and these are primarily grants-related UPNs. Grants programs typically maintain a larger uncosted and/or unobligated carryover into the next year in order to guard against the likelihood of a continuing resolution. Federal laws prohibit the expenditure of funds for any purpose other than that intended and authorized. Specific reports that record and track the obligation and expenditure of program funds are as follows: NASA monthly FACS report, contractor monthly and quarterly 533 reports, SF133 reports on budget execution and budgetary resources, FMS2108 year-end closing statement, and the annual Performance and Accountability Report.

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3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: YES Question Weight: 8%

Explanation: The SSE program has adopted effective management procedures to ensure that the program is executed in a cost effective and efficient manner. Failure to do so can lead to significant consequences.

Evidence: SSE follows Agency and Enterprise policies that incentivize competitive outsourcing, use best value procurement practices, and employ performance and productivity improvements. IT and improvements are used to improve data flow and make information more accessible. Full cost management will provide SSE with a better understanding of overhead costs. These actions focus on maximizing cost effectiveness of SSE's design and execution. Contractors are motivated to achieve cost effectiveness and efficiency via fee review. Panels review contractor performance progress and assign it a grade, which determines how much fee the contractor will earn for that review period. A projected cost growth of 15%+ triggers automatic review by senior management. Outcomes of past reviews have been program delay, redirection, or cancellation. All SSE projects must meet uniform efficiency measures: each SSE development project must complete its current phase within 10% of total life-cycle cost; each SSE research project must allocate 75% of funding competitively; all missions must be completed w/in 10% of baseline schedule.

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 8%

Explanation: The SSE collaborates and cooperates, where reasonable and practicable, with other NASA programs and/or Federal agencies where shared or similar goals and objectives might permit a more efficient use of resources while increasing the scientific and/or technological return. In addition, NASA maintains a willingness to collaborate with other nations in exploring the solar system where there is evidence of a genuine intersection of interests.

Evidence: SSE coordinates and collaborates with NASA's Aerospace Technology Enterprise to facilitate enabling and enhancing technology maturation and infusion. SSE continues to work closely with the Office of Space Flight to ensure the availability of launch services. SSE also maintains an ongoing collaborative relationship with various international partners at the program and project level for planning and coordination. SSE has a new collaborative effort with the Department of Energy and the Glenn Research Center in support of Project Prometheus. The two primary near-term objectives of Prometheus are the development of a new, more efficient radioisotope power system to provide spacecraft power for both surface and deep space missions, and the development of a compact fission reactor to provide up to 100 KW of power to support nuclear electric propulsion. The Jupiter Icy Moons Orbiter (JIMO) will be the first flight mission to utilize Project Prometheus nuclear power and electric propulsion technologies.

3.6 Does the program use strong financial management practices? Answer: YES Question Weight: 8%

Explanation: Most of the SSE program has historically operated under a full cost management philosophy. The remainder of the program, along with the rest of NASA, is now making the transition to full cost. Under full cost, service pool and G&A costs are managed and allocated in appropriate amounts to the direct costs of the programs they support. This assures that the full cost of a program is actively managed, rather than just the direct costs. SSE is also now utilizing some very powerful computer-based tools, as part of the Integrated Financial Management System, to enhance its financial management practices.

Evidence: Since JPL manages approximately two-thirds of the SSE programs (historically, as much as 80%), most of the SSE has already been operating in a full cost management mode. The remainder of the program is transitioning to full cost management. In addition, a very powerful computer-based tool now supports the Integrated Financial Management System, greatly enhancing its ability to track, integrate and account for all costs and financial resources.

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3.7 **Has the program taken meaningful steps to address its management deficiencies?** Answer: YES Question Weight: 8%

Explanation: The Space Science Enterprise, under which the SSE is managed, has a well-structured process in place to conduct both monthly and annual performance reviews. Any management deficiencies that are uncovered during these reviews are noted and subsequently remedied. In addition, lessons learned workshops are conducted in order to prevent the recurrence of errors in the program. The SSE Director also has frequent contact with directors of implementing organizations for SSE projects to discuss and mitigate any management deficiencies. Finally, there is a long tradition of inviting independent bodies to come in and review programs for various deficiencies, including management, and propose solutions to any problems that may have been detected.

Evidence: Routine program reviews led to the determination that the Deep Impact Project could not complete its mission on schedule without exceeding the approved cost cap (see 2CA1 and 3.1 for more details). Two termination reviews were held, resulting in a number of programmatic changes. A significant number of management changes also resulted. A new JPL Project Manager was selected and appointed, and a new business manager was brought in. The project manager was inserted as the Contract Technical Manager for the contractor, and a JPL technical representative was made resident at the contractor. A weekly review board was established, some reorganization occurred, and personnel changes were made. The contractor's award fee agreement was re-negotiated and criteria were revised. Finally, a new requirement regarding the amount of unencumbered reserves all projects must have (25% of Phase C/D) before being confirmed for implementation was established.

3.CA1 **Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?** Answer: YES Question Weight: 8%

Explanation: The SSE science community defines and prioritizes science objectives for a new project, and these objectives form the basis for a NASA Announcement of Opportunity for science investigations for the missions. Investigations are selected that correspond to the technology readiness, cost, schedule and prioritized science for the mission. During the more traditional hardware development and launch phases, an SSE program will develop and maintain a clearly defined list of deliverables, along with the required performance characteristics, costs and schedule goals. Progress is measured by traditional methods such as earned value, schedule accomplishment and independent assessment in order to determine whether the limited window for launch can be met, and whether the cost is exceeding predetermined limits.

Evidence: The SSE program often has very limited launch windows, or windows that may not reappear for years, if at all. In order to meet those launch windows, a clearly defined list of hardware and software deliverables, along with required performance characteristics and costs and schedule must be developed, documented, maintained and managed. Documentation includes the PCA (Program Commitment Agreement), the program plans, and the project plans. The program manages carefully to the information contained within these documents, because allowing requirements creep and schedule slip might prove disastrous to the program's ability to launch. There is also usually a hardware delete list in case the program has been spending too much money or has been losing schedule and must take an action to get back on schedule and budget. Any indications that the program may exceed total life cycle costs by 15% is automatic grounds for cancellation consideration.

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3.CO1 Are grants awarded based on a clear competitive process that includes a qualified assessment of merit? Answer: YES Question Weight: 8%

Explanation: NASA awards 100% of its grants according to a rigorous and well-defined system of competition and reviews that ensures that only the most meritorious proposals are selected for award.

Evidence: All grants selected for funding by the Space Science Enterprise, including the SSE theme, are broadly competed through the NASA Research Announcement process. Grant proposals must relate directly to both Agency and Enterprise goals and objectives. All proposals are peer-reviewed by a mix of scientific disciplines and are selected on merit. NASA also utilizes an electronic mailing list as part of its outreach efforts. This mailing list includes virtually the entire population of those who might wish to participate in the grant process.

3.CO2 Does the program have oversight practices that provide sufficient knowledge of grantee activities? Answer: YES Question Weight: 8%

Explanation: NASA has an oversight practice that provides sufficient insight into and knowledge of grantees' activities.

Evidence: Discipline scientists take the results of the grant peer reviews and make selections as to whom grants are awarded. These scientists then monitor the progress of the grant toward meeting its stated goals for the duration. Formal annual reports are provided by the grantee, and expenditures are tracked at a cumulative level. This gives the discipline scientists who work with the project sufficient insight into the performance of the grantee to understand what the grantees do with the resources that are allocated to them. The formal annual reports are the primary method through which oversight and management control are exerted on the grantees. There are simply too many grants and too few monitors to permit in-depth reviews at more frequent intervals. However, because of the relative paucity of grant money when compared to the number of potential grantees, there is little reluctance to cancel a grant because of poor performance and subsequently award the money to someone else.

3.CO3 Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner? Answer: YES Question Weight: 8%

Explanation: NASA collects grantee performance data and makes it available to the public in a manner that is both useful and meaningful.

Evidence: Formal progress reports, which are a required output of each research and analysis activity funded under the SSE, are submitted on an annual basis. The NASA lead scientist, together with appropriate discipline scientists review the progress reports before recommending continuation of the research activity or not to the procurement officers before funding is released to the grantees. The results of grants-based research are broadly disseminated to the public through the use of science forums, publications, NASA press releases and news conferences, museum displays, educational materials, and NASA's web site. NASA is currently working to develop an evolving database that will post grantees' annual reports on the Internet. The database is scheduled to become available to the public by calendar year 2004. In addition, some of the highlights from the grantee annual reports are published in the "Space Science: Supporting Research and Technology (SR&T) Program Highlight" brochure.

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3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality? Answer: YES Question Weight: 8%

Explanation: The current SSE missions, either planned or ongoing, are competed and peer reviewed. In addition, the Space Science Enterprise, under which the SSE is managed, has made a major philosophical change in the manner in which the early stages of its R&D programs are both structured and funded. This change was made in order to eliminate a great deal of technology-related risk before proceeding with development. This results in a higher quality program and avoids extra costs related to late detection of design defects, or the costs related to a failed mission. The program is managed as per NPG 7120.5B, NASA Program and Project Management Processes and Requirements. Included in the development process are a series of reviews which serve to demonstrate that the "design-to," "build-to" and "as-built" baseline requirements are properly established and met. Verification methods include test, analysis, demonstration and inspection.

Evidence: The Discovery Projects, the major source of planned or ongoing mid-sized SSE missions, begin as announcements of opportunity and are 100% competed and peer-reviewed. Once these projects are awarded and begin definition, they are subjected to extended Phase A and B stages in order to retire technical risk and ensure program quality before going into full development. Long-pole technology is allowed to mature off-line before being incorporated. Extending a program at its earlier stages in order to reduce technological risk results in higher program quality and keeps costs down by keeping immature (risky) hardware out of final integration. Design defects are less costly to correct if detected during the early design phase. During development, review boards comprising contractor and NASA personnel conduct Preliminary Design Review (PDR), Critical Design Review (CDR), and Design Certification Review (DCR). This verifies that the "design-to" baseline is established and meets requirements, the detailed design is suitable and the "build-to" baseline is established, and each "as-built" system satisfies the final performance requirements.

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: YES Question Weight: 20%

Explanation: The majority of SSE's long-term PART measures are new this year; moreover, most of them will be works in progress for the duration of the program's existence. Nonetheless, SSE has made significant progress towards addressing its long-term scientific, program management, development and technology goals.

Evidence: SSE has made significant progress towards addressing its long-term goals. NASA's FY02 Performance and Accountability Report indicates that the Space Science Enterprise, of which the SSE is a significant part, achieved 100% of its GPRA annual performance goals. The SSE's long-term performance goals or outcomes are linked to those of the Enterprise and contribute considerably to their achievement. Since the long-term performance goals reflect the cumulative effect of annual activities, and the degree to which long-term performance measures are being achieved is determined by the degree to which annual performance goals are being met, the SSE can be said to have demonstrated significant progress toward achieving its long-term performance goals. SSE missions have produced outstanding scientific results.

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4.2 Does the program (including program partners) achieve its annual performance goals? Answer: LARGE EXTENT Question Weight: 20%

Explanation: The program has achieved its performance goals consistent with its annual performance goals.

Evidence: SSE has achieved its annual performance goals to a large extent. NASA's FY02 Performance and Accountability Report indicates the Space Science Enterprise, of which SSE is part, achieved 100% of its GPRA annual performance goals. SSE annual performance goals are linked to the Enterprise's strategic goals and objectives and contribute significantly to their achievement. The Enterprise's 100% achievement of annual performance goals includes SSE's achievement of its annual performance goals. SSE projects in development are averaging a 9% cumulative and 0% FY2003 overrun over baseline life cycle cost. SSE missions have produced outstanding scientific results.

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: LARGE EXTENT Question Weight: 20%

Explanation: The SSE does demonstrate, to a large extent, improved efficiencies or cost effectiveness in achieving program goals each year. However, there are practical limits to what can be achieved.

Evidence: The SSE program does not engage in repetitive activities. Most potential savings are in the mission development phase, as opposed to mission operations. Each development program is unique, as are the supported space science investigations. Our merit-based peer reviews consider the amount of "science per dollar" that proposals offer. We might make selections based on "bang for the buck." However, there may be a proposal that is very costly, but because of the particular science it offers, is likewise selected for development. SSE tries to restrain unwarranted growth in cost and schedule by additional testing, extending initial Phase A and B development, and maturing critical technology off-line until it reaches a mission-acceptable level. This might cost more up front, but it saves the expenditure of larger amounts later on in the development cycle. All SSE projects are required to meet some uniform efficiency measures: each SSE development project should complete its current phase within 10% of the total life-cycle cost and 10% of baseline schedule, while SSE research projects are to allocate 75% of their funding competitively.

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: NA Question Weight: 0%

Explanation: There are no other programs, either government or private, with similar purpose and goals and of similar size and scope, with which to compare the SSE program.

Evidence:

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4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results?

Answer: LARGE
EXTENT

Question Weight 20%

Explanation: Independent evaluations of the SSE program conducted by the National Academy of Sciences and the NASA Advisory Council confirm that the program is being managed effectively and is achieving anticipated results.

Evidence: The National Academy of Sciences (NAS), as part of its decadal survey, reviewed the SSE program, evaluated progress to date, and helped NASA prioritize missions and science objectives for the next ten years. Subsequently, the SSE Roadmap was created to achieve the vision set out by the decadal survey. NAS reviews and strategic advice were also incorporated into the latest Space Science Enterprise Strategic Plan. The NASA Advisory Council (NAC) conducted independent reviews of the annual performance goals and confirmed that the Space Science Enterprise, of which the SSE program is a major constituent, achieved 100% of its annual performance goals. The NAC, the SScAC and the SSE subcommittee are each scheduled to review SSE science and program implementation strategy three times per year. With SScAC's annual review of the GPRA report, NAS input into Strategic Plan revisions every three years, the NAC's review of annual performance, and ad hoc reviews by other independent bodies, the effectiveness of every aspect of the SSE program is regularly reviewed.

4.CA1 Were program goals achieved within budgeted costs and established schedules?

Answer: LARGE
EXTENT

Question Weight 20%

Explanation: SSE program goals were largely achieved within budget costs and established schedules. One U.S. mission experienced some difficulty which led to a schedule slip. Several International missions for which the U.S. is a contributor rather than responsible for development were either slipped or cancelled due to problems not under our control or origin.

Evidence: The SSE program was successful to a large extent in staying within its budget and established schedules. Due to unforeseen technical problems, the launch of the Deep Impact mission was delayed approximately one year. The other SSE missions were essentially on budget and on schedule. There are a number of international missions for which we provide either instruments or science support but do not have developmental responsibility. Of these, Muses-C (Japan) experienced a later than planned launch, Rosetta (ESA) was indefinitely delayed, and Netlander (France) was cancelled. The data that the SSE would normally collect from these international missions goes primarily to science teams and guest investigators. The failure to collect these data due to a cancelled or delayed mission will not materially effect the ability of the SSE program to attain either its annual performance goals or its long-term outcomes.

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Measure: Compliance with NASA Procedures and Guidelines (NPG) 7120.5B

Additional Information: This measure tracks NASA's performance in managing SSE in accordance with Agency implementing strategies.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term (Efficiency Measure)
Ongoing	1		

Measure: Progress in understanding why the terrestrial planets are so different from one another

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Green		

Measure: Percentage of budget allocated through open, peer-reviewed competition

Additional Information: On average, SSE projects in development will not exceed their baseline costs by more than 10% cumulatively or 5% annually.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual (Efficiency Measure)
2003	<10%, <5%***	9%, 0%	
2004	<10%, <5%***		

Measure: Percentage of budget allocated through open, peer-reviewed competition

Additional Information: On average, SSE will allocate the targeted level of funding competitively.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual (Efficiency Measure)
2003	>75%	0.73	
2004	>75%		

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Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

Measure: Cumulative and annual percentage schedule slip on spacecraft under development
Additional Information: On average, SSE projects in development will not slip from their baseline schedules by more than 10% cumulatively or 5% annually.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual (Efficiency Measure)
2003	<10%, <5%	16%, 0%	
2004	<10%, <5%		

Measure: Progress in learning what our solar system can tell us about extra-solar planetary systems
Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Green		
2005			
2006			

Measure: Progress in determining the characteristics of the solar system that led to the origin of life
Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
Ongoing	Green		

Measure: Progress in determining the nature, history and distribution of volatile and organic compounds in the solar system
Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Green		

PART Performance Measurements

Program: Solar System Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

Measure: Progress in identifying the habitable zones in the solar system

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green		Annual

Measure: Progress in understanding how life begins and evolves

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
Ongoing	Green		Long-term

Measure: Progress in identifying the sources of simple chemicals that contribute to prebiotic evolution and the emergence of life

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green		Annual

Measure: Accomplishment of key development activities.

Additional Information: * Successfully launch MESSENGER; Deliver the Deep Impact spacecraft for environmental testing; Successfully complete the New Horizons/Pluto Critical Design Review

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Achieve *		Annual

Measure: Progress in studying Earth's geologic and biologic records to determine the historical relationship between Earth and its biosphere

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green		Annual

PART Performance Measurements

Program: Solar System Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

Measure: Accomplishment of key technology activities in support of solar system exploration.

Additional Information: ***** Define Level One science goals for the Jupiter Icy Moons Orbiter (JIMO) mission; Release a NASA Research Announcement (NRA) for high-capability instruments useful on the JIMO mission and as follow-on Project Prometheus payloads; Release an NRA for the next New Frontiers mission.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	*****		Long-term

Measure: Progress in understanding potential impact hazards to Earth from space

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
Ongoing	Green		Long-term

Measure: Progress in understanding the initial stages of planet and satellite formation (** NASA's external advisory committee will rate NASA's performance against this measure as "green" [on a green-yellow-red "stoplight" scale], signifying NASA's successful achievement of this goal.)

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green**		Long-term

Measure: Progress in determining the inventory and dynamics of bodies that may pose an impact hazard to Earth

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green		Annual

Measure: Progress in determining the physical characteristics of comets and asteroids relevant to any threat they may pose to Earth

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green		Annual

PART Performance Measurements

Program: Solar System Exploration
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	100%	74%	

Measure: Progress in determining how the solar system originated and evolved to its current diverse state

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
Ongoing	Green		

Measure: Progress in studying the processes that determine the characteristics of bodies in our solar system and how these processes operate and interact

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Green		

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

1.1 Is the program purpose clear?

Answer: YES Question Weight 20%

Explanation: Space and Flight Support (SFS) is comprised of several distinct Agency-level services. These includes Space Communications (SC), Launch Services (LS), Rocket Propulsion Testing (RPT), Crew Health and Safety (CH&S) and Environmental (ECR). These services are provided to a wide range of customers, including NASA scientists and engineers, other US Federal agencies, universities, foreign governments, and industry interests. These programs, with the exception of ECR, serve a common role of customer service. ECR is being moved from SFS, which will help to keep SFS focused on customer service.

Evidence: President's FY2005 Budget Submit to Congress http://www.nasa.gov/pdf/55413main_30%20SFS.pdf

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES Question Weight 20%

Explanation: Each of the component services serve specific and existing needs. LS acquires and manages launch services for NASA. SC provides communications services for low Earth orbit satellites and launch vehicles. CHS provides oversight, advocacy, and management of operational medicine for astronauts. RPT manages and coordinates the Agency's rocket testing. ECR is responsible for NASA's environmental compliance and restoration effort and for decommissioning NASA's Plum Brook nuclear facility.

Evidence: NASA Strategic Plan <http://www.hq.nasa.gov/office/codez/plans.html>

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES Question Weight 20%

Explanation: LSP: The Air Force (AF), National Reconnaissance Office (NRO) have different goals and requirements driving their space access needs. NASA LS Program, AF and NRO space launch programs have established a partnership that fosters information and resources sharing while allowing each entity to satisfy dissimilar goals and requirements. SC: Space Network capabilities are unique within the United States and directly support NASA and other US Agencies. SC makes significant use of commercially available services and maintains continuous involvement with other Agencies to pursue cross-cutting capabilities acquisition & development whenever possible. CHS: The health of the astronaut corps is dependent on a cooperative relationship between the Office of Health and Medical Systems, under the direction of the Chief Health Medical Officer (CHMO), the Office of Biological and Physical Research (OBPR), CHS, under the Office of Space Flight, and the Space and Life Sciences Directorate (SLSD) at the Johnson Space Center. The CHMO is responsible for medical policy, oversight of NASA healthcare including occupational health and space medicine, and the protection of research subjects. CHS serves as oversight, advocacy, and management of operational medicine, which is implemented through the SLSD. The OBPR is responsible for Advanced Human Support Technology and Biomedical Research and Countermeasures development. RPT: NASA has established a working alliance with DoD to maximize the utilization of the Nation's propulsion testing assets. NASA also works with the private sector to provide testing capability to the largest extent possible.

Evidence: LSP: MOU between LSP and AF/NRO. SC: The Space Network currently provides a significant amount of services to non-NASA US government customers on a reimbursable basis. Plans for future Space Network capabilities are currently being explored with other Agencies through the Transformational Communications Architecture study. NISN is currently obtaining services through commercial providers and the General Services Administration. RPT: NASA and DoD Alliance Board.

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight 20%

Explanation: LSP: is the focus for providing launch services for NASA payloads. The LS Provider contracts are fixed-price and have preferred customer clauses that guarantee that the program obtains the lowest price for the service, The Program partners with other Government organizations (NRO/DoD) to minimize duplication of effort and cost to the Government. The program recently reorganized to meet changing conditions and priorities with our customers and stakeholders. SC: Space Communications is currently pursuing architectures, technologies and continuation of service efforts targeted to provide more efficient and effective cross-cutting services for our customers. A strong presence in National & International Communications Standards and Spectrum organizations is maintained to ensure NASA's communications interests are aligned with industry and other government interests.

Evidence: LSP: Program Plan for Launch Services (August 2003); NASA Launch Services contracts Launch Services Program organizational chart dated 12/2002. SC: Space Communications has active Architecture, Technology, Continuation of Service, Standards, and Spectrum programs. Recent efforts in these areas include the Low Power Transciever (LPT) experiment, the Transformational Communications Architecture study, Space Network's Demand Access System capability, and the TDRS-Continuation effort. In addition, Space Communications personnel currently hold various leadership roles in national and international Standards and Spectrum forums and actively prepare and represent positions that will enhance Space Communications effectiveness and efficiency. CH&S: Bioastronautics Strategy document http://criticalpath.jsc.nasa.gov/NS_Resources.asp?DiscMode=D001.

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight 20%

Explanation: This theme serves a common role of customer service. ECR: In the area of environmental interests, NASA continues to demonstrate its dedication to environmental stewardship and regulatory assurance. The primary purpose of the ECR program is to return public lands under control of NASA back to the taxpayer in a suitable state. In FY 2003 the ECR program reduced unfunded environmental liabilities in excess of two dollars for every appropriated dollar received. SC: provides support for all Shuttle flights and low Earth orbiting missions. LS: meets all customer requirements and deadlines to achieve successful launches. RPT program provides test cells and associated facilities to meet customer demands. CHS: Certify the medical fitness and health of all astronauts before flight and provide them with care throughout their careers.

Evidence: ECR: http://www.hq.nasa.gov/office/codej/codeje/je_site/about_us/about_us.html and FY 2003 Accountability Report under the financial statements, Environmental Cleanup line http://ifmp.nasa.gov/codeb/docs/NASA_FY2003_PAR.pdf Plum Brook: <http://www.lerc.nasa.gov/WWW/pbrf/> LS: <http://www.ksc.nasa.gov/elvnew/elv.htm> <http://sspp.gsfc.nasa.gov> RPT: <https://rockettest.ssc.nasa.gov/> SC: <http://www.spacecommunications.nasa.gov> CHS: Bioastronautics Strategy document http://criticalpath.jsc.nasa.gov/NS_Resources.asp?DiscMode=D001.

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight 11%

Explanation: The program has two long-term performance measures that meaningfully reflect the purpose of the program.

Evidence: See measures section

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

- | | | | |
|---|--|-------------|---------------------|
| 2.2 | Does the program have ambitious targets and timeframes for its long-term measures? | Answer: NO | Question Weight:11% |
| Explanation: The program does not have ambitious targets for its long-term measures. One long-term target is already being regularly exceeded, and the other target is under development. | | | |
| Evidence: See measures section | | | |
| 2.3 | Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? | Answer: YES | Question Weight:11% |
| Explanation: The program has a limited number of annual performance measures that generally track towards the program's long-term measures. | | | |
| Evidence: See measures section | | | |
| 2.4 | Does the program have baselines and ambitious targets for its annual measures? | Answer: NO | Question Weight:11% |
| Explanation: The program does not have ambitious targets for the majority of its annual measures. With a couple of exceptions, targets are either under development or maintain the status quo and do not drive improvement. | | | |
| Evidence: See measures section | | | |
| 2.5 | Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? | Answer: YES | Question Weight:11% |
| Explanation: LSP: Requires Project Plans from all projects, customer agreements with reimbursable customers and contracts in place with launch service providers and support contractors. Each project is required to sign a Task Agreement with the LSP which will commit the project to cost, schedule and performance for each project. A forum (Flight Planning Board) is provided whereby customers and stakeholders work together to define and agree on requirements, determine strategic direction and concur on Launch Services Program contract actions. SC: Requirements for SC contractors and partners flow down from the annual and long-term goals via the program's agreement process for defining customer flight mission requirements in which contractors and partners are an integral part. Contract Performance/Award Fee evaluation and program reporting processes are in place to encourage contractor and partner performance toward achieving the goals of the program. ECR: The largest single program contract (for Plum Brook) is a partnership with the Army Corps of Engineers and an "earned-value" type contract, but most of the remaining program contracts are "time and materials" or IDIQs. | | | |
| Evidence: LSP: Signed Project Plans; Signed Customer agreements; Awarded Contracts; Signed Task Agreements; Flight Planning Board Minutes and Actions
SC: Multiple Contracts managed by the Centers. Memorandum of Agreement for the Management of NASA's Space Communications Networks, May 9, 2002. ECR: external agreements with 1) Nuclear Regulatory Agency License TR-3 and R-93; 2) Space Act Agreement signed on 9/13/1999, and SAA Mod #1 signed on 8/3/2000; 3) USACE contract with Montgomery Watson; 4) Montgomery Watson's contract and agreements with subcontractors (Duke Engineering & Services, and MOTA, Inc.); 5) NASA's agreements and contracts with support contractors: U.S Department of Energy's Argonne Nat'l Laboratory, Plum Brook Operations and Support Group, Focus Group and others; and , 7) NRC letter of Indemnification dated 7/8/2000, indemnifying NASA, USACE, and contractors and subcontractors. CHS: ReMAP, BPRAC reports, and the draft Code U Enterprise Strategy. | | | |

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

2.6 **Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need?** Answer: NO Question Weight:11%

Explanation: The program does not have regularly scheduled objective, high quality independent evaluations that examine how well the program is accomplishing its mission and meeting its long-term goals.

Evidence:

2.7 **Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget?** Answer: YES Question Weight:11%

Explanation: The program's goals and budget are clearly linked in the Integrated Budget and Performance Document, submitted with NASA's FY 2005 budget request. "Full Cost" accounting has further clarified the link between the budget and the program's goals by ensuring that the program or project's budget covers all of the costs associated with the program or project.

Evidence: President's FY2005 Budget Submit to Congress http://www.nasa.gov/pdf/55413main_30%20SFS.pdf and http://www.nasa.gov/pdf/55417main_34%20Management%20and%20Performance.pdf Integrated Financial Management Program and Full Cost Accounting

2.8 **Has the program taken meaningful steps to correct its strategic planning deficiencies?** Answer: YES Question Weight:11%

Explanation: For example, the Space Communications program has transitioned from a Lead Center program management approach to a NASA HQ approach led by Program Executives from each Enterprise under the guidance of the OSF AAA (Space Communications). As another example, CHS responded to the recommendations of the Institute of Medicine Report, "Safe Passage," in which specific recommendations were made for improving overall operations of health and safety programs and improving processes to identify and mitigate risks of space travel.

Evidence: SC: Memorandum of Agreement for the Management of NASA's Space Communications Networks, May 9, 2002. New contracts have been awarded to reflect the new HQ decentralized management approach.

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

2.CA1 **Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity?** Answer: YES Question Weight:11%

Explanation: Program analyses of procurement & technical approaches alternatives considered cost, risk, and performance trade-offs to determine the appropriate approach. LSP: As part of development of the Integrated Space Transportation Plan, a detailed analysis of cost, schedule, risk and performance goals was conducted. SC: Program analyses of procurement & technical approaches alternatives considered cost, risk, and performance trade-offs to determine the appropriate approach. The Program decided to not exercise the option on the CSOC contract but to pursue another overall procurement approach. Also an analysis on procuring services for NISN through GSA compared to a direct commercial provider approach was completed. The Program is also currently studying alternate approaches for ensuring continuation of Space Network capabilities.

Evidence: Integrated Space Transportation Plan presentation Flight Planning Board Briefings. Transformational Communications Architecture Study.TDRS-Continuation pre-formulation.

3.1 **Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?** Answer: YES Question Weight:13%

Explanation: The Agency and Enterprise collects and uses timely and credible performance information, including data from contractors, to manage and improve the program.

Evidence: Monthly PSR.Monthly PMR.Monthly and Quarterly Erasmus Reports.Quarterly Agency & Enterprise PMC. JPL and GSFC Quarterly Executive Discussion presentations and minutes. Boeing, Lockheed, and Orbital Quarterly Program Review presentations and minutes

3.2 **Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results?** Answer: YES Question Weight:13%

Explanation: Federal and contractor managers of the program are held accountable for cost, schedule and performance results. The Agency's organization structure clearly identifies managers responsibilities for this Theme as evidenced in the FY 2005 President's Budget (Performance and Management section).

Evidence: POP; Monthly performance reviews; Management reviews and reports per 3.1 above.Contractor Performance Evaluation and Fee Determination.Government and contractor managers who sign/support the COFR and are accountable for the Program's support to every ISS and Space Shuttle mission. Agency Full Cost Management Initiative.
http://www.nasa.gov/pdf/55417main_34%20Management%20and%20Performance.pdf

3.3 **Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose?** Answer: YES Question Weight:13%

Explanation: The program reports funding, net operating assets, obligations and cost plans and actuals monthly. 99.5% of PY 2003 funds were obligated by 9/30/03.

Evidence: POP, Monthly performance reviews, Monthly and Quarterly Erasmus Reports - Cost Charts.IFM records.Contractor 533s.

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: YES Question Weight: 13%

Explanation: LSP: The NASA Launch Services Contracts (NLS) includes a Launch Services Task Order process which effectively compares launch services from various prequalified sources and provides the most cost effective launch service. SC: All contractor performances are evaluated to assess operational and system effectiveness. Recommended improvements are incorporated into the budget request. ECR: Uses as a key metric the ratio of reduction in long-term environmental liability to amount spent on cleanup. Recent information system improvements have been designed to help track the ratio. CHS: : Routine cost-benefit and gap analyses are conducted to be certain that maximum efficiency is gained in all areas. RPT: The program performs a benefit study against cost, technical and schedule for each test assignment to provide the most effective test solution to each customer. Efficiencies in facility modernization, maintenance and safety are managed, prioritized and funded annually.

Evidence: Contractor Performance Evaluation and Fee Determination. Budget request for network improvements. Operating procedures for the Rocket Propulsion Test Management Board (NASA) and the National Rocket Propulsion Test Alliance (NASA/DoD) are well established. A common cost form is used for competitive cost estimating across test sites in evaluating the best value to the government

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 13%

Explanation: LSP: AF and NRO launch vehicle performance and reliability data is shared between the partners. In addition quality and safety performance and measurement for the Launch Service Provider manufacturing facilities are shared. The AF, NRO, and NASA hold an annual Mission Assurance Forum to share space launch status, plans, metrics, information, processes, and data. SC: The Program is currently collaborating with key Federal customers to study alternate approaches for ensuring continuation of Space Network capabilities. Collaboration is also taking place with the Air Force and NOAA on communications interoperability technology and demonstrations. ECR: program leverages knowledge in consultation with other federal environmental programs in order to gain an understanding of best environmental management practices as well as to transfer valuable information gained in program execution to other agencies. CH&S: The Bioastronautics Strategy demonstrates the level of collaboration and coordination that exists to date. In addition, routine planning meetings are held between Codes AM, M, U and JSC/SLSD. RPT: through alliance with DoD and cooperation with commercial ventures, continues to coordinate and collaborate, where possible, the management and utilization of available NASA propulsion test assets.

Evidence: Agreements between the AF, NASA, and NRO. Mission Assurance Forum minutes. Collaborative web sites. Transformational Communications Architecture Study. Interoperability Working Group tasks. SATOPS Working Group Interoperability tasks. NASA environmental management chairs the interagency working group on environmental management systems, is a member of the Federal Remediation Technology Roundtable (FRTR), the federal environmental cost estimating committee (EC2), and a partner agency in the national Cooperative Ecosystems Studies Unit (CESU) along with DOD, DOI, USFS, and other federal partners. Bioastronautics Strategy document http://criticalpath.jsc.nasa.gov/NS_Resources.asp?DiscMode=D001.

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

3.6 Does the program use strong financial management practices? Answer: NO Question Weight: 13%

Explanation: NASA's most recent Independent Auditor report identified four material weaknesses (two of which are repeats) as well as noncompliance with the Federal Financial Management Improvement Act.

Evidence: NASA's FY 2003 Performance and Accountability Report includes the communication from the NASA Inspector General and the report of the Independent Auditor. In addition, the GAO has published numerous reports identifying shortcoming in NASA's new financial management system as well as its financial management processes (most recent is GAO-04-754T released on May 19, 2004).

3.7 Has the program taken meaningful steps to address its management deficiencies? Answer: YES Question Weight: 13%

Explanation: LSP: In October, 2002, the Launch Services Program reorganized to combine the former Expendable Launch Vehicle and Payload Carriers Programs. This combining of the programs provided a more efficient management structure and resulted in the elimination of a layer of management. The reorganization also provided the opportunity to address management span of control deficiencies. SC: The Space Communications program has transitioned from a Lead Center program management approach to a NASA HQ approach led by Program Executives from each Enterprise under the guidance of the OSF AAA (Space Communications). CH&S: program was developed in an effort to fill a management deficiency. Since that time, CH&S has helped guide further management deficiencies at the operational level.

Evidence: LSP: Comparison of the organizational charts before and after the reorganization demonstrates the flattened organization and the shorter span of control for the engineering supervisors. SC: Memorandum of Agreement for the Management of NASA's Space Communications Networks, May 9, 2002.

3.BF1 Does the program have oversight practices that provide sufficient knowledge of grantee activities? Answer: YES Question Weight: 0%

Explanation: The Agency and Enterprise collects and uses timely and credible performance information, including data from Contractors, to manage and improve the program.

Evidence: Monthly PSR. Monthly PMR. Monthly and Quarterly Erasmus Reports. Quarterly Agency & Enterprise PMC. JPL and GSFC Quarterly Executive Discussion presentations and minutes. Boeing, Lockheed, and Orbital Quarterly Program Review presentations and minutes

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

3.CA1 **Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?** Answer: YES Question Weight: 13%

Explanation: LSP: Clearly Defined deliverables: Successful launches, Credible schedule goals: Launch Manifest Credible cost goals: within the POP budget Clear capability/Performance characteristics: Assuring launch services are available for all manifested missions (part of the performance commitment in the PCA). All Launch Service Program contracts are performance-based and therefore have clearly defined deliverables, capability /performance characteristics and appropriate credible schedule goals. In addition, over 90% of the contracts are fixed-price and therefore have credible cost goals. SC: The program maintains clearly defined requirements of the services (including level of service and technical performance expectations) to be provided to customer missions based on each customer's specific written needs.

Evidence: Latest Launch Manifest; POP submit, Launch Services Program Commitment Agreement (May 22, 2003). Signed contracts. Customer Agreements/Requirements Documents. Space Communications contracts (Performance metrics, Financial reports).

4.1 **Has the program demonstrated adequate progress in achieving its long-term performance goals?** Answer: SMALL EXTENT Question Weight: 17%

Explanation: LSP: is meeting or exceeding the long-term goals. The Launch success rate is currently 98% which is better than the goal of greater than 95%. SC: The Program's technical performance has been extremely effective, with success in exceeding performance goals for data delivery over the long-term. NASA's flight missions and numerous commercial, foreign and other Government Agency missions, including Space Shuttle, ISS and ELV launches continue to be successfully supported with Space Network (SN) and NISN Space Communications services. ECR: Even though the performance metric is new for FY03, a look back at recent program results confirms that the ECR program is progressing towards eventual elimination of all unfunded environmental liability. CHS: is on track to achieve its goals. However, the loss of Columbia has forced us to focus on return to flight and support to Soyuz launches/landings. RPT: Program has been effective in integrating Agency requirements, managing and maintaining availability of Agency propulsion test assets in meeting Agency needs. The program was given a "small extent" because it has not yet developed ambitious targets and timeframes for its long-term performance goals.

Evidence: Annual Performance and Accountability Reports (ex. FY2002 page 189). EMPC reports. See performance measure tab.

4.2 **Does the program (including program partners) achieve its annual performance goals?** Answer: SMALL EXTENT Question Weight: 17%

Explanation: LV: Total Mission Success, On Plan Budget Performance, and On Time Schedule Performance. SC: The Program's technical performance has been extremely effective, with success in exceeding performance goals for data delivery for the current fiscal year to date. NASA's flight missions and numerous commercial, foreign and other Government Agency missions, including Space Shuttle, ISS and ELV launches continue to be successfully supported with Space Network (SN) and NISN Space Communications services. ECR: The program is achieving its annual performance goal. CH&S: The loss of Columbia has caused a delay in implementing our performance goals. However, we successfully supported the two missions this year and are continuing our work to support return to flight. RPT: The program is meeting it's goal on managing and maintaining availability of Agency propulsion test assets in meeting Agency needs. Additional processes are under development to assure test efficiencies regarding technical and cost performance of Agency assets utilized. The program was given a "small extent" because it has not yet developed ambitious targets and timeframes for its annual performance goals.

Evidence: Monthly and Quarterly Erasmus Reports - Performance Indicator chart. See performance measure tab.

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

- | | | | |
|---|---|-------------------------|----------------------|
| 4.3 | Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? | Answer: LARGE
EXTENT | Question Weight: 17% |
| <p>Explanation: LSP: The program established goals consistent with the President's Management Agenda to enable maximum program efficiency. The LSP is highly focused using competitively selected launch services and fixed price contracts. SC: The program realized significant efficiencies and cost effectiveness. Since 1999, operational performance to space communications customers has not be compromised despite a significant reduction to the budget. ECR: The program is largely achieving it's annual performance goal. CH&S: A major goal is to improve efficiencies/cost effectiveness. Ongoing efforts are made to address these areas. RPT: The program continues to assure assets availability through modernization and maintenance projects and has realized significant cost savings and avoidance. On going efforts under development to improve efficiencies in infrastructure performance and cost.</p> <p>Evidence: SC: Space Communications Annual Budget Submits. Contractor financial and metrics reports Contractor Cost Savings Initiatives. ECR: Annual results for FY02 environmental liability reduction and projected results for FY03 reduction confirm performance goals are being met. CH&S: Success is reported quarterly at the EPMC. See performance measure tab.</p> | | | |
| 4.4 | Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? | Answer: LARGE
EXTENT | Question Weight: 17% |
| <p>Explanation: LSP: long-term performance goal for launch success is favorable compared to the DOD and Commercial launch success. SC: 'Space Communications provides the only current end to end primary communications capability for the Space Shuttle and the International Space Station. Space Network capabilities are unique within the US. CH&S: is comparable with the Russian Space Agency, which is the only other space medicine program.</p> <p>Evidence: The NASA ELV launch success rate is currently 98% based on data collected from 1992 through 2002. This is favorable compared to the military success rate of 90% and the commercial rate of 92% over the same period. See performance measure tab.</p> | | | |
| 4.5 | Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results? | Answer: NO | Question Weight: 17% |
| <p>Explanation: The program does not have regularly scheduled objective, high quality independent evaluations that examine how well the program is accomplishing its mission and meeting its long-term goals.</p> <p>Evidence:</p> | | | |
| 4.CA1 | Were program goals achieved within budgeted costs and established schedules? | Answer: LARGE
EXTENT | Question Weight: 17% |
| <p>Explanation: The program maintains clearly defined requirements of the services (including level of service and technical performance expectations) to be provided to customer missions based on each customer's specific written needs at an agreed to cost and schedule. The program's performance to meet these requirements within overall budgeted cost and schedule has been largely successful.</p> <p>Evidence: Customer Agreements/Requirements Documents. Customer and Service Utilization Reports. Technical Metrics Contractor financial reports. Monthly PSR. Monthly and Quarterly Erasmus Reports. Quarterly Agency & Enterprise PMC. IFM and Agency financial records and EMPC Reports Cost actuals vs. cost planned for FY 2002 for the missions and the support contractors. Official minutes from FPB for all launch date changes.</p> | | | |

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

Measure: Percent of planned data delivery achieved

Additional Information: This measure tracks the Space Network performance in delivering data to the International Space Station, each Space Shuttle mission, and low-Earth orbiting missions against the scheduled data delivery requirements of these missions.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	0.95	>95%	
2005	0.95		
2006	0.95		

Measure: Cost overrun or underrun

Additional Information: This measure tracks the overall program performance in executing within budget.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	<10%		
2005	<10%		
2006	<10%		

Measure: Ratio of reduction in long-term environmental liability to amount spent on cleanup.

Additional Information: This measure tracks effectiveness of appropriated funds by matching amounts appropriated for cleanups with annual reductions in cleanup liability.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual (Efficiency Measure)
2003	1	2.1	
2004	1.1	1.4	
2005	1.1		

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

Measure: Number of major mishaps in the Space and Flight Support program
Additional Information: Major mishaps are those that cause damage to property of at least \$250K, death, permanent disability, or hospitalization of 3 or more people

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	0	0	
2005	0		
2006	0		

Measure: Positive customer satisfaction rating from rocket propulsion test customers.
Additional Information: Positive feedback will be determined through the analysis of surveys completed by each customer. Positive is defined as achieving a score of 3 or higher on a 5 point scale.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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Measure: Percentage of NASA expendable launch vehicles that successfully achieve their missions.
Additional Information: Success is defined for each individual mission within the contractual Interface Control Document and reflects the payload's unique orbital requirements

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2010	0.95		

Measure: Crew downtime due to health-related reasons during spaceflight missions
Additional Information: Measure includes time spent on preventative measures (e.g., exercise to prevent bone loss)

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2016			

PART Performance Measurements

Program: Space and Flight Support
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Adequate
100%	67%	88%	45%	

Measure: Percent of astronaut medical requirements data captured in a comprehensive medical data management infrastructure
Additional Information: Overall goal is to design, implment, and maintain a comprehensive medical data management infrastructure to support space medicine and operations

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	>0	10%	
2005	>=30%		
2006	>=50%		
2007	>=70%		

Measure: Throughput of the Space Network and NASA Wide Area Network divided by cost
Additional Information: This measure will track the networks' performance relative to its cost. The intent is to maintain or decrease the throughput per unit cost

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
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PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

- 1.1 Is the program purpose clear?** Answer: YES Question Weight20%
- Explanation: The mission of the Space Station Program is to provide safe, reliable, and efficient human access to low Earth orbit and the International Space Station, optimizing scientific research, demonstrating advances in technology, and stimulating national interest in education and exploration. Our goals are to fly safely, meet the manifest, improve supportability, and improve the system.
- Evidence: The Space Shuttle transports people, materials, and equipment to low Earth orbit and the Space Station. See Shuttle Program Annual report 2002 at <http://spaceflight.nasa.gov/shuttle>
- 1.2 Does the program address a specific and existing problem, interest or need?** Answer: YES Question Weight20%
- Explanation: The Space Shuttle provides the only current U.S. capability for accessing the International Space Station.
- Evidence: The Space Shuttle is the only existing U.S. vehicle capable of transporting people, materials, and equipment to the Space Station.
- 1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?** Answer: YES Question Weight20%
- Explanation: The Space Shuttle provides the only current U.S. capability for accessing the International Space Station.
- Evidence: The Space Shuttle is the only existing, U.S. vehicle capable of transporting people, materials, and equipment to the Space Station.
- 1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency?** Answer: NO Question Weight20%
- Explanation: The Space Shuttle was designed in the 1970s to serve numerous roles, including launching NASA, commercial and military satellites, serving as a space laboratory, and building and servicing a future space station. The Space Shuttle's operating cost has been significantly reduced over time, but it is still likely to require more than \$4 billion per year for the rest of its service life. There is no demand for the Shuttle to conduct most of its original missions, and the Shuttle typically flies no more than 6 times per year, resulting in a very high cost per flight. Although NASA has taken many steps to ensure safety, the Shuttle has a historical catastrophic failure rate of 1 in 56.5.
- Evidence: Historical NASA budget data. The Space Shuttle Decision: NASA's Search for a Reusable Space Vehicle (NASA SP-4221) by T.A. Heppenheimer
 The Flights of the Space Shuttle:<http://www.spaceflight.nasa.gov/shuttle/archives/>
- 1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly?** Answer: YES Question Weight20%
- Explanation: The Space Shuttle is used almost exclusively to support assembly and logistics flights for the International Space Station. For at least the near-term, Space Shuttle flights will be used primarily to support human space flight missions. Through educational outreach, commercialization, and technology transfer the Shuttle Program attempts to reach other beneficiaries.
- Evidence: See Annual Performance and Accountability Report FY2002 report located at http://ifmp.nasa.gov/codeb/docs/fy02p_ar.pdf

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: NO Question Weight:11%

Explanation: The Shuttle program has developed some long term performance goals, but the measures provided in the PART are not measurable and do not directly and meaningfully support the program's purpose.

Evidence: Goals are listed in the Shuttle Integrated Budget and Performance Document (IBPD). The FY04 IBPD is located at www.nasa.gov/pdf/1975main_shuttle.pdf pages 2, 4, and 5. Measures are also located in measures section of the PART

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: NO Question Weight:11%

Explanation: No timeframes or targets (except an undefined "green") are provided

Evidence: Measures are located in the measures section of the PART

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: NO Question Weight:11%

Explanation: The program has a limited number of specific annual performance measures. However, last year's PART said that the answer to this question was "No" because "While NASA's annual performance plan includes a number of key metrics for measuring Space Shuttle operations, performance metrics for Space Shuttle supportability upgrades, safety investments, and facilities investments either do not exist or merely measure inputs, not outputs or outcomes." This has not changed.

Evidence: All annual performance goals (APGs) are listed with the associated outcome goal in the Shuttle IBPD. The FY04 IBPD is located at www.nasa.gov/pdf/1975main_shuttle.pdf pages 2, 4, and 5. Measures are also located in the measures section of the PART

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: NO Question Weight:11%

Explanation: Most of the measures reflect specific targets, e.g. achieve 100% mission success, achieve zero type A and B mishaps, and execute programs within 10% of cost and schedule. The targets in use for the Shuttle program are ambitious, but are unchanging and do not drive performance improvement. For next year's PART, NASA should add ambitious targets that drive performance improvement.

Evidence: All APGs are listed with the associated outcome goal in the Shuttle IBPD. The FY04 IBPD is located at www.nasa.gov/pdf/1975main_shuttle.pdf pages 2, 4, and 5. Measures are also located in the measures section of the PART

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: NO Question Weight:11%

Explanation: Shuttle program contractors were an integral part of the Service Life Extension Program (SLEP) summit process which framed the program's long-term investment strategy. Space Shuttle contractors were an important part of the Shuttle upgrades work in the late 1990s and are currently an integral part of not only the SLEP process, but also the return-to-flight planning and redesign efforts. The contractors are as technically capable and as equally valued as the government for planning, designing and executing program directed changes. Contractor lobbying for upgrades the program does not want has not been disruptive to the program during the past year. Since the program does not yet have good annual or long-term performance goals, however, partners cannot commit to these goals.

Evidence: The contractors provide either monthly, quarterly, and semi annual metrics data that support the Shuttle plan and the GPRA APGs.

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight:11%

Explanation: Numerous independent reviews are conducted on the Space Shuttle program to help ensure flight safety, assess programmatic, and evaluate performance.

Evidence: Aerospace Safety Advisory Panel, Space Flight Advisory Council, and Rand review, GAO Audits, and Non-Advocacy reviews. Most recently the program was reviewed by the Columbia Accident Investigation Board.

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: YES Question Weight:11%

Explanation: The IBPD provides, for every budget line item, an associated performance measure and strategic objective. Last year's PART noted a concern about the lack of visibility into the effect of funds spent on Shuttle safety investments, supportability upgrades, and facilities revitalization. The Shuttle program has begun a service life extension program (SLEP) process that is intended to make improved tradeoffs among potential safety investments. The SLEP process is new and the program will need to work to improve its transparency, metrics for choosing investments, and traceability to requirements. Next year's PART will examine how well the SLEP is achieving these goals.

Evidence: The Shuttle IBPD is located at www.nasa.gov/pdf/1975main_shuttle.pdf The SLEP summit summary CD (available from NASA) provides additional information on the SLEP summit and SLEP process

2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight:11%

Explanation: NASA's Integrated Space Transportation Plan (ISTP) lays out a plan for NASA's key space transportation capabilities over the next decades. The Space Shuttle's SLEP program addresses the critical requirements for the Space Shuttle to safely and effectively meet the mission needs called for in the ISTP.

Evidence: NASA 2003 Strategic Plan describes the ISTP. The Plan is located at ifmp.nasa.gov/codeb/docs/2003_Strategic_Plan.pdf

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

2.CA1 **Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity?** Answer: YES Question Weight:11%

Explanation: The SLEP process is a step towards weighing and evaluating the investment direction for projects in the areas of safety, sustainability, infrastructure, resources, operations, and performance. NASA is currently considering alternatives to the current Shuttle configuration for supplying the ISS with cargo and crew.

Evidence: The SLEP Summit Briefing Charts CD is available from NASA

3.1 **Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?** Answer: YES Question Weight:12%

Explanation: The Agency and Enterprise collect data monthly and quarterly in which performance, cost, and schedule information relating to key goals and objectives are utilized to make key management decisions.

Evidence: The Agency and Space Flight Enterprise hold Program Management Councils in which timely and credible performance information is reviewed periodically. An electronic system assists in providing an easily accessible collection of key performance, cost, and schedule information (http://nasa-mis.nasa.gov/nasa_mis)

3.2 **Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results?** Answer: YES Question Weight:12%

Explanation: The Shuttle Program has various contract incentives tied to cost, schedule and performance. Each contract has surveillance plans that each technical manager uses to monitor performance. Federal managers' performance plans have key factors that deal with cost/schedule/performance and SES bonuses are tied to performance metrics. Following the Columbia accident, managers were reassigned and contractors did not receive a variety of incentive fees.

Evidence: A Requirements and Procedures for Certification of Flight Readiness document is in place that establishes responsibility for key government and contractor managers who are accountable for every Shuttle launch. Schedule and costs are controlled through the Program Requirements Control Board. The Space Shuttle Program will receive flight rate credit from United Space Alliance (USA) for the flights not flown in 2003. The flight rate credit from not flying is being used to partially offset the Columbia investigation and recovery effort.

3.3 **Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose?** Answer: YES Question Weight:12%

Explanation: The Space Shuttle program tracks all funds. Next year's PART assessment will review this area in more detail.

Evidence: The Space Shuttle utilizes the NASA accounting system and complies with all financial management rules and regulations.

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not Demonstrated
80%	44%	88%	7%	

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: YES Question Weight:12%

Explanation: The program does implement IT improvements and has contract incentives that encourage and reward the contractor for safe, high quality, cost effective performance in fulfilling the contract requirements in alignment with Shuttle program goals..

Evidence: One particular IT improvement was the implementation of the NASA Management Information System web interface (located at http://nasa-mis.nasa.gov/nasa_mis) that gives management insight into the status of key program performance indicators. The Space Shuttle prime contracts are performance based with award fee, cost incentives, and performance-based measurements on specific elements.

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight:12%

Explanation: Through SLEP panels, NASA had the appropriate forum to collaborate to determine the appropriate investment direction for projects in the areas of safety, sustainability, infrastructure, resources, operations, performance, and industry. The Space Shuttle program collaborates with several federal agencies.

Evidence: The Space Shuttle program and Department of Defense collaborate in the scheduling of payload manifesting and the use of range facilities at Cape Canaveral. Several agencies, including the Departments of Transportation and Defense, are represented on the Space Shuttle program's Mishap Investigation Board. NASA has worked with many federal and state agencies in the Columbia Recovery effort (including police departments, the Forest Service, the Coast Guard, the Environmental Protection Agency, the Department of Homeland Security, the National Guard, and the Park Service)

3.6 Does the program use strong financial management practices? Answer: YES Question Weight:12%

Explanation: The Space Shuttle program adheres to financial management practices such as full cost accounting and IBPD. NASA's FY 2001 and 2002 financial statement audits noted a material weakness in the Agency's accounting for contractor-held property. The Space Shuttle Program is responsible for a considerable amount of this property. If the contractor-held property issue for the Space Shuttle Program is not resolved by next year's PART, the answer to this question may become "No."

Evidence: The Space Shuttle program complies with all Agency policies and guidance, General Accounting Office practices, OMB Circulars, Federal Budget Publications, Executive Orders, etc.

3.7 Has the program taken meaningful steps to address its management deficiencies? Answer: NO Question Weight:12%

Explanation: The report of the Columbia Accident Investigation Board identified significant management deficiencies that contributed to the loss of the Space Shuttle Columbia. The next PART assessment will review whether the program has adequately addressed these deficiencies.

Evidence: The report of the Columbia Accident Investigation Board is online at www.caib.us

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

- 3.CA1 Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?** Answer: YES Question Weight: 12%
- Explanation: The Space Shuttle program and the International Space Station program work together to define Space Station support needs. Requirements are fully documented. These requirements are matched against available Shuttle resources (technical and budget) and established flight production templates to derive launch schedules. The Deputy Associate Administrator for Shuttle and Space Station reviews cost, schedule, and performance through the NASA management information system.
- Evidence: The Space Shuttle deliverables include customer agreements, supplier agreements, prime contractor documentation requirements, and the Space Shuttle program plan.
- 4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals?** Answer: NO Question Weight: 20%
- Explanation: Up until the loss of Space Shuttle Columbia, the program was achieving its goals. Currently the program is focusing on safely returning to flight.
- Evidence:
- 4.2 Does the program (including program partners) achieve its annual performance goals?** Answer: NO Question Weight: 20%
- Explanation: Because of the loss of Columbia, essentially none of the program's outcome metrics were met.
- Evidence:
- 4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year?** Answer: NO Question Weight: 20%
- Explanation: Because of the loss of Columbia many measures were not met this year.
- Evidence:
- 4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals?** Answer: NA Question Weight: 0%
- Explanation: The Space Shuttle is the only human rated reusable space vehicle in the world. There is no other vehicle capable of providing assembly support for the ISS or carrying crews to rendezvous and service the Hubble Space Telescope.
- Evidence:

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results? Answer: SMALL EXTENT Question Weight 20%

Explanation: The Shuttle program has undergone several independent and quality evaluations that show the program has achieved some minor positive results this year. However, the report of the Columbia Accident Investigation Board was critical of many program practices.

Evidence: Aerospace Safety Advisory Panel, Space Flight Advisory Council, Rand review, GAO Audits, Independent Program Assessment Office non-advocacy reviews, and the Columbia Accident Investigation Board report (online at www.caib.us)

4.CA1 Were program goals achieved within budgeted costs and established schedules? Answer: NO Question Weight 20%

Explanation: Because of the loss of Columbia, program goals were not achieved within budgeted costs and established schedules

Evidence:

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

Measure: Mishaps causing death, damage to property of more than \$250 thousand, or permanent disability or hospitalization of three or more people

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2001	0	0	
2002	0	0	
2003	0	2	
2004	0		
2005	0		
2006			

Measure: Measure Under Development

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
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Measure: Measure Under Development

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual (Efficiency Measure)
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Measure: Average number of in flight anomalies per flight

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2001	<8	4.6	

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

2002	<8	6
2003	<8	5.3
2004	<8	
2005	<8	
2006		

Measure: On-orbit mission success

Additional Information: Mission success criteria are those provided to the Space Shuttle prime contractor for purposes of determining successful accomplishment of the performance incentive fees in the contract.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2001	1	100%	
2002	1	100%	
2003	1	89%	
2004	1		
2005	1		

Measure: Implement necessary modifications to the Space Shuttle system for return-to-flight in FY04.

Additional Information: This is a new measure

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	All		

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

Measure: Extend the operational life of the Space Shuttle.
Additional Information: This is a new measure

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green		
2005	Green		

Measure: Critical Review of Shuttle Service Life Extension
Additional Information: This is a new measure

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	1		
2005	1		

Measure: Conduct a well managed program in accordance with Agency implemetning strategies
Additional Information: This is a new measure

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green		

Measure: Program execution cost
Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	within 10%		
2005	within 10%		

PART Performance Measurements

Program: Space Shuttle
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Results Not
80%	44%	88%	7%	Demonstrated

Measure: Program execution baseline schedules
Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	within 10%		
2005	within 10%		

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

1.1 Is the program purpose clear?

Answer: Yes

Question Weight 20%

Explanation: The mission of the International Space Station (ISS), as stated in NASA's FY2005 budget submit to Congress, is to "provide a long-duration habitable laboratory for science and research activities primarily to support future human and robotic exploration of the solar system.' The Vision for Space Exploration outlines three major tasks required for ISS to help realize the vision. First, complete assembly by the end of the decade. Second, focus U.S. research and use of the ISS on supporting space exploration goals, with emphasis on understading how the space environment affects astronaut health and capabilities and developing countermeasures. Finally, conduct ISS activities in a manner consistent with U.S. obligations contained in the agreement between the U.S. and other partners in the ISS.

Evidence: FY 05 Budget ISS IBPD Summary: http://ifmp.nasa.gov/codeb/budget2005/FY05_Agency_Summary-2_31.pdfThe Vision for Space Exploration: http://www.nasa.gov/pdf/55583main_vision_space_exploration2.pdf

1.2 Does the program address a specific and existing problem, interest or need?

Answer: Yes

Question Weight 20%

Explanation: The ISS supports the Vision for Space Exploration by enabling research that could not be effectively pursued on Earth to prepare for human and robotic exploration beyond low Earth orbit. This includes research on the long-term effects of reduced gravity and the development of countermeasures against space radiation.

Evidence: 2003 NASA Strategic Plan FY 05 Budget ISS IBPD, p. EC 5-2: http://www.nasa.gov/pdf/55411main_28%20ISS.pdfThe Vision for Space Exploration: http://www.nasa.gov/pdf/55583main_vision_space_exploration2.pdf

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: Yes

Question Weight 20%

Explanation: The ISS is the only existing platform for supporting prolonged human research activity in space.

Evidence: ReMAP Report to NAC, http://SpaceResearch.nasa.gov/general_info/remap.html; During its preliminary report to the NASA Advisory Council, the Research Maximization and Prioritization (REMAP) Task Force reported as follows: 'In several areas of biological and physical research, solutions of very large, important questions require microgravity. ISS provides a unique environment for attacking these problems 'as only NASA can.'

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight 20%

Explanation: The program has implemented the recommendations of the ISS Mgmt. and Cost Eval. (IMCE) and ReMAP task forces of the NAC, resolving or partially resolving some major flaws in the program. Two potential major flaws remain: (1) limited ability to conduct research on the ISS, and (2) problems with logistics and resupply. The ISS's limited ability to conduct research during the assembly phase is well recognized. In the near-term, the ISS program is working to produce the maximum research return consistent with the available capabilities. The ISS program is taking various steps to attempt to resolve this issue. The ISS's dependence on a limited number of launch vehicles and supply options is another potential flaw that was highlighted following the Columbia tragedy. The FY 2005 President's Budget provides funding for crew and cargo services to "enable new ISS science capabilities, deliver and retrieve cargo, and provide human-rated crew transport for crew rotation when the Shuttle and partner-provided transportation is insufficient to meet space station requirements" and "establish a transportation capability for crew and cargo for the ISS after the Shuttle is retired".

Evidence: ReMAP Report to NAC, http://SpaceResearch.nasa.gov/general_info/remap.html; FY 2005 President's Budget Request ISS Program Action Plan for Selection of an ISS Configuration, December 6, 2002 HOA Meeting FY 05 Budget ISS IBPD, p. EC 5-17 http://www.nasa.gov/pdf/55411main_28%20ISS.pdf

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight 20%

Explanation: Space Station research is being realigned to directly support the Vision for Space Exploration, and station capabilities already support research on the effects of long-duration space flight effects on human physiology. The President's FY 2005 budget request paves the way for research capability enhancements that will enable increased human presence on the space station, and enables additional bioastronautics investigations with the objective of completing research required to support human explorers on other worlds by 2016. NASA has pursued the development of a regenerative environmental control and life support system (ECLSS) as a means of enhancing human sustainability in space. Deployment of the ECLSS on the space station will provide an on-orbit test bed for future exploration environmental control systems and help determine logistics and maintenance strategies for sustaining such systems on other worlds.

Evidence: National Vision for Space Exploration FY 2005 President's Budget Request Reports of the National Research Council have consistently identified significant research issues that require the capabilities of the ISS. http://spaceresearch.nasa.gov/general_info/adv.html; National Academy of Science reports on biomedical, microgravity, materials science, radiation hazards, biological and biotechnology research <http://www.nas.edu/ssb/bib1.html>. OBPR Research Plan; http://spaceresearch.nasa.gov/common/docs/OBPR_Research_Plan.pdf

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight:11%

Explanation: The National Vision for Space Exploration defines a vital role for the ISS program. ISS has three long term outcome measures that focus on specific outcomes that will support the Vision goals.

Evidence: See measures section

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight:11%

Explanation: Completion of assembly by the end of the decade while provideing required services to the science community is both long-term and ambitious.

Evidence: See measures section

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight:11%

Explanation: Each long-term measure is linked to an annual performance goal that demonstrates progress toward the long-term measure. Additionally three efficiency measures montior how effective the program is in achieving long-term goals.

Evidence: See measures section

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight:11%

Explanation: All annual measures have a baseline goal with targets that can be measured. The targets are ambitious but achievable.

Evidence: See measures section

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: Yes Question Weight:11%

Explanation: Signed ISS Intergovernmental Agreements (IGAs) and Memoranda of Understanding (MOU) create a framework for integrated program implementation that align with the NASA ISS Program goals and validate the International Partners' commitment to strategic and tactical planning. Multi-lateral control boards, working groups, and technical interchange meetings provide a forum for measuring progress and addressing cost, schedule, and/or technical concerns. For contracted U.S requirements, Contract Performance/Award Fee Evaluation processes are in place to encourage and reward the contractor for safe, high quality, cost effective performance in fulfilling the contract requirements in alignment with ISS Program goals. The evaluation process provides objective and subjective assessments by the Government, which allows percentages of the potential fee to be based on the contractor's performance measured against performance criteria in areas of safety, technical, management, customer satisfaction, cost control, and socioeconomic considerations. This process allows the Government to award or penalize the contractor's performance. Planned ISS contract consolidations will include performance visibility and measurement tools such as earned value.

Evidence: SSP50200-01, Station Program Implementation Plan, Volume 1, Preface Intergovernmental Agreements International Memoranda of Understanding Multi-lateral Coordination Board Charters, Agendas, and Action Summaries ISS Signed Protocols ISS Prime and Non-Prime Contracts

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: Yes Question Weight: 11%

Explanation: Currently, multiple independent/quality evaluations are conducted by external entities on a mission, daily, monthly, quarterly, semi-annually, annually, and 'as-required' basis depending on their charter. The ISS uses these advisory groups to obtain external input to its strategies and performance planning and evaluation activities. Examples include: Aerospace Safety Advisory Panel (ASAP): Focus on Safety (Quarterly); General Accounting Office (GAO): Focus on overall Program (Annual); NASA Engineering and Safety Center (NESC): Technical and Engineering Safety Reviews; Program Management Councils (Agency, Enterprise level): Program (Quarterly); Office of Inspector General (OIG): Focus on Program (Quarterly); Internal Control Council (ICC): Chaired by Deputy Administrator (Quarterly)

Evidence: · ASAP Reviews: HQ January 2004; JSC April 2004; KSC September 2003 · General Accounting Office (GAO): GAO-04-118 - Disciplined Process Needed to Better Manage NASA's Integrated Financial Management Program - November 2003, GAO-04-151 - NASA's Integrated Financial Management Program Does Not Fully Address Agency's External Reporting Issues - November 2003, GAO-04-203 - Further Improvements Needed in NASA's Modernization Efforts - January 2004, GAO-04-642 - Lack of Disciplined Cost-Estimating Processes Hinders Effective Program Management - May 2004 · Office of Inspector General (OIG): IG-A-03-012-00 - Minimizing Contract Costs from Government-Caused Delays - December 3, 2003, IG-04-009 - Information Assurance Controls at JSC's SDIL - February 2, 2004, IG-A-04-007-00 - Status of NASA Office of Inspector General Review of Space Shuttle Imaging - April 16, 2004, IG-A-01-009-00 - International Space Station Parts Costs, IG-A-4-037-00 - Management of ISS Risks · NASA Engineering and Safety Council (NESC): 04-019 - Post-proof NDE of ISS European Module Welds, 04-018 - ISS Cooling Water Chemistry/Compatibility, 04-012 - Improved Methods of Pressure Leak Detection for ISS, 04-038 - ISS Node 2 Use of AN Fittings · Internal Control Council (ICC): MC-03-02 - ISS Cost Management

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: Yes Question Weight: 11%

Explanation: Task requirements tied to program goals and objectives are captured in the program Cost Analysis Requirements Document (CARD). A corresponding cost breakdown structure is captured in the Agency Integrated Financial Management (IFM) System, brought on-line in FY03. Annual Program Operating Plan submissions can be traced to the approved work breakdown structure reflected in the CARD.

Evidence: ISS CARD, version 3/28/03 [http://iss-www.jsc.nasa.gov/ss/issapt/cmo/CARD/ISS FY 05 Budget Submission](http://iss-www.jsc.nasa.gov/ss/issapt/cmo/CARD/ISS%20FY%2005%20Budget%20Submission)

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

2.8 **Has the program taken meaningful steps to correct its strategic planning deficiencies?** Answer: Yes Question Weight: 11%

Explanation: Following large Space Station cost overruns in previous years, NASA has implemented changes that have resulted in improved program management and control over the program's cost. NASA introduced a new management team to the ISS Program, and revised the basic chain of authority for the program. The new managers have tightened control of program content and spending, improved program reporting and cost analysis at all levels, gained better control of program requirements and reserves, and are building a automated management information system to provide management the opportunity to correct problems before they expand beyond the Agency's control. Over the past three years NASA has demonstrated sound program management remaining on schedule and within budget. To address ISS dependence on a limited number of launch vehicles, the FY 2005 President's Budget provides funding for crew and cargo services to "enable new ISS science capabilities, deliver and retrieve cargo, and provide human-rated crew transport for crew rotation when the Shuttle and partner-provided transportation is insufficient to meet space station requirements" and "establish a transportation capability for crew and cargo for the ISS after the Shuttle is retired."

Evidence: NASA response to the IMCE Report. NASA Management Information Systems https://extranet.sef.hq.nasa.gov/nasa_mis/index.htm
ISS Success Criteria FY 05 Budget ISS IBPD, p. EC 5-2
http://www.nasa.gov/pdf/55411main_28%20ISS.pdf

2.CA1 **Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity?** Answer: Yes Question Weight: 11%

Explanation: On January 14, 2004 President Bush established a new vision for U.S. space exploration. The FY 2005 President's budget focuses the ISS budget on achieving that vision. ISS will focus on completing assembly by the end of the decade and enabling acceleration of research to support exploration. NASA will continue to pursue research as quickly as possible to facilitate the vision. Alternative options are being investigated to improve program research capabilities, to reduce the ISS's dependence on the Space Shuttle, and to safely complete ISS assembly by the end of the decade. These alternatives include changes to the ISS assembly sequence and final configuration, as well as the analysis of potential sources of crew and cargo supply.

Evidence: The Vision for Space Exploration FY 05 Budget ISS, http://www.nasa.gov/pdf/55411main_28%20ISS.pdf, ReMAP Report
Summaries of Agreements and Actions of the ISS Multilateral Coordination Board
Proceedings of the Heads of Agency Meetings M1 Memorandum Transmittal: Information for Use in ISTP Option Studies, dated May 22, 2003

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

3.1 Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance? Answer: YES Question Weight: 13%

Explanation: Program cost, schedule, and technical performance information is routinely collected and analyzed through the One NASA Management Information System, and the Agency Integrated Financial Management (IFM) System. A performance measurement system is in place using both traditional earned-value techniques for industrial contracts and modified earned-value techniques for operations activities. An early warning system has been in operation since mid-2002, and monthly assessments are provided to NASA managers all at levels. The ISS Program monitors contractor and International Partner progress, technical performance, actions, risk, cost, and schedule through regularly-scheduled unilateral and multi-lateral reviews, audits, technical interchange meetings, boards, and panels. Exploration Systems peer review research process collects data from grantees on publications as well as abstracts of research progress. Feedback from this peer-reviewed science process influences scoring on new grant proposals.

Evidence: FY2003 Performance Plan http://ifmp.nasa.gov/codeb/budget2003/31-HEDS_Enterprise.pdf NASA Management Information Systems https://extranet.sef.hq.nasa.gov/nasa_mis/index.htm ISS Program Calendar URL below for list of internal control mechanisms: <http://iss-www.jsc.nasa.gov/ss/issapt/boards.html> Monthly Early Warning System Reports NASA FY 2003 Performance and Accountability Report

3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: Yes Question Weight: 13%

Explanation: Federal managers are held accountable for ISS Program performance as evident by the recent management changes within the program and NASA Headquarters. Performance measures have been included in key management position performance criteria. Contractors are held accountable for their performance through various contract incentives. In addition to the contract incentives surrounding hardware deliveries, program management, and business management, the ISS Prime contract also contains built in ISS on-orbit incentives.

Evidence: OSF and ISS Program restructure and new organization charts Performance Evaluation Board for the multiple ISS contractors. NASA FY 2003 Performance and Accountability Report

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: Yes Question Weight: 13%

Explanation: Annual NASA R&D funds are available for obligation for two years, and fully obligated by the end of the period. Operating plans for the program year are submitted to Congress and revised as needed over the two year time period. Internally, obligation and cost plans are developed, compared to actual spending, and reviewed monthly by all levels of the program. The NASA Procurement Management System is the primary system used to provide monthly reporting of all obligations and costs. These are tracked against station unique project numbers (UPNs) traceable to contractor and institutional source documents. Contractor and government accounting systems are audited periodically to ensure compliance with government standards. As an example, 98% of ISS PY 2000 funds were obligated by 9/30/00, 100% by 9/30/01. 95% of PY 2001 funds were obligated by 9/30/01, 100% by 9/30/02. 91% of PY 2002 funds were obligated by 9/30/02. 85% of PY 2003 funds were obligated by 9/30/03 (the Columbia accident caused a sizable operations under-run in the execution year).

Evidence: NASA Monthly FACS Report Contractor monthly & quarterly reports (533s) SF133 Report on Budget Execution and Budgetary Resources FMS2108 Year-End Closing Statement Annual NASA Accountability Report

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution? Answer: YES Question Weight: 13%

Explanation: Contract Performance/Award Fee Evaluation processes are in place to encourage and reward the contractor for safe, high quality, cost effective performance in fulfilling the contract requirements in alignment with ISS Program goals. The ISS Program competitive sourcing strategy approved in Dec. 2002 reduced ISS direct contracts from 28 to six. Nine of the 28 contracts were competitively sourced and 4 of the 6 new consolidation contracts were competitively sourced. The contract for sustaining engineering was delayed in favor of an extension of the Prime contract through the return to flight period. The new contracts effectively minimize duplication of specialized expertise and redundant infrastructure in multiple contracts; provide for focused accountability for a deliverable to the ISS; minimize formal product development, management and deliveries between contracts; maximize competition; require performance measures; and encourage cost savings through requirements management and infrastructure reduction.

Evidence: Ref. Contract PEB data. ISS Program Plan: Acquisition Strategy, Section 10.0. Contract Strategy: RFI's: released 3/2002 RFP's released 3/2003. Contract selection: 10/2003 Period of performance to begin January 2004. NGO website
http://SpaceResearch.nasa.gov/research_projects/ngo.html NGO Congressional Report web site
http://SpaceResearch.nasa.gov/research_projects/ngocdt.html

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

3.5 Does the program collaborate and coordinate effectively with related programs? Answer: YES Question Weight: 13%

Explanation: NASA ground and ISS on-orbit research capabilities are available to researchers across the country in industry, academia and the public sector, but are being refocused to support research for the Vision for Space Exploration as a first priority. Competition for research grants and allocation of ISS resources is open, vigorous and competitive. NASA is cooperating with several government agencies, including NIH, NSF, DOE, and DOD. The ISS program has established pricing policy for potential commercial users of ISS resources and maintains a network of Commercial Space Centers that facilitate access to space for commercial projects. In addition, NASA has sought out partner agencies to leverage return from the unique capabilities of the ISS. Most recent are discussions with the DoD on the development of an unpressurized pallet. The ISS Program has clear planning and operational links to the Space Shuttle program for launch services, and to the Office of Exploration Systems for science payload manifesting, ground processing, and on-orbit resource scheduling.

Evidence: SS IGAs and MOUs, 18 active agreements with NIH, Commercial Space Center Annual Reports, ISS Pricing Policy

3.6 Does the program use strong financial management practices? Answer: NO Question Weight: 13%

Explanation: NASA and particularly the ISS program have made improvements in financial management practices. However, NASA's auditors continue to find agency-wide material weaknesses. NASA is taking steps to improve its practices: the Agency's new Integrated Financial Management (IFM) System has been activated; the One NASA MIS is on-line and routinely updated with program performance and budget reserve status information; and the NASA IG downgraded its assessment of ISS cost management controls from a material weakness to an "other weakness".

Evidence: NASA IFM System, NASA's FY 2003 Financial Statement Audit, NASA Management Information Systems, https://extranet.sef.hq.nasa.gov/nasa_mis/index.htm, Minutes of the NASA ICC Meeting of 5/21/03

3.7 Has the program taken meaningful steps to address its management deficiencies? Answer: YES Question Weight: 13%

Explanation: NASA has introduced a new management team to the ISS Program and revised the basic chain of authority for the program. The new managers have tightened control of program content and spending, improved program reporting and cost analysis at all levels, gained better control of program requirements and reserves, and are building an automated management information system (MIS) to provide management the opportunity to correct problems before they expand beyond the Agency's control. NASA and the ISS Program use several systems to identify and correct program management deficiencies. These include program management councils at the agency, enterprise, and program level and the NASA Management Information System (MIS). The ISS Program Office also conducts daily, weekly, monthly, and quarterly, and special reviews of all program elements, which are routinely monitored by the station and shuttle HQs staffs.

Evidence: NASA response to the IMCE Report, NASA Management Information Systems, https://extranet.sef.hq.nasa.gov/nasa_mis/index.htm, INCE Report, CAIG Report

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

3.CA1 **Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?** Answer: YES Question Weight: 13%

Explanation: The program maintains clearly defined deliverables capability/performance characteristics, and appropriate, credible cost and schedule goals. These have proven effective: prior to the Columbia accident, all U.S contractor-provided flight hardware was delivered to the launch site for integration, test, and flight processing; the next four launch packages had been completed and placed in protective storage pending the Shuttle's return to flight; ISS assembly missions were flown within days or weeks of originally planned launch dates; and on-orbit assembly proceeded in near-perfect fashion, providing research capabilities as planned during the assembly phase.

Evidence: Monthly On-Orbit Research Status Planned vs Actual Launch Dates Status of ISS Launch Packages
 Monthly Operational Availability Report

4.1 **Has the program demonstrated adequate progress in achieving its long-term performance goals?** Answer: SMALL EXTENT Question Weight: 20%

Explanation: With the development of the Vision for Space Exploration, the ISS has new long term goals against which it can measure progress. Although the Space Shuttle has not returned to flight, the ISS program is making progress toward its long term goals. Development is largely complete with all major core complete elements at KSC. The ISS is well positioned to resume assembly and is developing an assembly sequence to complete ISS by the end of the decade. Despite a reduced crew, ISS continues to support research and is working to increase available crew time. Once Shuttle flights resume in FY05 a crew of three will allow for a more robust research effort. Additionally, the President's FY05 Budget request contains funding and direction to develop a cargo/crew services strategy that will enable adequate non shuttle ISS access. Finally ISS has continued to improve its management processes.

Evidence: The Vision for Space Exploration FY 05 Budget ISS IBPD, http://www.nasa.gov/pdf/1977main_iss.pdf ReMAP Report Actual vs planned launch dates for assembly elements provided during monthly OMB status briefs. On-orbit research progress data provided during monthly OMB status briefs. NASA FY 2003 Performance and Accountability Report <http://spaceflight.nasa.gov/station/>

4.2 **Does the program (including program partners) achieve its annual performance goals?** Answer: LARGE EXTENT Question Weight: 20%

Explanation: The ISS program deserves significant credit for improvements in efficiency and project and financial management. The annual performance measures developed after Columbia indicate that the program is making progress toward its annual goals even though the Space Shuttle has not returned to flight. Cost performance for FY 2001, FY 2002, FY2003 and the first half of FY 2004 has been on target with controls in place to estimate work carryover, accurately account for reserves, manage risk, and assess threats to future performance. As stated in 4.1 above, all U.S.-provided assembly elements have been delivered. Research expeditions 5, 6 , 7, 8 & 9 were successfully deployed in spite of the Columbia accident, ensuring continuous on-orbit human presence and continuous research through FY 2004. Japan delivered its experiment module (JEM) in June '03, and Node 2 was also delivered in June by Alenia.

Evidence: Monthly ISS Status Briefs to OMB One NASA MIS NASA FY 2003 Performance and Accountability Report

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

-
- 4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year?** Answer: LARGE EXTENT Question Weight20%
- Explanation: NASA has taken steps to improve the Space Station's reserves standing through cost efficiencies, and is beginning to demonstrate performace over a number of fiscal years. Cost performance for FY 2002 and FY 2003 was on target and performance to date for FY 2004 has been on target dispite the difficulties associated with the loss of Columbia. Hardware delivery schedules have been met, program saftey has been excellent and revised up-mass, volume and crew time agreements have been satisfied.
- Evidence: Hardware delivery & launch scheds, INCE Report DoD CAIG ReportFY 2002 and FY 2003 Reserve Reconciliation ReviewFY 2004 Program Reserve Status (One NASA MIS)
- 4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals?** Answer: NA Question Weight: 0%
- Explanation: There is no comparable program with similar purpose or goals.
- Evidence:
- 4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results?** Answer: Small Extent Question Weight20%
- Explanation: As the Space Station enters its operational phase, its ability to fully support required research will become more clear, but it is too early to declare the Space Station support for research effective. The FY05 President's Budget recognized improved program management and cost control. As a result, the Space Station program is now free to move forward to complete construction fo the ISS, and to pursue enhancements to research capabilities that will support the goals of U.S. space exploration, by the end of the decade.
- Evidence: FY 05 Budget ISS IBPD, http://www.nasa.gov/pdf/55411main_28%20ISS.pdfFY 2005 President's Budget Request
- 4.CA1 Were program goals achieved within budgeted costs and established schedules?** Answer: SMALL EXTENT Question Weight20%
- Explanation: Prior to the Columbia accident, ISS assembly missions for the previous year were launched on or near planned dates; all U.S contractor-provide flight hardware was delivered to the launch site for integration, test, and flight processing; the next four launch packages have been completed and placed in protective storage pending the Shuttle's return to flight. Planned launches of key research hardware and science experiments have also proceeded on or near schedule. Actual program costs were accrued under plan for the last 2 years, with reserve levels steady or increasing. FY 2004 trends indicate program costs will accrue under plan for this year as well.Following the Columbia accident, the ISS program's ability to move towards achieving the program's long-term goals were severely hampered. The program has met all post-Columbia performance measures on schedule and within cost.
- Evidence: ISS Assembly Flight Planned vs Actual Launch DatesISS Research Payload Deployments and Cumulative Science InvestigationsFY 2005 President's Budget RequestActual FY 2002, 2003 and FY 2004 Budget Reserve Trends (One NASA MIS)

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

Measure: Percent of the International Space Station, including the U.S. components that support U.S. space exploration goals and those provided by foreign partners, assembled by the end of this decade.

Additional Information: This measure is required by the national Vision for Space Exploration and is supported by the President's FY 2005 budget request. Final configuration of the ISS will be decided within the next year.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2010	100		

Measure: Percent of optimal ISS up-mass, down-mass, and crew availability provided by non-Shuttle crew and cargo services

Additional Information: Shuttle phase-out will mean that the ISS must acquire crew and cargo services to support all U.S. up-mass and down-mass requirements by the 2010 timeframe. The ISS has already begun working to acquire crew and cargo services to supplement the Shuttle prior to its retirement. The target will be assessed against an optimal baseline level of post-Shuttle requirements for up-mass, down-mass, volume, and crew time that will be set over the next few years as the ISS final configuration and research plan become clearer.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2010	80%		

Measure: Percent of optimal on-orbit resources and accommodations (including power, data, crew time, logistics and accommodations) available to support research.

Additional Information: This measure addresses the science utilization resources needed to develop knowledge and countermeasures required by the Vision for Space Exploration. ISS will measure its ability to provide the needed resources against an optimal baseline level of requirements that will be set over the next few years as the ISS research plan becomes more clear.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2016	80%		

Measure: Agreement among the International Partners on the final ISS configuration.

Additional Information: This annual measure is linked to long-term measure #1. Subsequent annual measures would status agreements.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Config. approved		
2005	Content Baselined		

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

Measure: Initiate non-Shuttle crew and cargo transfer to the Space Station

Additional Information: This annual measure is linked to long-term measure #2. Subsequent annual measures would evaluate the baseline strategy and acquisition status.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	Publish Strategy	Not done	
2005	Complete RFP		
2006	TBD		

Measure: Number of Type-A (damage to property of at least \$1M or death) or Type B (damage to property of at least \$250K or permanent disability or hospitalization or involving 3 or more persons) mishaps in FY 2004.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2003	0	0	
2004	0	0	
2005	0		

Measure: Maximum negative cost and schedule variance for ISS development.

Additional Information: Baseline will be based on major schedule milestones developed after Shuttle RTF and the FY05 President's budget profile

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	10%		
2006	10%		

PART Performance Measurements

Program: Space Station
Agency: National Aeronautics and Space Administration
Bureau: Office of Space Flight
Type(s): Capital Assets and Service Acquisition

Section Scores				Rating
1	2	3	4	Moderately
100%	100%	88%	47%	Effective

Measure: To be developed

Additional Information: Measure will be related to Space Station operations cost. Baseline will be developed after Shuttle RTF within the FY06 President's budget profile.

Information: Annual targets to apply to operations costs only, with the objective of reducing costs by TBD within the station's service life.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2007	TBD		
2008	TBD		

Measure: Functional availability for all ISS subsystems that support on-orbit research operations.

Additional Information: Functional availability will be tracked monthly and cumulatively. Achievement will be based on cumulative availability at the end of each fiscal year.

Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	90%		
2005	90%		
2006	90%		

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

1.1 Is the program purpose clear?

Answer: YES Question Weight 20%

Explanation: The Structure and Evolution of the Universe (SEU) program has a discretely defined purpose that relates directly to the NASA Vision and Mission statements. Its goals/objectives are clear/unambiguous to all interested parties (Congress, Administration, and public) and are linked to specific elements of both the Space Science Enterprise and NASA Strategic Plans.

Evidence: SEU's objectives are to: (1) Discover what powered the Big Bang and the nature of the mysterious dark energy that is pulling the Universe apart; (2) Learn what happens to space, time, and matter at the edge of a black hole, and (3) Understand the development of structure and the cycles of matter and energy in the evolving universe. The SEU program has developed an integrated SEU Roadmap which describes the program's goals and objectives and their linkages to both Enterprise and Agency Strategic Plans. The SEU strategy is defined by three science objectives. Each objective is the subject of several research focus areas representing key areas of scientific emphasis. Identified within each of these focus areas are investigations that indicate the specific near- and mid-term scientific advances to be pursued. Finally, the specific missions that collect data for the investigations are identified. NASA's Integrated Budget and Performance Document (IBPD) and the Space Science Enterprise Strategic Plan articulate the rationales for the program.

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES Question Weight 20%

Explanation: The SEU program addresses three science problems that have seemed beyond the reach of science until now: (1) discover what powered the Big Bang and the nature of the mysterious dark energy that is pulling the universe apart; (2) learn what happens to space, time, and matter at the edge of a black hole; and (3) understand the development of structure and the cycles of matter and energy in the evolving universe.

Evidence: The National Academy of Sciences identified the top priorities in astronomy and astrophysics through its Decadal Survey. A separate National Academy of Sciences study by the Committee on the Physics of the Universe identified the most important experiments at the intersection of astronomy and physics. The SEU Roadmap, published in 2003, drew upon broad community input, including specific recommendations from the NAS reports Astronomy and Astrophysics in the New Millennium (2001) and Connecting Quarks with the Cosmos (2002). SEU's scientific and public relevance is clear: the program addresses top priorities in astronomy and astrophysics, among which are some of the most profound and puzzling questions of all time. The SEU Roadmap presents and prioritizes the science objectives for SEU and identifies the research programs and space missions required to address the science objectives.

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1.3 **Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?** Answer: YES Question Weight 20%

Explanation: While the National Science Foundation (NSF) conducts astronomical research, it is performed exclusively from ground-based observatories. Some universities also conduct limited studies, including those funded in part or in total by NASA. The goals and objectives of the SEU program can only be realized through space-based missions. There are no efforts by any federal, state, local, or private entity in the U.S. of the magnitude and scope of NASA's Structure and Evolution of the Universe program. SEU is a unique, one-of-a-kind program that seeks to achieve both near- and long-term science goals by studying solar system objects and phenomena.

Evidence: The SEU program utilizes multiple space missions to answer the heretofore unanswerable questions regarding the origin, limits, and natural laws that govern the universe. SEU also pursues and develops both enabling and enhancing technologies to provide new capabilities to collect data and achieve unique scientific advances. No other program directed at understanding the structure and evolution of the universe supports such a broad panoply of published goals and objectives.

1.4 **Is the program design free of major flaws that would limit the program's effectiveness or efficiency?** Answer: YES Question Weight 20%

Explanation: The scientific design of the Structure and Evolution of the Universe program and its ability to effectively and efficiently achieve its goals has been optimized by considering and incorporating the advice and counsel of a broad community of experts who have been intimately involved for a number of years. These experts are from NASA and other federal agencies, universities, industry, and our International partners. SEU strategies, missions, and objectives are also reviewed and prioritized by the National Academy of Sciences, NASA advisory committees and the Structure and Evolution of the Universe Subcommittee. The hardware/software development part of the program is subjected to a series of formal design reviews to ensure that the "design-to," "build-to," and "as-built" baseline requirements are properly established and met. In addition, lessons-learned workshops are conducted to prevent any previous mistakes from being repeated.

Evidence: The SEU Roadmap, which lays out direction for the future, is used to ensure the program's optimal design. The science community advises to ensure use of efficient and effective approaches to achieve program goals. The Roadmap is updated to reflect discoveries, lessons learned, or changes in the Space Science Enterprise Strategic Plan. Incorporated into hardware/software development are preliminary design review (PDR), critical design review (CDR) & design certification review (DCR). Contractor & NASA personnel verify the "design-to" baseline meets requirements, the detailed design is suitable, the "build-to" baseline is established, and each "as-built" system satisfies final performance requirements. A confirmation review is conducted between PDR and CDR & identifies schedule & cost risk, determines their manageability w/in limits of program reserves, & informs commitment to continue program funding. This review ensures the use of the most effective management approach.

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1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight: 20%

Explanation: The rigor with which the Structure and Evolution of the Universe program is designed, structured, managed, and funded ensures that resources will reach ONLY the intended beneficiaries and will address the program's purpose directly. The science objectives outlined in the Roadmap guide the activities of the SEU and provide the context through which specific research objectives are formulated, science investigations are defined, and missions that address them are planned. Missions are broken down into discrete activities, and funds are issued at the program level and below. These funds may not be spent on anything other than the purpose for which they were issued.

Evidence: The scientific purpose of each mission is well documented (see the IBPD and the Strategic Plan) and is linked to specific Enterprise and Agency goals and objectives. Funds are issued to the appropriate entity at the mission level or below. Research and Analysis programs, viewed as an integral part of the life-cycle of each mission, are selected on the basis of their contribution to the SEU objectives. All grants are fully competed and peer-reviewed to ensure that funding is provided to the most capable researchers. Above a certain level, federal law prohibits the redirection of resources issued for one program to another program without express Congressional approval. In addition, the Agency has adopted a full-cost management approach, which instills additional rigor in properly targeting and managing its funds. Finally, a revised financial system and a new computer tracking system will enable all Agency programs to ensure that each program dollar is properly directed and expended.

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 10%

Explanation: SEU long-term measures focus on outcomes and meaningfully reflect the program's purpose.

Evidence: SEU has five specific long-term performance measures, four of which are scientific outcome measures. They meaningfully and accurately reflect the purpose of SEU. The remaining long-term performance measure deals with long-term compliance with NASA management guidelines.

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight: 10%

Explanation: SEU has ambitious targets and timeframes for its long-term measures.

Evidence: SEU's scientific measures aim for an annual rating of "green," signifying excellent progress, by an external advisory committee. These measures will be assessed for the program's duration. SEU's program management long-term measure aims for 100% compliance with NASA's management guidelines and will also be assessed for the program's duration. The development and technology milestone measures include a series of annual targets the program is expected to meet each year.

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight: 10%

Explanation: SEU has specific annual performance measures that demonstrate progress toward achieving the program's long-term goals.

Evidence: SEU's annual performance measures support and indicate progress toward addressing its long-term measures. Each of the long-term science measures is supported by annual measures that address various facets of the scientific questions encapsulated in the long-term measures. Long-term measurement of program management is supported by three annual uniform measures that serve as indicators of effective management: adherence to baseline cost and schedule, delivery of at least a specified percentage of scheduled operating hours and a competitive awards regime.

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2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight: 10%

Explanation: SEU has baselines and ambitious targets for its annual measures.

Evidence: The program management annual measures have targets intended to note whether costs and schedule are followed closely, scheduled operating hours are delivered and the majority of project funds are competed. The scientific annual measures all aim for ratings of "green," signifying excellent progress, by an external advisory committee.

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: YES Question Weight: 10%

Explanation: SEU partners (NASA Centers, JPL, contractors, universities, international organizations, and other federal agencies) are directly involved in planning and establishing the program's goals and objectives. Consequently, they fully support and are committed to the achievement of both the annual and the long-term goals of the program. Both regularly scheduled and ad hoc reviews provide management insight into whether SEU partners are adhering to and supporting the program's goals and objectives. Partners who fail to exhibit proper support can be terminated from the program.

Evidence: SEU goals are made clear to partners, and "relevance to NASA strategic goals and SEC objectives" is a selection criterion for all mission investigations and grants. Partners are involved in establishing goals and objectives and therefore understand them from the start. SEU missions document their goals, objectives, technical deliverables, and data drops in program plans and commitments, signed agreements between NASA HQ and the lead NASA center. These documents are available to all partners. SEU enters into agreements with and obtains commitments from other entities to work toward and report on progress in achieving the annual and/or long-term goals of the program. Letters of Agreement and Memoranda of Understanding have been signed with major international partners and other federal agencies. Contracts and grants with industry and universities have been signed, and task-level agreements between SEU and JPL and other NASA centers have also been reached. SEU conducts award fee reviews, mid-year performance reviews, and ad hoc reviews to determine and verify partner commitment. Independent contract/programmatic reviews are conducted routinely.

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2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight:10%

Explanation: The SEU's effectiveness and program relevance are subjected to regular reviews and evaluations by the National Academy of Sciences, NASA advisory committees, and the Structure and Evolution of the Universe Subcommittee. Annual performance toward achieving stated outcomes is both determined and validated by annual external reviews. In addition, every three years, a broad community of experts from NASA, other federal agencies, universities, industry, and international partners evaluates SEU and offers strategic advice and counsel that leads to a revision of the Space Science Enterprise Strategic Plan.

Evidence: The National Academy of Sciences reviewed the SEU program as part of its Decadal Survey to help NASA prioritize missions and science objectives for the next ten years. The SEU Roadmap was created to lay out an effective path to achieve the vision set forth in the Decadal Survey. Independent external reviews by the NASA Advisory Council (NAC) are conducted annually to evaluate progress toward meeting scientific outcomes. The latest findings appear in the FY2003 Performance and Accountability Report. In addition, the NAC, the Space Science Advisory Committee, and the SEU Subcommittee meet three times per year to conduct reviews of science and program implementation strategies. Finally, every three years, the major reviews and contributions by a broad community of experts lead to the revision and publication of the Space Science Enterprise Strategic Plan. This plan incorporates any and all SEU program improvements, enhancements, and changes in strategy.

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: YES Question Weight:10%

Explanation: SEU long-term performance goals reflect the cumulative effect of annual activities. The degree to which these outcomes are realized is dependent upon the degree to which the annual performance goals are achieved. This assessment is validated by external reviews. SEU goals and objectives are directly linked to specific missions. Budget requests for each mission are dependent upon the successful completion of the current year's planned activities and the future requirements. The life-cycle cost requirements for each mission, now stated in full cost, are included in an integrated budget and performance document.

Evidence: SEU long-term performance goals are directly linked to both Enterprise and Agency strategic goals and objectives (see Space Science Enterprise and Agency Strategic Plans). In addition, the SEU Roadmap tracks objectives down to specific missions. Budget requests for each mission are derived from assessments of annual performance and estimates of resources required to complete the mission. The resource requirements are clearly stated, and are now stated in full cost. The Integrated Budget and Performance Document links program budget and goals, displaying important status data for each mission, listing the budget requirements for life-cycle cost, and identifying the specific long-term outcomes and annual performance goals supported by that mission.

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2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight: 10%

Explanation: The SEU program regularly reviews its strategic planning and utilizes a number of different mechanisms to identify and correct any deficiencies.

Evidence: Experts review SEU's progress, leading to revision every three years of the Space Science Enterprise Strategic Plan, which the National Academy of Sciences then reviews. SEU strategies, missions, and objectives are also reviewed by the Space Science Advisory Committee and SEU Subcommittee. Changes in strategic planning are incorporated into the SEU Roadmap and Integrated Budget and Performance Document. Last year, the Space Science Enterprise, including SEU, reviewed risk mitigation and cost reduction strategies to determine whether and where to make strategic changes. It was decided to extend mission phases A & B to retire technical risk. By allowing long-pole technology to mature before incorporating it into a project, risk is reduced and cost growth avoided. Extension of phase A allows a project to carry multiple contractors for longer, resulting in a clear design winner among competitors or more mature design options. The Joint Dark Energy Mission (JDEM) Science Definition Team has been convened to establish science requirements and pre-conditions to move forward (with JDEM), even with a deferred budget.

2.CA1 Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity? Answer: YES Question Weight: 10%

Explanation: When a program/project is formulated, its concepts, technology requirements, operations concepts, internal management controls, budget, and institutional requirements are evaluated by independent bodies. During this period of formulation, design trade studies are conducted in order to reconcile trade-offs between competing performance factors. Programs/projects are subjected to independent reviews throughout their life-cycle to evaluate their ability to meet commitments. Included in these reviews are recommendations for proceeding with, modifying or terminating the program or project, or enhancing overall technical and programmatic performance.

Evidence: During FY03, the SEU program conducted a technology readiness and implementation plan review of the major missions LISA and Con-X. The review of technology, management, cost, and schedule was conducted by an independent external review team. The report identified technology and developmental risks as well as critical milestones leading toward a successful project. The findings of the review panel were used to set budget requirements and schedule, as well as acquisition strategies, to complete these missions in the next decade. It was decided to develop LISA first. Also, GLAST mission tradeoffs were conducted to determine the best technical approach for the Large Area Telescope. GLAST also performed completed spacecraft trade studies. Multiple contractors were selected in order to study interfaces and tradeoffs, which allowed for a more thorough and informed review of spacecraft vendors. LISA and Con-X have subsequently been slipped at least two years to provide funding for the exploration vision.

2.RD1 If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals? Answer: NA Question Weight: 0%

Explanation: This question is not applicable. SEU is a basic research program that is unique in the type of scientific discovery it enables. Its benefit is the generation of scientific knowledge that it yields. No other efforts have similar goals.

Evidence:

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2.RD2 **Does the program use a prioritization process to guide budget requests and funding decisions?** Answer: YES Question Weight: 10%

Explanation: The SEU program is completely integrated with Agency and Enterprise goals and objectives. Independent outside organizations review the program and help set scientific priorities in line with these goals and objectives. These scientific priorities are then matched to research focus areas, which represent key areas of scientific emphasis. Within each focus area are investigations that indicate the specific scientific advances to be pursued in the near- and mid-term. The investigations form the framework for identifying specific missions. Generally, NASA decides which missions to fund based on a combination of science priorities set by the science community through NASA studies and SEU Roadmap; programmatic considerations including technical readiness; coordination with international and domestic partner agencies; and the cost of lost science opportunities for delayed projects. Mission cost estimates are then used to guide budget requests and funding decisions. Repeated management and scientific peer reviews ensure that each mission provides data in a cost effective manner.

Evidence: The National Academy of Sciences reviewed SEU as part of its Decadal Survey to help NASA prioritize missions and science objectives for the next ten years. The SEU Roadmap links objectives to specific missions. Mission life cycle costs form the basis for budget requests and funding decisions. Independent and NASA reviews of prioritized science outcomes ensure priorities are assigned to budget requests and funding decisions. The May 29, 2003, Space Studies Board (SSB) letter review of the 2003 SSE Strategy discusses responses to previous SSB advice by indicating that for SEU, the Board applauded the Space Science Enterprise for initiating the Einstein Probes, which related to priorities identified in the NRC report "Connecting Quarks with the Cosmos." It later became necessary to prioritize existing projects and examine them with a view toward the cancellation of some lower priority projects in the agency in order to fund the new exploration vision. For this reason, funding for the Einstein Probes was delayed beyond the current funding horizon.

3.1 **Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?** Answer: YES Question Weight: 8%

Explanation: The SEU program collects relevant technical and programmatic performance data on a monthly basis. This information is used to assess monthly progress and annual progress toward meeting long-range outcomes and can be used to develop risk mitigation strategies, adjust priorities, or make additional resource allocations. Grant activities, which do not have deliverables, are assessed on an annual basis.

Evidence: The Space Science Enterprise conducts monthly reviews of its missions to gather performance data; these performance data include schedule, cumulative milestones, earned value, reserves, and technical data that are uploaded into the agency's Erasmus performance reporting system. All programs over a certain monetary size are required to employ a contractor-owned, Agency-approved earned value system; NASA analysts study the results. Independent groups annually review SEU's progress toward achieving both annual and long-range performance outcomes. NASA has initiated full-cost management and an integrated financial management system to conduct financial affairs with a greater degree of precision and performance. A confirmation review held after international partners withdrew from the Large Area Telescope on the GLAST mission led to an approved rebaselining of cost and schedule. The launch was delayed 8 months and the program budget, including reserve, was increased. The cost and schedule overruns evinced in regularly scheduled monthly reviews resulted in the termination of the FAME mission. The SPIDR mission also was terminated when it became evident that it would not be able to meet the expected performance specs for the expected cost.

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3.2 **Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results?** Answer: YES Question Weight: 8%

Explanation: Federal managers and program partners are held accountable for cost, schedule, and performance results through a series of formal procedures and requirements. A responsible Center official called a Project Manager is clearly designated for each mission. This person is directly responsible for the delivery of hardware and the success of the mission. Federal managers who fail to demonstrate the required level of performance are subject to a variety of disciplinary actions, including reassignment or termination. Partners who likewise fail to demonstrate the required level of performance may find their level of participation in the program either diminished or terminated.

Evidence: Every manager is required to develop a formal personal performance plan with his or her supervisor. This plan consists entirely of critical elements, at least one of which must be linked to the agency's Strategic Plan or the organization's operating plan or goals. Although the project's performance may be evaluated on a more frequent basis, the project manager's performance is formally evaluated twice yearly. Bonuses and promotions are dependent upon the manager making positive progress toward meeting the goals of the project. Should he or she fail to do so, corrective actions ranging from counseling, reassignment or, in extreme cases, termination may result. Partners who fail to perform as required may likewise find their participation reduced or terminated--grantees, for example, might not have their project funds renewed if they have mismanaged the funds provided to them earlier.

3.3 **Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose?** Answer: YES Question Weight: 8%

Explanation: Annual NASA R&D funds are available for obligation for two years and are fully obligated by the end of the period. Operating plans for the program year are submitted to Congress and revised as needed over the two-year time period. Internally, obligation and cost plans are developed, compared to actual spending, and reviewed monthly by all levels of the program. The NASA Procurement Management System is the primary system used to provide monthly reporting of all obligations and costs. These are tracked against unique project numbers (UPNs) traceable to contractor and institutional source documents. Contractor and government accounting systems are audited periodically to ensure compliance with government standards. SEU has neither had any significant erroneous payments nor been in violation of the Anti-Deficiency Act.

Evidence: The percentage of SEU FY03 funds obligated by the end of FY03 varies by UPN but ranges from a high of 98.6% to a low of 83.8%. Most UPNs are in the upper 90% range. Only three UPNs have obligation rates in the 80% range (87%, 83.8%, 88.4%), and these are primarily grants-related UPNs. Grants programs typically maintain a larger uncosted and/or unobligated carryover into the next year in order to guard against the likelihood of a continuing resolution. Federal laws prohibit the expenditure of funds for any purpose other than that intended and authorized. Specific reports that record and track the obligation and expenditure of program funds are as follows: contractor monthly and quarterly 533 reports, SF133 reports on budget execution and budgetary resources, FMS 2108 year-end closing statement, and the annual Performance and Accountability Report.

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3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution?

Answer: YES

Question Weight: 8%

Explanation: The SEU program has adopted effective management procedures to ensure that the program is executed in a cost effective and efficient manner. Program participants are selected through open competition, ensuring a quality, cost effective program. Programs work to meet predetermined milestones and metrics to achieve cost effectiveness. Tracking earned value, plans versus actuals, and reserves as a fraction of cost-to-go are typical tools used to track cost effectiveness.

Evidence: SEU follows agency and Enterprise policies that incentivize competitive outsourcing, use best value procurement practices, and employ performance and productivity improvements. IT and improvements are used to improve data flow and make information more accessible. Full-cost management provides SEU with a full understanding of overhead costs. These actions focus on maximizing cost effectiveness of SEU's design and execution. Contractors are motivated to achieve cost effectiveness and efficiency via fee review. Panels review and grade performance to determine the fee the contractor will earn for that period. A projected cost growth of 15% triggers automatic review by senior management. Outcomes of past reviews have been program delay, redirection, or cancellation. SEU must: complete all development projects within 110% of the cost & schedule baselines; deliver >90% of scheduled operating hours for all operations and research facilities; peer-review and competitively award at least 80%, by budget, of research projects.

3.5 Does the program collaborate and coordinate effectively with related programs?

Answer: YES

Question Weight: 8%

Explanation: The SEU collaborates and cooperates, where reasonable and practicable, with other NASA programs and/or federal agencies where shared or similar goals and objectives might permit a more efficient use of resources while increasing the scientific and/or technological return. NASA coordinates the nation's astronomy program with the National Science Foundation (NSF) through regular joint staff meetings. The Astronomy and Astrophysics Advisory Committee (AAAC) provides community advice on NASA-NSF coordination. Facilities and investigations are optimized through each agency's telescope allocation process; their competitive processes ensure that all facilities are used in scientifically optimal manners. NASA and NSF also have joint allocation of facilities agreements, whereby a proposal is sent to the primary telescope facility requesting additional, coordinated use of the other agency's telescope, and NASA and NSF then block off those proposed times. In addition, NASA maintains a willingness to collaborate with other nations in exploring the universe where there is evidence of a genuine intersection of interests.

Evidence: SEU programs coordinate and collaborate with NASA's Aerospace Technology Enterprise exploration systems office to mature and validate new technology before it is used in a new SEU mission. SEU continues to work closely with the Office of Space Flight to ensure the availability of launch services. SEU maintains an ongoing collaborative relationship with various international partners at the program and project level for planning and coordination. SEU currently collaborates with the Department of Energy on the GLAST Large Area Telescope Instrument and will also collaborate with Energy on the future dark energy mission. SEU also collaborates with NSF on scientific ballooning and science projects at the South Pole. Examples of international partnerships include: European Space Agency (Herschel and Planck, LISA and EUSO); Italy (Swift Gamma-ray Burst Explorer); Japan (Astro-E2); Germany, France, Sweden, and Japan (GLAST). NASA (including SEU), Energy, and NSF are working together on a coordinated federal response to the National Academy of Sciences/Committee on the Physics of the Universe regarding implementation of their seven recommendations to address eleven questions at the interface of physics and astronomy.

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3.6 Does the program use strong financial management practices?

Answer: NO

Question Weight: 8%

Explanation: NASA had four material weaknesses including controls reconciling fund balance with Treasury, ability to provide an audit trail to support financial statements and controls over property, plant and equipment. As a result of these material weaknesses, NASA is not in compliance with the Federal Financial Management Improvement Act (FFMIA). These weaknesses pervade every program in the agency.

Evidence: FY 2003 independent audit by PriceWaterhouseCoopers

3.7 Has the program taken meaningful steps to address its management deficiencies?

Answer: YES

Question Weight: 8%

Explanation: The Space Science Enterprise, under which the SEU is managed, has a well-structured process in place to conduct both monthly and annual performance reviews. Any management deficiencies that are uncovered during these reviews are noted and subsequently remedied. In addition, lessons learned workshops are conducted in order to prevent the recurrence of errors in the program. The SEU director also has frequent contact with directors of implementing organizations for SEU projects to discuss and mitigate any management deficiencies. Finally, there is a long tradition of inviting independent bodies to come in and review programs for various deficiencies, including management, and propose solutions to any problems that may have been detected.

Evidence: Every project has an Independent Review Team that reviews the project at least annually and reports directly to NASA headquarters. Based on team recommendations, NASA adjusts the budget, schedule, requirements, management, etc. of a project. When it was determined that SPIDR was not going to be able to deliver planned science capabilities, we terminated the project. When two projects, GLAST and Swift, were over budget and running behind schedule, we brought in new project managers (and, since Swift is scheduled to launch this fall, the change has worked). When the GP-B program was cancelled due to poor performance on three separate occasions (and Congressional appropriators restored its funding each time), the program underwent reviews to restrain cost and schedule growth. Project managers were held to strict standards for mission progress, with cancellation as the alternative if standards were not met. In early 2003, an independent review team evaluated mission development progress to date. The team put forth requirements for continuation, the project implemented them, and GP-B launched in April 2004.

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3.CA1 **Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?** Answer: YES Question Weight: 8%

Explanation: The SEU science community defines and prioritizes science objectives for a new project, and these objectives form the basis for a NASA Announcement of Opportunity for science investigations for the missions. Investigations are selected that correspond to the technology readiness, cost, schedule and prioritized science for the mission. During the more traditional hardware development and launch phases, an SEU program will develop and maintain a clearly defined list of deliverables, along with the required performance characteristics, cost and schedule goals. Progress is measured by traditional methods such as earned value, schedule accomplishment, and independent assessment in order to determine whether the limited window for launch can be met, and whether the cost is exceeding predetermined limits.

Evidence: The SEU programs develop, document, maintain, and manage a clearly defined list of hardware and software deliverables, along with required performance characteristics and costs and schedule. Documentation includes the Program Commitment Agreement, the program plans, and the project plans. The program manages carefully to the information contained within these documents, because allowing requirements creep and schedule slip might prove disastrous to the program's ability to launch. There is also usually a hardware delete list in case the program has been spending too much money or has been losing schedule and must take an action to get back on schedule and budget. Any indications that the program may exceed total life cycle costs by 15% is automatic grounds for cancellation consideration. The Program Manager is most directly responsible for adhering to cost, schedule, and performance goals and is accountable to the Center Director and the director of the Space Science Enterprise's astronomy and physics division. Projects at the Centers, one or more of which may constitute a program, are managed by Project Managers, who are responsible for the delivery of hardware and the success of the mission. HQ Program Executives are in charge of project oversight and performance monitoring.

3.CO1 **Are grants awarded based on a clear competitive process that includes a qualified assessment of merit?** Answer: YES Question Weight: 8%

Explanation: NASA awards 100% of its grants according to a rigorous and well-defined system of competition and reviews that ensures that only the most meritorious proposals are selected for award. Approximately 1% of the FY2004 grant awards funds were congressionally earmarked. The party to receive the earmarked funds must submit a validation proposal to NASA prior to receipt of those funds.

Evidence: All grants selected for funding by the Space Science Enterprise, including the SEU theme, are broadly competed through the NASA Research Announcement process. Grant proposals must relate directly to both Agency and Enterprise goals and objectives. All proposals are peer-reviewed by a mix of scientific disciplines and are selected on merit. NASA also utilizes an electronic mailing list as part of its outreach efforts. This mailing list includes virtually the entire population of those who might wish to participate in the grant process.

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3.CO2 **Does the program have oversight practices that provide sufficient knowledge of grantee activities?** Answer: YES Question Weight: 8%

Explanation: NASA has an oversight practice that provides sufficient insight into and knowledge of grantees' activities.

Evidence: Discipline scientists take the results of the grant peer reviews and make selections as to whom grants are awarded. These scientists then monitor the progress of the grant toward meeting its stated goals for the duration. Formal annual reports are provided by the grantee, and expenditures are tracked at a cumulative level. This gives the discipline scientists who work with the project sufficient insight into the performance of the grantee to understand what the grantees do with the resources that are allocated to them. The formal annual reports are the primary method through which oversight and management control are exerted on the grantees. There are simply too many grants and too few monitors to permit in-depth reviews at more frequent intervals. However, because of the relative paucity of grant money when compared to the number of potential grantees, there is little reluctance to cancel a grant because of poor performance and subsequently award the money to someone else.

3.CO3 **Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner?** Answer: YES Question Weight: 8%

Explanation: NASA collects grantee performance data and makes it available to the public in a manner that is both useful and meaningful.

Evidence: Formal progress reports, which are a required output of each research and analysis activity funded under the Space Science Enterprise, are submitted on an annual basis. The NASA lead scientist, together with appropriate discipline scientists, review the progress reports before recommending continuation of the research activity or not to the procurement officers before funding is released to the grantees. The results of grants-based research are broadly disseminated to the public through the use of science forums, publications, NASA press releases and news conferences, museum displays, educational materials, and NASA's web site. NASA had previously been working to improve the Sisyphus system to develop an evolving database that would post grantees' annual reports on the Internet. However, instead of trying to improve the old database, a new system, N-Spires, will be up and running during the 2005 calendar year.

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality? Answer: YES Question Weight: 8%

Explanation: The current SEU missions, either planned or ongoing, are competed and peer reviewed. In addition, the Space Science Enterprise, under which the SEU is managed, has made a major philosophical change in the manner in which the early stages of its R&D programs are both structured and funded. This change was made in order to eliminate a great deal of technology-related risk before proceeding with development. This results in a higher quality program and avoids extra costs related to late detection of design defects, or the costs related to a failed mission. The program is managed as per NPG 7120.5B, NASA Program and Project Management Processes and Requirements. Included in the development process are a series of reviews which serve to demonstrate that the "design-to," "build-to" and "as-built" baseline requirements are properly established and met. Verification methods include test, analysis, demonstration and inspection.

Evidence: A high percentage of SEU missions begin as projects that are competitively awarded, with 100% peer-reviewed. Once these projects are awarded and begin definition, they undergo extended Phase A and B stages in order to retire technical risk and ensure program quality before going into full development. Long-pole technology is allowed to mature off-line before being incorporated. Extending a program at its earlier stages reduces technological risk, resulting in higher program quality and lower costs. Design defects are less costly to correct if detected before final integration. During development, review boards comprising contractor and NASA personnel conduct Preliminary Design Review, Critical Design Review, and Design Certification Review. This verifies that the "design-to" baseline is established and meets requirements, the detailed design is suitable and the "build-to" baseline is established, and each "as-built" system satisfies the final performance requirements. While SEU projects are fully and openly competed to the maximum extent possible, procurement protocol dictates that certain SEU projects be acquired through a sole source mechanism. Two examples are the extension of the Chandra operations contract (the original contract was awarded following a full and open competition) and the Swift prime contract (selected as an Explorer following a full and open competition).

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: YES Question Weight: 20%

Explanation: The majority of SEU's long-term measures are new this year; moreover, most of them will be works in progress for the duration of the program's existence. Nonetheless, SEU has made significant progress towards addressing its long-term scientific, program management, development and technology goals. Need to factor in FY04 performance against PART measures when available.

Evidence: SEU has made significant progress towards achieving its long-term goals. SEU's long-term performance goals are linked to those of the Enterprise, and therefore, the Agency, and contribute considerably to their achievement. Since the long term goals reflect the cumulative effect of annual activities, the degree to which long-term performance measures are being achieved is determined by the degree to which annual performance goals are being met. NASA's FY03 Performance and Accountability Report indicates that SEU's performance in support of its five Research Focus Areas merited two blue and three green ratings. SEU's performance in support of its objectives merited one blue and one green rating. Some of the most astonishing scientific discoveries of late have come from the SEU program.

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: LARGE EXTENT Question Weight 20%

Explanation: The program has achieved its performance goals consistent with its annual performance goals. Need to factor in FY04 performance against PART measures when available.

Evidence: SEU has achieved its annual performance goals to a large extent. NASA's FY03 Performance and Accountability Report indicates that, although SEU earned two blue and three green performance ratings, the Space Science Enterprise earned a yellow rating for one annual performance goal. Although this was an Agency/Enterprise annual performance goal, SEU contributed to the rating when the GP-B and several other SEU projects experienced launch delays due to technical problems. GP-B was subsequently launched in April 2004, and technical and management changes were made to the other projects to guard against a recurrence of problems in the future. These problems have not significantly impeded the successful achievement of SEU's annual performance goals.

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: LARGE EXTENT Question Weight 20%

Explanation: The SEU does demonstrate, to a large extent, improved efficiencies or cost effectiveness in achieving program goals each year. However, there are practical limits to what can be achieved.

Evidence: SEU activities are not repetitive. Most savings are in the development rather than the mission operations phase. Each development program and supported science investigation is unique. Merit-based peer reviews consider the amount of "science per dollar" offered in proposals, and selections may be based on "bang for the buck." Conversely, a very costly proposal may be selected because of the particular science offered. Growth in cost and schedule is restrained by additional testing, extending initial phase A and B development, and maturing critical technology off-line until a mission-acceptable level is reached. This trades greater up-front costs for larger cost reductions later in the cycle. All SEU projects are required to meet some uniform efficiency measures: each SEU development project should be completed within 110% of the cost and schedule baseline; will deliver at least 90% of scheduled operating hours for all operations and research facilities; and at least 80% of SEU research project dollars will be peer-reviewed and competitively funded.

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: NA Question Weight: 0%

Explanation: There are no other programs, either government or private, with similar purpose and goals, with which to compare the SEU program.

Evidence: Although other programs (e.g., NSF, DOE) undertake research programs that may contribute to SEU's objectives, no other domestic program undertakes the major space missions that are required to accomplish the SEU objectives. NSF engages in what might be termed "curiosity science," with no specific goals such as those established by NASA. NSF metrics are primarily concerned with the dispersal of grant money to universities. NASA answers specific scientific questions tied to strategic objectives. Through the use of quality management and oversight processes, major SEU space missions (e.g., Chandra, MAP, etc.) have been 100% successful after launch.

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results? Answer: YES Question Weight 20%

Explanation: Independent evaluations of the SEU program conducted by the National Academy of Sciences and the NASA Advisory Council confirm that the program is being managed effectively and is achieving anticipated results. The SEU subcommittee of the Space Science Advisory Committee gave NASA top ratings for SEU's performance in five research focus areas and overall objectives.

Evidence: The National Academy of Sciences, as part of its decadal survey, reviewed the SEU program, evaluated progress to date, and helped NASA prioritize missions and science objectives for the next ten years. Subsequently, the SEU roadmap was created to achieve the vision set out by the decadal survey. Academy reviews and strategic advice were also incorporated into the latest Space Science Enterprise Strategic Plan. The NASA Advisory Council, the Space Science Advisory Committee, and the SEU subcommittee are each scheduled to review SEU science and program implementation strategy three times per year. With SScAC's annual review, Academy input into Strategic Plan revisions every three years, the NASA Advisory Council's review of annual performance, and ad hoc reviews by other independent bodies, the effectiveness of every aspect of the SEU program is regularly reviewed. Some of the most profound scientific discoveries ever regarding the initial formation of the universe, first star formation, and the expansion of the universe at an increasing rate have come recently from the SEU program.

4.CA1 Were program goals achieved within budgeted costs and established schedules? Answer: SMALL EXTENT Question Weight 20%

Explanation: SEU program goals were achieved to a limited extent within budget costs and established schedules. External factors can impact on the ability of a mission to be completed on cost and on schedule. These include launch vehicle problems and the performance of other international and domestic partners.

Evidence: The SEU program was successful to a limited extent in staying within its budget and established schedules. Due to unforeseen technical problems, the GP-B mission was delayed until its successful launch in April 2004. The GLAST program will not launch until May 2007 due to the withdrawal of the international partners and the Large Area Telescope rebaselining. The Swift Gamma-ray Burst Explorer has experienced some technical difficulties that will result in cost and schedule increases. The SPIDR project, one of SEU's small development projects, was terminated in FY2003 when it was determined that it would not achieve the sensitivity originally proposed.

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

Measure: Average number of days to make research award selections

Additional Information: Measures the time from deadline for receipt of proposals to mailing of awards notification letters

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	150		
2006	142		

Measure: Progress toward determining the size, shape and matter-energy content of the Universe (NASA's external advisory committee will rate performance as "green" on a green-yellow-red "stoplight" scale, where green = all goals were achieved; yellow = some but not all goals were achieved; and red = goals largely were not achieved.)

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress in determining the nature of dark energy

Additional Information: Research seeks to learn the nature of the mysterious dark energy that is pulling the Universe apart.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
Ongoing	Green	Blue	

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

Measure: Progress toward measuring the cosmic evolution of the dark energy

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Blue	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress toward learning what happens to space, time and matter at the edge of a black hole

Additional Information: Research seeks to learn the extent to which space, time and matter are distorted at the edges of black holes.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
Ongoing	Green	Green	

Measure: Progress toward determining how black holes are formed, where they are, and how they evolve

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	
100%	100%	92%	73%	Effective

Measure: Progress toward testing Einstein's theory of gravity and map space-time near event horizons of black holes

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress in observing stars and other material plunging into black holes

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress toward understanding the development of structure and the cycles of matter and energy in the evolving Universe

Additional Information: Research seeks to learn how cycles of matter and energy and the formation and destruction of chemical elements created the conditions for our own existence.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
Ongoing	Green	Green	

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

Measure: Progress in determining how, when and where chemical elements were made; progress in tracing the flows of energy and magnetic fields that exchange them between stars, dust and gas

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress in exploring the behavior of matter in extreme astrophysical environments, including disks, cosmic jets, and the sources of gamma-ray bursts and cosmic rays

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Cumulative percentage baseline cost overrun on spacecraft under development (* On average, SEU projects in development will not exceed their baseline costs by more than 10% cumulatively.)

Additional Information: On average, SEU projects in development will not exceed their baseline costs by more than 10% cumulatively.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Under dev		

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

2006 Under dev

2007 Under dev

Measure: Progress in discovering how the interplay of baryons, dark matter and gravity shapes galaxies and systems of galaxies

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Percentage of scheduled operating hours delivered for all operations and research facilities

Additional Information: On average, SEU projects will deliver at least 90% of scheduled operating hours to all operations and research facilities.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	>90%		
2006	>90%		
2007	>90%		

Measure: Percentage of budget allocated through open, peer-reviewed competition

Additional Information: On average, SEU will allocated the targeted level of funding competitively.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	>80%	87%	

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

2005	>80%
2006	>80%
2007	>80%

Measure: Cumulative percentage baseline schedule slip on spacecraft under development

Additional Information: On average, SEU projects in development will not exceed their baseline schedule by more than 10% cumulatively.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Under dev		
2006	Under dev		
2007	Under dev		

Measure: Accomplishment of key development activities in support of SEU (In 2005, NASA will successfully complete the integration and testing of the GLAST spacecraft bus.)

Additional Information: Complete the integration and testing of the GLAST spacecraft bus.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Achieve		
2006	Achieve		
2007	Achieve		
2008	Achieve		

PART Performance Measurements

Program: Structure and Evolution of the Universe
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	73%	

Measure: Accomplishment of key technology activities in support of SEU**

Additional Information: **Demonstrate laser stabilization to 30 Hz/rtHz with a cavity capable of tracking varying arm lengths for LISA mission (this critically affects the utility of arm-locking and the corresponding demands on Time Delay Interferometry); demonstrate required repeatability of flight-sized mirror substrates for Constellation X mission.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Achieve		
2006	Achieve		
2007	Achieve		
2008	Achieve		

Measure: Progress in discovering what powered the Big Bang.

Additional Information: Einstein's Theory of Relativity predicts that the Universe is expanding from the Big Bang. What powered it?

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
Ongoing	Green	Green	

Measure: Progress in searching for gravitational waves from the earliest moments of the Big Bang

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

1.1 Is the program purpose clear?

Answer: YES

Question Weight 20%

Explanation: The Sun-Earth Connection (SEC) Program has a discretely, clearly defined purpose: to understand the Sun, heliosphere, and planetary environments as a single connected system. This purpose is derived from the NASA Strategic Plan and the rationale in the Space Science Enterprise Strategy. SEC's purpose/goal and the science objectives that are derived from the purpose are documented in the SEC Roadmap and are clear to all interested parties (Congress, the Administration, and the public).

Evidence: The science objectives in the SEC Roadmap are to understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments; explore the fundamental physical processes of space plasma systems; and define the origins and societal impacts of variability in the Sun-Earth connection. Each objective is associated with several research focus areas, representing key areas of scientific emphasis. Each focus area is associated with investigations that indicate the specific near- and mid-term scientific advances to be pursued. Finally, specific missions that collect data for the investigations are identified. NASA's Integrated Budget and Performance Document (IBPD) articulate the rationale for the program.

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES

Question Weight 20%

Explanation: The SEC program's improved understanding of the Sun-heliosphere-planetary environment connected system is a prerequisite to predicting space weather. Accurate prediction will reduce space weather uncertainties, thereby improving the performance of future scientific and exploration spacecraft, technological systems on Earth, and the ability to maximize protection to aircraft crews and astronauts in the radiation environment.

Evidence: The effects of solar variability and the Sun's ionizing radiation are as follows: communications/signal transmission on Earth can be interrupted; microelectronics' performance in aircraft and spacecraft can be changed or stopped; and, ionizing radiation can pose health risks to crews during polar aircraft flights and space flight. The ability to predict space weather and its effects will permit the systems that rely on links in space to improve performance by design, maintain radiation doses to future flight crews and astronauts to levels as low as reasonably allowable (as required by OSHA), and enable prediction of radiation levels and maintain system performance during future exploration.

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES

Question Weight 20%

Explanation: The National Science Foundation funds studies of the connected Sun-Earth system using ground-based observatories and existing data from space. NOAA and the U.S. Air Force Weather Agency (AFWA) develop the predictions for space weather using existing scientific understanding and data products as well as operational measurements. Only the SEC program develops and flies new experimental instruments in space to resolve scientific questions about the connected Sun-Earth system that cannot be answered by existing data, ground-based measurements, or measurements from operational instruments.

Evidence: The SEC program is unique in its development and flight of new science instruments and analyzes new and existing data to improve the scientific understanding of the Sun, heliosphere, and planetary environments. SEC's products are used to improve NOAA's and AFWA's space weather forecasting models. Often, after NASA instruments have successfully flown, NOAA and the Department of Defense replicate them for operational space weather satellites. SEC missions that address space plasma systems and the changing flow of energy and matter in our solar system are part of SEC's Solar Terrestrial Probes program, and missions that define the origin and societal impacts of variability in the SEC are part of SEC's Living With a Star program. SEC also uniquely funds tool development to visualize data from several spacecraft simultaneously.

PART Performance Measurements

Program: Sun-Earth Connection
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Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency? Answer: YES Question Weight 20%

Explanation: The scientific design of the SEC program and its ability to effectively and efficiently achieve its goals has been optimized by considering and incorporating the advice and counsel of a broad community of experts who have been intimately involved for a number of years. These experts are from NASA and other federal agencies, universities, industry and our foreign partners. SEC strategies, missions, and objectives are routinely reviewed and prioritized by the National Academy of Sciences (NAS), NASA advisory committees, and the Sun-Earth Connection Advisory Subcommittee (SECAS). The hardware/software development part of the program is subjected to a series of formal design reviews to ensure that the "design-to," "build-to," and "as-built" baselined requirements are properly established and met. In addition, lessons-learned workshops are conducted to prevent any previous mistakes from being repeated.

Evidence: The NAS review of the SEC program as part of its 2002 decadal survey found no major flaws. The SECAS 2003 review of SEC performance found no major flaws in the program and gave "green," or top, ratings to SEC's performance against its annual goals. The SECAS review of the Solar Terrestrial Probes (STP) and Living With a Star (LWS) programs found that STP missions appropriately address science questions of space plasma systems and the changing flow of energy and matter in the solar system, and the LWS program addresses science questions targeted at the origins and societal impacts of the variability in the Sun-Earth connection. Independent Review Teams (IRT) assessed the readiness of the AIM, THEMIS, and SDO missions and the LWS program to enter implementation. The IRTs found that the 3 missions and the LWS Program had no major scientific, technical, or managerial flaws and should be transitioned into implementation; the governing Program Management Councils confirmed all three missions and the LWS program to begin implementation. An IRT reviewed the STEREO mission during its critical design review and found that the STEREO mission had no major flaws.

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly? Answer: YES Question Weight 20%

Explanation: The rigor with which the SEC program is designed, structured, managed, and funded ensures that resources will reach ONLY the intended beneficiaries and will address the program's purpose directly. The science objectives outlined in the SEC Roadmap guide the activities of the SEC and provide the context through which specific research objectives are formulated, science investigations are defined, and missions that address them are planned. Missions are broken down into discrete activities, and funds are issued at the mission level and below. These funds may not be spent on anything other than the purpose for which they were issued.

Evidence: A selection criterion for each science investigation, whether it is a research and analysis (R&A) grant or a science investigation in a mission, is "relevance to the SEC objectives" as defined in the SEC Roadmap; thus funding is targeted effectively from the start. Funding for multi-year R&A grants is performed yearly, dependent upon the successful completion of the past year's objectives and continuity in plans for follow-on research to maintain relevance to SEC objectives. The scientific purpose of each mission is well documented (see the IBPD and the Strategic Plan) and is linked to specific Enterprise and Agency goals and objectives. Funds are issued to the appropriate entity at the mission level or below. Above a certain level, federal law prohibits the redirection of resources issued for one program to another program without express Congressional approval. The Agency's full-cost management approach instills additional rigor in properly targeting and managing funds, ensuring that each program dollar is properly directed and expended.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 10%

Explanation: The SEC program's long-term PART measures focus on outcomes and meaningfully reflect the program's purpose.

Evidence: SEC has six long-term performance measures. Four are outcome measures, one of which addresses program management while the other three address scientific outcomes, the purpose of the SEC program. Two of the performance measures are outputs, and they address accomplishments of key project milestones and technology activities.

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight: 10%

Explanation: The Sun-Earth Connection program has ambitious targets and timeframes for its long-term measures.

Evidence: SEC's scientific measures aim for an annual rating of "green," signifying excellent progress as evaluated by an external advisory committee. These measures will be assessed for the program's duration. SEC's program management long-term measure aims for 100% compliance with NASA's management guidelines and will also be assessed for the program's duration. The development and technology milestone measures include a series of annual targets the program is expected to meet each year.

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight: 10%

Explanation: The SEC program has specific annual performance measures that demonstrate progress toward achieving the program's long-term goals.

Evidence: The SEC program's annual performance measures support and indicate progress toward addressing its six long-term measures. Each of the three long-term science measures is supported by an annual measure that encapsulates the long-term measure. The program management long-term measure is supported by three annual measures that serve as indicators of effective program management: adherence to baseline cost, baseline schedule, and a competitive awards regime.

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight: 10%

Explanation: The SEC program has baselines and ambitious targets for its annual measures.

Evidence: The program management annual measures have targets intended to note whether costs and schedule are followed closely and the majority of research project funds are competed. The scientific annual measures all aim for ratings of "green," signifying excellent progress, by an external advisory committee.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program? Answer: YES Question Weight:10%

Explanation: SEC partners (NASA Centers, JPL, contractors, universities, international organizations, and other federal agencies) are directly involved in planning and establishing the program's goals and objectives. Consequently, they fully support and are committed to the achievement of both the annual and the long-term goals of the program. Both regularly scheduled and ad hoc reviews provide management insight into whether SEC partners are adhering to and supporting the program's goals and objectives. Partners who fail to exhibit proper support can be terminated from the program.

Evidence: SEC goals are made clear to partners, and "relevance to NASA strategic goals and SEC objectives" is a selection criterion for all mission investigations and grants. Partners participate in establishing goals and objectives and therefore understand them from the start. SEC missions document their goals, objectives, and technical deliverables in program plans and commitments, signed agreements between NASA HQ and the lead NASA center. These documents are available to all partners. SEC uses instruments available to government agencies to enter agreements with non-NASA entities to obtain commitments to working toward and reporting on progress in achieving the annual and/or long-term goals of the program. Appropriate documents have been signed with major international partners and other federal agencies. Contracts and grants with industry and universities have been signed, and agreements between SEC, JPL, and other NASA centers have been reached. SEC conducts ad hoc reviews to determine/verify partner commitment. Independent contract and programmatic reviews are conducted routinely.

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need? Answer: YES Question Weight:10%

Explanation: The SEC program's effectiveness and program relevance are subjected to regular reviews and evaluations by the National Academy of Sciences, NASA advisory committees, and the Sun-Earth Connection Advisory Subcommittee. Annual performance toward achieving stated outcomes is both determined and validated by annual external reviews. In addition, every three years, a broad community of experts from NASA, other federal agencies, universities, industry, and our international partners evaluates SEC and offers strategic advice and counsel that leads to a revision of the Space Science Enterprise Strategy.

Evidence: The National Academy of Sciences reviewed the SEC program as part of their Decadal Survey to independently develop SEC science objectives across government agencies. The SEC Roadmap was created concurrent with but separately from the Decadal Survey; the science objectives and priorities in the Survey and Roadmap agree with each other. Independent external reviews by the NASA Advisory Council (NAC) are conducted annually to evaluate progress toward meeting scientific outcomes. The latest findings appear in the FY2003 Performance and Accountability Report. In addition, the NAC, the Space Science Advisory Committee, and the SEC Advisory Subcommittee meet three times per year to conduct reviews of science and program implementation strategies. Finally, every three years, major reviews and contributions by a broad community of experts lead to the revision and publication of the Space Science Enterprise Strategy. This plan incorporates any and all SEC program improvements, enhancements, and changes in strategy.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget? Answer: YES Question Weight: 10%

Explanation: SEC long-term performance measures reflect the cumulative effect of annual activities. The degree to which these outcomes are realized is dependent upon the degree to which the annual performance goals are achieved. This assessment is validated by external reviews. SEC goals and objectives are directly linked to specific missions. Budget requests for each mission are dependent upon the successful completion of the current year's planned activities and the future requirements. The life-cycle cost requirements for each mission, now stated in full cost, are included in NASA's Integrated Budget and Performance Document.

Evidence: SEC long-term performance goals are directly linked to both Enterprise and Agency strategic goals and objectives (see Space Science Enterprise and Agency Strategic Plans). In addition, the SEC Roadmap tracks objectives down to specific missions. Budget requests for each mission are derived from assessments of annual performance and estimates of resources required to complete the mission. The resource requirements are clearly stated in full cost. The Integrated Budget and Performance Document links program budget and goals, displaying important status data for each mission, listing the budget requirements for life-cycle cost, and identifying the specific long-term outcomes and annual performance goals supported by that mission.

2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Answer: YES Question Weight: 10%

Explanation: The SEC program regularly reviews its strategic planning and utilizes a number of different mechanisms to identify and correct any deficiencies.

Evidence: The space science community and the Enterprise update the Space Science Enterprise Strategy and SEC Roadmap every 3 years, and the National Academy of Sciences reviews the Enterprise Strategy. SEC strategies, missions, and objectives are also reviewed by the Space Science Advisory Committee and SEC Advisory Subcommittee. Recently, the Space Science Enterprise (including SEC) reviewed risk mitigation and cost reduction strategies. It decided to critically evaluate missions' progress at the end of Phase A and to make changes in the mission if sufficient progress is not evident. When an instrument on the Solar Dynamics Observatory (SDO) did not show satisfactory progress at the end of Phase A, its funding was terminated. To maintain sufficient justification for the expenditure of funds for SDO, some science needed to be restored. Lockheed Martin's Atmospheric Imaging Assembly (AIA) instrument was awarded a Phase A/B contract with the provision that SDO's Preliminary Design Review should only be delayed by two months. The AIA met a deadline and was confirmed with the SDO mission to begin implementation.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

2.CA1 **Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity?** Answer: YES Question Weight: 10%

Explanation: When a program/project is formulated, its concepts, technology requirements, operations concepts, internal management controls, budget, and institutional requirements are evaluated by independent bodies. During this period of formulation, design trade studies are conducted in order to reconcile trade-offs between competing performance factors. Programs/projects are subjected to independent reviews throughout their life-cycle to evaluate their ability to meet commitments. Included in these reviews are recommendations for proceeding with, modifying or terminating the program or project, or enhancing overall technical and programmatic performance.

Evidence: The SDO mission began Phase A with 3 science investigations selected from an Announcement of Opportunity. The investigation awards for the entire mission were contingent upon showing satisfactory progress at the end of Phase A and to meet a specified cost target. Two investigations met the award requirements, and they were confirmed to begin Phase B. The third investigation did not show adequate progress and exceeded its cost target by ~\$40 million; it was not confirmed to begin Phase B, and funding was terminated. The SEC program performed trade studies to determine alternatives for continuing the mission. The study conclusions were that the project was too important to terminate but that continuing the project with only two investigations did not justify the expenditure of funds. Adding an instrument from an international partner added risk due to lack of design maturity, but adding a U.S.-led investigation restored most of the science without adding risk to the project due to its design maturity and heritage. The latter option was exercised.

2.RD1 **If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals?** Answer: NA Question Weight: 0%

Explanation: This question is not applicable. SEC is a basic research program that is unique in the type of scientific discovery it enables. Its benefit is the generation of scientific knowledge that it yields. No other efforts have similar goals.

Evidence:

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

2.RD2 **Does the program use a prioritization process to guide budget requests and funding decisions?** Answer: YES Question Weight: 10%

Explanation: Independent outside organizations help set scientific priorities in line with the Agency's and Enterprise's goals and objectives. These scientific priorities are then matched to research focus areas in the SEC Roadmap. Each focus area contains investigations that indicate scientific advances to be pursued in the near- and mid-term. The SEC program uses the priorities for scientific advances in the SEC Roadmap and the availability of funding to guide budget requests and funding decisions. The Living with a Star and Solar-Terrestrial Probes programs have their own research focus areas. If funding is available in the Living with a Star program, for example, funding is initiated for the highest-priority unfunded science advances for its focus area: defining the origins and societal impacts of variability in the Sun-Earth connection. Other factors considered in making funding decisions are mission technical readiness and international partner interests. Evaluation criteria for grant proposals are relevance to SEC objectives and the highest quality science.

Evidence: The National Academy of Sciences reviewed SEC as part of its Decadal Survey to help NASA prioritize missions and science objectives for the next ten years. The SEC Roadmap links objectives to specific missions. Mission life cycle costs form the basis for budget requests and funding decisions. Independent and NASA reviews of prioritized science outcomes ensure priorities are assigned to budget requests and funding decisions. The May 29, 2003, Space Studies Board (SSB) letter review of the 2003 SSE Strategy recommended that the Space Science Enterprise should resolve substantial variance between the missions and programs in SEC. The SEC independently revised its roadmap in 2003, and now the priorities for 2003-2013 in the revised SEC Roadmap and the Decadal Survey agree. Comporting with the Decadal Survey, overall SEC R&A funding is over 22% of the overall flight mission budget.

3.1 **Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?** Answer: YES Question Weight: 8%

Explanation: The SEC program collects relevant technical and programmatic performance data on a monthly basis for all of its programs and missions within the budget horizon including missions in pre-concept, formulation, and development. This information is used to assess monthly progress and annual progress toward meeting long-term outcomes and can be used to develop risk mitigation strategies, adjust priorities, or make additional resource allocations.

Evidence: The Space Science Enterprise conducts monthly reviews to gather and analyze performance data; these performance data include the schedule, cumulative milestones, earned value, reserves, and technical data that are uploaded into the agency's Erasmus performance reporting system for use by other NASA organizations. Independent science and program technical/management groups annually review SEC's progress toward achieving long-term performance outcomes and efficiencies. The Space Science Enterprise used the findings of the Independent Review Team from the SDO system requirements review to determine whether the SDO mission and its 3 instruments should be confirmed to begin Phase B. The team found that the SHARPP instrument was high risk with a projected cost of more than \$40 million over its target and a complex management structure. The Enterprise did not confirm the SHARPP instrument to begin Phase B.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results? Answer: YES Question Weight: 8%

Explanation: Federal managers and program partners are held accountable for cost, schedule, and performance results through a series of formal procedures and requirements. A responsible official, the project manager, is clearly designated for each mission. Federal managers who fail to demonstrate the required level of performance are subject to a variety of disciplinary actions, including reassignment or termination. Partners who likewise fail to demonstrate the required level of performance may find their level of participation in the program either diminished or terminated.

Evidence: Every manager is required to develop a formal personal performance plan with his or her supervisor. This plan consists entirely of critical elements, at least one of which must be linked to the agency's Strategic Plan or the organization's operating plan or goals. Although the project's performance may be evaluated on a more frequent basis, the project manager's performance is formally evaluated twice yearly. Bonuses and promotions are dependent upon the manager making positive progress toward meeting the goals of the program. Should he or she fail to do so, corrective actions ranging from counseling, reassignment or, in extreme cases, termination may result. Partners who fail to perform as required may likewise find their participation reduced or terminated--grantees, for example, might not have their project funds renewed if they have mismanaged funds provided to them earlier.

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose? Answer: YES Question Weight: 8%

Explanation: Annual NASA R&D funds are available for obligation for two years and are fully obligated by the end of the period. Operating plans for the program year are submitted to Congress and revised as needed over the two-year time period. Internally, obligation and cost plans are developed, compared to actual spending, and reviewed monthly by all levels of the program. The NASA Procurement Management System is the primary system used to provide monthly reporting of all obligations and costs. These are tracked against unique project numbers (UPNs) traceable to contractor and institutional source documents. Contractor and government accounting systems are audited periodically to ensure compliance with government standards. SEC has had no significant erroneous payments and has not been in violation of the Anti-Deficiency Act.

Evidence: The percent of FY03 SEC funds obligated by the end of FY03 varies by UPN but ranges from a high of 100% to a low of 70%. Most UPNs are in the upper 90% range. Only two UPNs have obligation rates in the 70% range: a grants UPN and SEC Technology and Advanced Concepts (TAC). Grants programs typically have a large uncosted carryover to maintain funding during a continuing resolution. The carryover in SEC TAC permits a new Living with a Star mission to begin formulation while fully funding SDO as it begins development in FY04, thereby smoothing out an irregular budget profile. Federal laws prohibit the expenditure of funds for any purpose other than that intended and authorized. Specific reports that record and track the obligation and expenditure of program funds are as follows: NASA Business Warehouse report, contractor 533 reports, SF133 reports on budget execution and resources, FMS2108 year-end closing statement, and the annual Performance and Accountability Report.

PART Performance Measurements

Program: Sun-Earth Connection
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Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution?

Answer: YES

Question Weight: 8%

Explanation: The SEC program has adopted effective management procedures to ensure that the program is executed in a cost effective and efficient manner. Tracking earned value, plans versus actuals, and reserves as a fraction of cost-to-go are typical tools used to track cost effectiveness. Triggers for termination reviews when the projects are approved to begin development, and all SEC projects have an automatic trigger when the projected cost growth exceeds 110% of the cost cap.

Evidence: SEC follows agency and Enterprise policies that incentivize competitive outsourcing, use best value procurement practices, and employ performance and productivity improvements. Each SEC mission in formulation develops a schedule with controlled milestones that is linked to its staffing, cost plan, cost cap, descope plans, reserves, and technical content. The plans are independently reviewed prior to a transition into Phase B (design) and into Phase C (development), and yearly thereafter. The independent review findings including an independent cost estimate are significant factors in determining whether the mission is confirmed to begin the follow-on phase. When Phase C begins, the mission's plans are baselined and the costs are capped. SEC reviews progress against the baseline monthly for all missions; it also monitors progress weekly and conducts independent reviews yearly for all missions in development. A projected cost growth of 10% over the cap triggers automatic review by senior management. Outcomes of past reviews have been program delay, redirection, or cancellation. Contractors are motivated to achieve cost effectiveness and efficiency via fee review. Panels review contractor performance progress and assign a grade which determines how much fee the contractor will earn for that review period. All SEC projects must meet uniform efficiency measures: each development project must complete its current phase within 110% of baselined schedule and cost; each SEC research project must allocate 80% of funding competitively, and on average, SEC must deliver 90% of scheduled operating hours.

3.5 Does the program collaborate and coordinate effectively with related programs?

Answer: YES

Question Weight: 8%

Explanation: The SEC collaborates and cooperates, where reasonable and practicable, with other NASA programs and/or federal agencies where shared or similar goals and objectives might permit a more efficient use of resources while increasing the scientific and/or technological return. In addition, NASA maintains a willingness to collaborate with other nations where there is evidence of a genuine intersection of interests.

Evidence: SEC works with the New Millennium Program and NASA's Exploration Office to mature and validate new technology before it is used in a new SEC mission. The SEC program works with the U.S. Air Force's Space Technology Alliance to reduce space environment effects for large imaging systems. SEC also participates in the National Space Weather Program, a program coordinated by the Office of the Federal Coordinator for Meteorology, with membership from the National Science Foundation, the Office of the Secretary of Defense, the U.S. Space Command, the Air Force Weather Agency, and the National Oceanic and Atmospheric Administration; the SEC's improvements in the scientific understanding of the source for space weather and solar variability are the starting points for those agencies to develop a predictive space weather capability and a vital requirement for future NASA exploration. The Air Force Weather Agency uses data products from SEC missions to provide daily space weather predictions for national defense applications.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

3.6 Does the program use strong financial management practices? Answer: NO Question Weight: 8%

Explanation: NASA had four material weaknesses including controls reconciling fund balance with Treasury, ability to provide an audit trail to support financial statements and controls over property, plant and equipment. As a result of these material weaknesses, NASA is not in compliance with the Federal Financial Management Improvement Act (FFMIA). These weaknesses pervade every program in the agency.

Evidence: FY 2003 independent audit by PriceWaterhouseCoopers

3.7 Has the program taken meaningful steps to address its management deficiencies? Answer: YES Question Weight: 8%

Explanation: The Space Science Enterprise, under which the SEC is managed, has a well-structured process in place to conduct both monthly and annual performance reviews. Any management deficiencies that are uncovered during these reviews are noted and subsequently remedied. In addition, lessons learned workshops are conducted in order to prevent the recurrence of errors in the program. The SEC director also has frequent contact with directors of implementing organizations for SEC projects to discuss and mitigate any management deficiencies. Finally, there is a long tradition of inviting independent bodies to come in and review programs for various deficiencies, including management, and propose solutions to remedy any problems that may have been detected.

Evidence: For the SDO project, routine program reviews and independent reviews during Phase A led to the determination that the SHARPP instrument had a high risk of exceeding its schedule and cost target by at least \$40M and did not have the management controls and processes in place to support development on schedule and on cost target. SDO project management attempted to remedy SHARPP's management deficiencies by supplementing the SHARPP management with contractors, but the contractors resigned prior to the beginning of Phase B (design). Due to the risks of exceeding schedule and cost targets, the SHARPP instrument was not confirmed to begin Phase B. An Atmospheric Imaging Assembly (AIA) instrument provided by Lockheed Martin was judged to be low risk and have good management practices; it was added to the SDO project at the beginning of Phase B to restore some science to the mission while minimizing risk to the overall project.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

3.CA1 **Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?** Answer: YES Question Weight: 8%

Explanation: The SEC science community defines and prioritizes science objectives for a new project, and these objectives form the basis for a NASA Announcement of Opportunity for science investigations for the mission. Investigations are selected that correspond to the technology readiness, cost, schedule, and prioritized science for the mission. During the more traditional hardware development and launch phases, an SEC project will develop and maintain a clearly defined list of deliverables along with the required performance characteristics, costs, and schedule goals. Progress is measured by traditional methods such as earned value, schedule accomplishment, and independent assessment in order to determine whether the cost, schedule, and performance maintain alignment with predetermined requirements.

Evidence: SEC develops and manages each project to a clearly defined list of goals and objectives, hardware and software deliverables, and required performance characteristics, costs and schedules. Requirements and deliverables are documented in Program Commitment Agreements, Program Plans, Project Plans, and subordinate documentation. Each project has a program-level requirements appendix to the Program Plan that documents the agreement between the Enterprise and implementing organizations to deliver a mission with specified science content within a cost cap, launch readiness date, and spacecraft performance characteristics. SEC holds the project manager responsible for delivering a product that meets the program-level requirements; not meeting requirements may impact mission science. The Program Manager is most directly responsible for adhering to cost, schedule, and performance goals. HQ Program Executives are in charge of project oversight and performance monitoring. SEC charters an independent annual review of each development project to identify problems early. Any indications that the project may exceed total life cycle costs or schedule by 10% are grounds for cancellation consideration.

3.CO1 **Are grants awarded based on a clear competitive process that includes a qualified assessment of merit?** Answer: YES Question Weight: 8%

Explanation: NASA awards 100% of its grants according to a rigorous and well-defined system of competition and reviews that ensures that only the most meritorious proposals are selected for award.

Evidence: All grants selected for funding by the Space Science Enterprise, including SEC grants, are broadly competed through the NASA Research Announcement process. Grant proposals must relate directly to both Agency and Enterprise goals and objectives. All proposals are peer-reviewed by a mix of scientific disciplines and are selected on merit. NASA also utilizes an electronic mailing list to reach out to virtually the entire population of those scientists who might wish to participate in the grant process. SEC had no grant earmarks and had 0.04 percent of its total FY 2004 funds earmarked.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

3.CO2 Does the program have oversight practices that provide sufficient knowledge of grantee activities? Answer: YES Question Weight: 8%

Explanation: NASA has an oversight practice that provides sufficient insight into and knowledge of grantees' activities.

Evidence: Discipline scientists take the results of the grant peer reviews and make selections as to whom grants are awarded. These scientists then monitor the progress of the grant toward meeting its stated goals for the duration. Formal annual reports are provided by the grantee, and expenditures are tracked at a cumulative level. This gives the discipline scientists who work with the grantee sufficient insight into his/her performance to understand what the grantees do with the resources that are allocated to them. The formal annual reports are the primary method through which oversight and management control are exerted on the grantees. There are simply too many grants and too few monitors to permit in-depth reviews at more frequent intervals. However, because of the relative paucity of grant money when compared to the number of potential grantees, there is little reluctance to cancel a grant because of poor performance and subsequently award the money to someone else.

3.CO3 Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner? Answer: YES Question Weight: 8%

Explanation: NASA collects grantee performance data and makes it available to the public in a manner that is both useful and meaningful.

Evidence: Formal progress reports, which are a required output of each research and analysis activity funded under the SEC, are submitted on an annual basis. The NASA lead scientist, together with appropriate discipline scientists review the progress reports before recommending continuation of the research activity or not to the procurement officers before funding is released to the grantees. The results of grants-based research are broadly disseminated to the public through the use of science forums, publications, NASA press releases and news conferences, museum displays, educational materials, and NASA's web site. NASA is currently working to develop an evolving database that will post grantees' annual reports on the Internet. The database is scheduled to become available to the public by calendar year 2005. In addition, some of the highlights from the grantee annual reports are published in the "Space Science: Supporting Research and Technology (SR&T) Program Highlight" brochure.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

3.RD1 For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality? Answer: YES Question Weight: 8%

Explanation: The scientific investigations (instruments and data analysis) in SEC missions are competed through announcements of opportunity open to the entire scientific community and are peer reviewed. The acquisition strategies for the Living With a Star, Solar Terrestrial Probes, and Explorer programs are defined in their Program Commitment Agreements, agreements between the Enterprise and the NASA Deputy Administrator. The Space Science Enterprise, under which SEC is managed, recently decided to extend mission phases A and B to retire a great deal of technology-related risk before beginning development. This results in a higher quality program and avoids extra costs related to late detection of design defects, or the costs related to a failed mission. The program is managed as per NPR 7120.5B, NASA Program and Project Management Processes and Requirements. Included in the development process are a series of reviews which serve to demonstrate that the "design-to," "build-to," and "as-built" baselined requirements are properly established and met. Verification methods include test, analysis, demonstration, and inspection.

Evidence: Science investigations in SEC projects (science instruments and data analyses) are 100% competed and peer-reviewed prior to the start of Phase A. When the Enterprise awards investigations, it also decides on the project implementing organization and whether the spacecraft will be competed or built in-house by the implementer. Exceptions due to Congressional actions/understandings are: Solar B, which began as an earmark with MSFC as implementer; STEREO, which began as an earmark with Applied Physics Laboratory (APL) as the spacecraft provider; and the Living With a Star project, whose implementers will be either GSFC or APL by Congressional mandate. For the SDO spacecraft, GSFC competed with non-NASA spacecraft providers. The Enterprise selected GSFC to build the spacecraft in-house to maintain core competency. NASA oversees all projects and holds the projects to uniform standards for management (NPR 7120.5) including NASA-initiated independent reviews. SEC corrects deficiencies promptly (see question 3.7's evidence/data).

4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: YES Question Weight: 20%

Explanation: The Sun-Earth Connection Program, as part of the Space Science Enterprise, has demonstrated significant progress toward achieving its long-term performance goals. Need to factor in FY04 performance against PART measures when available.

Evidence: SEC PART measures are new this year, and they align with SEC's measures in the Performance and Accountability Report. NASA's FY03 Performance and Accountability Report indicates that the Space Science Enterprise (that includes SEC), achieved 100% of its annual performance measures. The SEC's long-term performance outcomes are linked to those of the Enterprise and contribute considerably to their achievement. Since the long-term performance measures reflect the cumulative effect of annual activities, and the degree to which long-term performance measures are being achieved is determined by the degree to which annual performance goals are being met. Since the majority of the annual performance measures evaluated are either directly related to SEC or are related to SEC through cross-cutting linkages, the SEC can be said to have demonstrated significant progress toward achieving its long-term performance goals.

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: LARGE EXTENT Question Weight20%

Explanation: The program has achieved its performance goals consistent with its annual performance goals. Need to factor in FY04 performance against PART measures when available.

Evidence: SEC has achieved its annual performance goals to a large extent. SEC PART measures are new this year, and they align with SEC's goals in the Performance and Accountability Report (PAR). NASA's FY03 PAR indicates that the Space Science Enterprise (that includes SEC), achieved 100% of its annual performance goals. The annual performance goals of the SEC are linked to the Strategic goals and objectives of the Enterprise, and contribute significantly to their achievement. SEC itself earned top ("green" and "blue") ratings against its FY03 GPRA performance measures, but the delay in progress on a Solar-B instrument contributed to a "yellow" rating for one Space Science Enterprise annual performance goal. This issue has not significantly impeded the successful achievement of SEC's annual performance goals.

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: LARGE EXTENT Question Weight20%

Explanation: The SEC does demonstrate, to a large extent, improved efficiencies or cost effectiveness in achieving program goals each year. However, there are practical limits to what can be achieved.

Evidence: SEC does not engage in repetitive activities. Most potential savings are in mission development phase instead of mission operations. Each development project and space science investigation is unique. Our merit-based peer reviews consider the amount of "science per dollar" that proposals offer. We might make selections based on "bang for the buck." However, there may be a proposal that is very costly, but because of the particular science it offers, is likewise selected. SEC tries to restrain unwarranted growth in cost and schedule by additional testing, extending phase A and B development time, and maturing critical technology off-line until it reaches a mission-acceptable level. This might cost more up front, but it avoids larger costs later in development. All SEC projects are required to meet uniform measures: each SEC development project should complete its current phase within 10% of the baselined cost and schedule; SEC research projects should allocate 80% of their funding competitively, and SEC should deliver 90% of scheduled operations and research facilities.

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: NA Question Weight: 0%

Explanation: There are no other programs, either government or private, with similar purpose and goals, with which to compare the Sun-Earth Connection Program.

Evidence: No other agency or organization takes the technology risks of building new experimental, one-of-a-kind instruments on unique space missions and uses data from the missions to improve science. SEC's success is demonstrated by its 100 percent achievement of its annual performance goals as defined in the FY 2003 Performance and Accountability Report.

PART Performance Measurements

Program: Sun-Earth Connection
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Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

Measure: Average number of days to make research award selections

Additional Information: Measures the time from deadline for receipt of proposals to mailing of awards notification letters

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	150		
2006	142		

Measure: Progress in understanding solar variability's impact on space climate/global change in Earth's atmosphere (NASA's external advisory committee will rate performance as "green" on a green-yellow-red "stoplight" scale, where green = all goals were achieved; yellow = some but not all goals were achieved; and red = goals largely were not achieved.)

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress in understanding the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
On-going	Green	Blue	

PART Performance Measurements

Program: Sun-Earth Connection
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Bureau:
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Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

Measure: Progress in understanding the structure and dynamics of the Sun and solar wind and the origins of solar variability.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress in determining the evolution of the heliosphere and its interaction with the galaxy.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Blue	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress in understanding the response of magnetospheres and atmospheres to external and internal drivers.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		

PART Performance Measurements

Program: Sun-Earth Connection
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Bureau:
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Section Scores				Rating
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2007 Green

Measure: Progress in understanding the fundamental physical processes of space plasma systems.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
On-going	Green	Green	Long-term

Measure: Progress in discovering how magnetic fields are created and evolve and how charged particles are accelerated.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green	Green	Long-term
2005	Green		
2006	Green		
2007	Green		

Measure: Progress in understanding the coupling across multiple scale lengths and its generality in plasma systems.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term:
2004	Green	Green	Long-term
2005	Green		
2006	Green		
2007	Green		

PART Performance Measurements

Program: Sun-Earth Connection
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Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
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Measure: Cumulative percentage baseline cost overrun on spacecraft under development (* On average, SEC projects in development will not exceed their baseline costs by more than 10% cumulatively.)

Additional Information: On average, SEC projects in development will not exceed their baseline costs by more than 10% cumulatively.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Under dev		
2006	Under dev		
2007	Under dev		

Measure: Percentage of budget allocated through open, peer-reviewed competition

Additional Information: On average, SEC will allocate the targeted level of funding competitively.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2004	>75%	83%	
2005	>75%		
2006	>75%		
2007	>75%		

Measure: Cumulative percentage schedule slip on spacecraft under development

Additional Information: On average, SEC projects in development will not slip from their baseline schedules by more than 10% cumulatively.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Under dev		
2006	Under dev		
2007	Under dev		

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

Measure: Accomplishment of key development activities (In 2005, NASA will successfully complete Critical Design Review for the SDO and THEMIS missions and complete STEREO integration and testing.)

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Achieve		
2006	Achieve		
2007	Achieve		
2008	Achieve		

Measure: Accomplishment of key technology activities in support of the SEC.

Additional Information: For 2004, Complete STP MMS Phase A studies

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2005	Achieve		
2006	Achieve		
2007	Achieve		
2008	Achieve		

Measure: Progress in understanding the origins and societal impacts of variability in the Sun-Earth connection.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
On-going	Green	Green	

PART Performance Measurements

Program: Sun-Earth Connection
Agency: National Aeronautics and Space Administration
Bureau:
Type(s): Research and Development

Section Scores				Rating
1	2	3	4	Effective
100%	100%	92%	74%	

Measure: Progress in developing the capability to predict solar activity and the evolution of solar disturbances as they propagate in the heliosphere and affect the Earth.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		

Measure: Progress in specifying and enabling the prediction of changes to the Earth's radiation environment, ionosphere, and upper atmosphere.

Additional Information:

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2004	Green	Green	
2005	Green		
2006	Green		
2007	Green		