# National Aeronautics and Space Administration

# Fiscal Year 2003 Performance Plan Remapped

## The NASA Vision

To improve life here,
To extend life to there,
To find life beyond.

## The NASA Mission

To understand and protect our home planet,
To explore the universe and search for life,
To inspire the next generation of explorers
… as only NASA can.

# Introduction

This document is a revision of the Fiscal Year 2003 (FY03) Performance Plan, published on Feb. 4, 2002. It maps the FY03 Performance Plan to NASA's new Vision and Mission, 2003 Strategic Plan and the current budget framework. This remapped plan will serve as the basis for the FY03 Performance and Accountability Report.

The detailed content of the FY03 Performance Plan has not changed. The annual performance goals (APGs) have been remapped to the new 2003 Strategic Plan objectives as updated September 2003, to facilitate evaluation of FY03 performance relative to the Agency's current strategic objectives; allowing a simple transition from the FY03 Performance Plan to the FY03 Performance and Accountability Report.

## *Background*

NASA and other government agencies are shifting the way they structure budgets and are fully integrating performance planning and reporting into the budget process. This change is designed to ensure that individual programs and projects are held accountable for their results, and that those results can be clearly used to justify the budget. Performance - based budgeting also will give Agency managers insight into the details of the tasks they manage and how the tasks contribute to the overall Agency Vision, Mission, and goals.

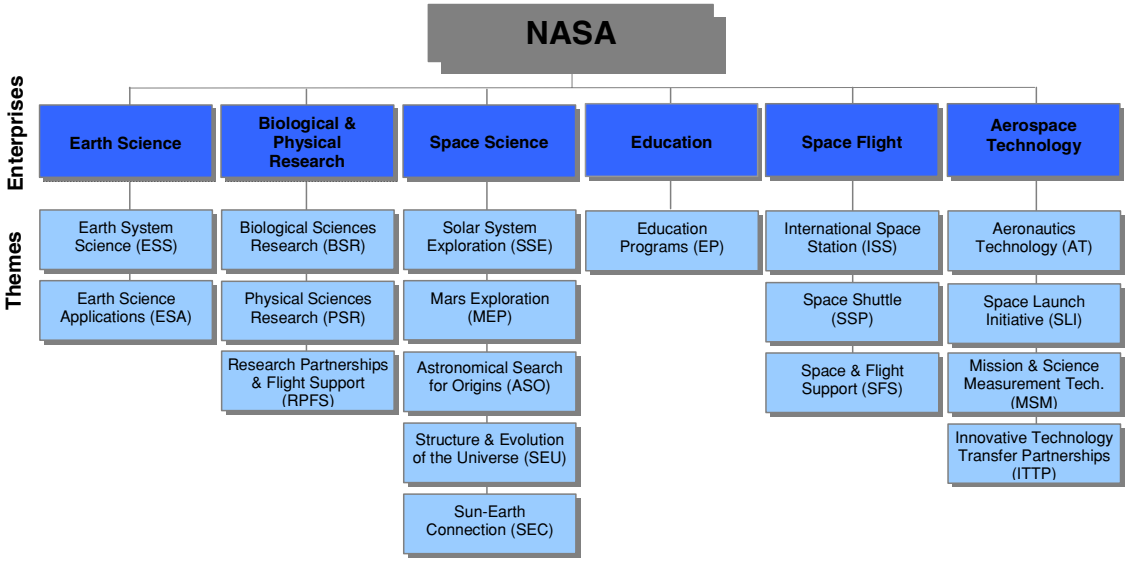
NASA's 2003 Strategic Plan articulates the Agency's Vision and Mission and establishes a new budgeting and performance-planning framework.

NASA released the 2003 Strategic Plan, the Fiscal Year 2004 Budget Request also known as the Integrated Budget and Performance Document (IBPD), and the Fiscal Year 2002 Performance and Accountability Report (PAR) on Feb. 3, 2003. The simultaneous release of these three documents demonstrated NASA's commitment to performance and budget integration. These documents can be viewed at http://www.nasa.gov/about/budget

The 2004 Budget is performance – based; and represents a significant change from prior years. Its purpose is to help ensure that budget, performance planning, and performance results are integrated. Many documents published separately in prior years have been combined, tightening the connection between budget and performance.

The Agency's programs and projects are all budgeted under 18 Themes, which represent the organization of work within NASA. Under full cost, all budget and performance measures are allocated to these Themes. See Figure 1 for NASA's 18 Themes and the responsible Enterprises.

**Figure 1: NASA's Enterprises and Themes**



*Budget and Planning Process*

NASA's planning process starts with the Vision and Mission and flows to more focused Goals and Objectives, then to near-term plans and documents.

This is the Agency's new Vision and Mission:

**The NASA Vision:**
*To improve life here, To extend life to there, To find life beyond.*

**The NASA Mission:**
*To understand and protect our home planet, To explore the universe and search for life, To inspire the next generation of explorers…as only NASA can.*

Ten goals stem from the Vision and Mission, and NASA's Themes meet these goals through a series of objectives, all of which are documented in the 2003 Strategic Plan.

NASA's objectives have been further defined into outcomes and FY04 APGs, which are distributed throughout the 18 Themes in the FY04 budget. The Agency's entire budget – its means for accomplishing the objectives and performance goals – is fully allocated to the 18 Themes.

This structure ensures that NASA is directly accountable for its performance, and that the results of every NASA program are visible to the taxpayers and traceable to the Agency's Vision and Mission.

Figure 2 shows how the Agency's Missions and goals are accomplished by the 18 Themes.

**Figure 2: NASA's Strategic Planning from Vision to Detailed Performance Measures**

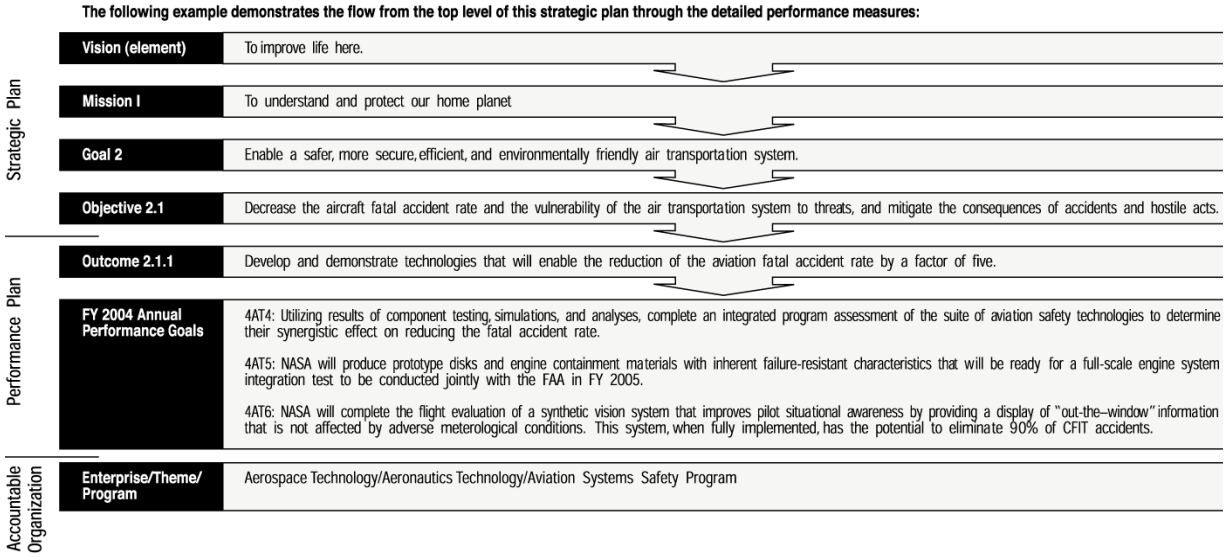
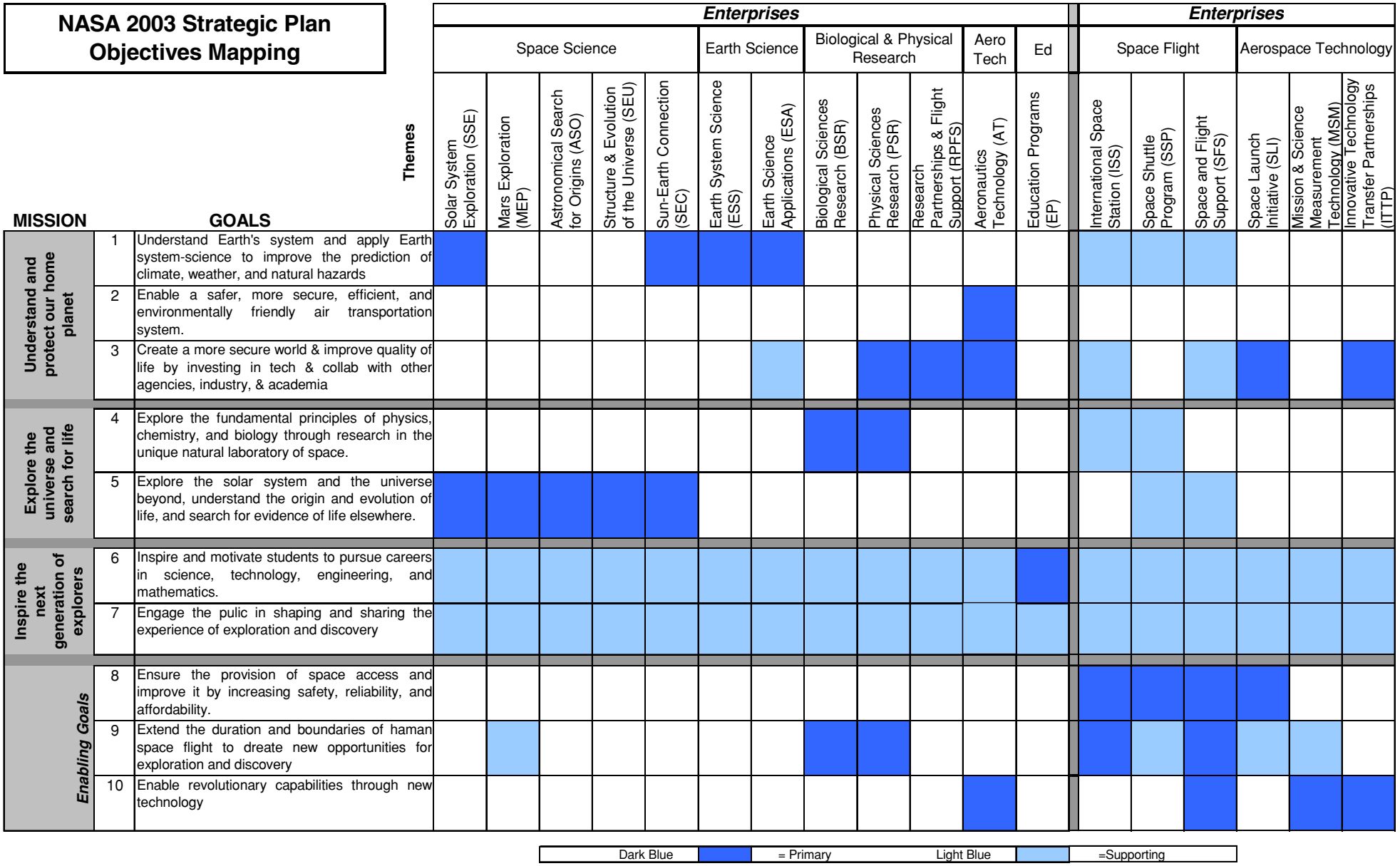


Figure 3: NASA's 18 Themes Support the Accomplishment of NASA's Goals



## New Mapping to Agency Theme Structure

*Process*

The FY03 budget and performance goals were structured around the Agency's Enterprises. The new budget is structured around the 18 Themes.

To ensure consistency between the FY03 and FY04 budget and performance goals, NASA has remapped the FY03 performance plan to the new strategic framework and Theme structure. The previous annual performance goals were preserved. New annual performance goals were included for the budget amendment submitted to Congress by the President on Nov. 13, 2002. That amended budget led to the creation of six performance goals under the Space Launch Initiative Theme, labeled 3SLI1-3SLI6, and the cancellation of 3R6-3R9.

NASA has undertaken this exercise to recognize our new strategic framework, and to ensure that our FY03 PAR will better portray how we are progressing towards our goals and objectives. In addition, multi-year formats help demonstrate cumulative progress toward strategic goals and objectives and keep FY03 performance reporting relevant to our current missions.

In accordance with commitments identified in the 2003 Strategic Plan, NASA has updated the Strategic Objectives in the FY04 Performance Plan. These are documented in the September 2003 update to the FY04 Performance Plan. Objectives used in this remap are consistent with the latest updated FY04 Performance Plan.

*Implications*

Every FY03 APG is accounted for in this remapping document. Previous years' APGs that support current objectives are included to demonstrate cumulative progress. Due to our full cost implementation, detailed performance plans will no longer be reported for management initiatives that have no specific allocated costs. Instead, management initiatives will be reported at summary levels in future annual reports.

Due to the new structure of the 2003 Strategic Plan, some objectives may not have annual performance goals until FY04. However, progress toward these objectives will be discussed in the FY03 Performance and Accountability Report.

## FY03 Budget Mapped to New Theme Structure

The 18 new Themes are subsets of the Enterprises. Since the release of the FY03 budget, Education Programs have been elevated to a sixth Enterprise.

The following table shows how the original FY03 budget translates into the Theme-based structure. The FY03 budget is not yet in full cost, so each Enterprise still has an institutional budget in addition to the Theme budget. These were integrated in the FY04 budget request.

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**
**FISCAL YEAR 2003 BUDGET**

| By Enterprise<br>By Theme<br><br>($ in millions) | FY2003 President's Budget | FY2003 President's Budget Re-Mapped |
|---|---|---|
| **Space Science** | **3,414.3** | **3,414** |
| Solar System Exploration Theme | | 976 |
| Mars Exploration Theme | | 496 |
| Astronomical Search for Origins Theme | | 698 |
| Structure & Evolution of the Universe Theme | | 331 |
| Sun-Earth Connections Theme | | 544 |
| Institutional | | 370 |
| **Earth Science** | **1,628.4** | **1,628** |
| Earth System Science Theme | | 1,249 |
| Earth Science Applications Theme | | 62 |
| Institutional | | 318 |
| **Biological and Physical Research** | **842.3** | **842** |
| Biological Sciences Research Theme | | 245 |
| Physical Sciences Research Theme | | 247 |
| Research Partnerships & Flight Support Theme | | 170 |
| Institutional | | 181 |
| **Aerospace Technology** | **2,815.8** | |
| Aeronautics | | **986** |
| Aeronautics Technology Theme | | 541 |
| Institutional | | 445 |
| **Crosscutting Technologies** | | **1,829** |
| Space Launch Initiative Theme | | 879 |
| Mission & Science Measurement Tech. Theme | | 275 |
| Innovative Tech. Transfer Partnerships Theme | | 147 |
| Institutional | | 528 |
| **Education** | | |
| Academic Programs | **143.7** | |
| Education Theme | | **144** |
| **Space Flight** | **6,130.9** | **6,131** |
| International Space Station Theme | 1,492.1 | 1,492 |
| Space Shuttle Theme | 3,208.0 | 3,208 |
| Space Flight Support Theme | | 239 |
| Space Communication & Data Systems | 117.5 | |
| Payload & ELV Support | 87.5 | |
| Institutional | | 1,192 |
| HEDS Investments and Support | 1,178.2 | |
| Safety, Mission Assurance & Engineering | 47.6 | |
| **Inspector General** | **24.6** | **25** |
| **Total** | **15,000.0** | **15,000** |

## FY03 Performance Plan Mapped to New Theme Structure

Following are tables for each of the 18 Themes, with their allocated objectives and annual performance goals for the fiscal years 1999 - 2003. The tables display performance data for the past four fiscal years as required by the Office of Management and Budget's Circular A-11 and the Government Performance and Results Act. Performance results are indicated by color for fiscal years 1999-2002. This is what the colors indicate:

- **Blue**: Significantly exceeded annual performance goal;
- **Green**: Achieved performance goal;
- **Yellow**: Did not achieve performance goal, progress was significant and achievement is anticipated within next fiscal year;
- **Red**: Failed to achieve performance goal, do not anticipate completion within the next fiscal year.

The color bar at the top of each APG indicates the annual status for prior years.

Each annual performance goal has a number, such as 3Y05. The first number refers to the year, in this case 2003. The first letter refers to the Enterprise, in this example, Code Y, Earth Science. The final number is the number of the annual performance goal, or APG.

The organization of the table rows is not intended to denote continuity of APGs across years. However, those APGs that are the same or very similar from one year to the next, are marked with an arrow to indicate the trend.

Two translation tables are included in this document as tools for tracing NASA's objectives and APGs, as allocated to Themes, back to the originating Enterprise and to the Agency's Goals. Translation Table 1 provides the original 2003 objective and APG (based on NASA's 2000 Strategic Plan) as mapped to the 2003 Agency Goals, Objectives and Themes (based on NASA's 2003 Strategic Plan). Translation Table 2 provides the same information organized by the Enterprise that created the APG.

Theme: Solar System Exploration (SSE)

Objective 1.4: Catalog and understand potential impact hazards to Earth from space.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>Conduct research and analysis. (OS68) | Blue<br>Investigate the composition, evolution, and resources of Mars, the Moon, and small bodies by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by making satisfactory progress in related R&A and DA programs. Meet no fewer than 75% of the performance objectives for Mars Odyssey ('01 Orbiter), CONTOUR, Mars Global Surveyor, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S10) |
| | Green<br>Conduct data analysis. (OS69) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Green<br>The Rosetta project will deliver the electrical qualification models for the four U.S.-provided instruments to ESA in May 2000 for integration with the Rosetta Orbiter. (OS20) | |
| | Green<br>Release an AO for the next Discovery mission. (OS32) | |
| | Green<br>Successfully complete the breadboard of the imager instrument for CONTOUR and award the contract for the propulsion system after a PDR that confirms the design and maintains 15% margins for mass and power. (OS42) | |
| | Green<br>Stardust: Continue spacecraft cruise operations without major anomalies and perform interstellar dust collection for at least 36 days. (OS37) | |
| | Red<br>Complete the system CDR for the New Millennium Deep Space-4 (Champollion) project before the end of FY00, including successful completion of the avionics subsystem CDR and the mechanical subsystem CDR. (OS47) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |

Theme: Solar System Exploration (SSE)

Objective 1.4: Catalog and understand potential impact hazards to Earth from space.

| 2002 | 2003 | 2004 |
|---|---|---|
| Blue<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand forces and processes, such as impacts, that affect habitability of Earth; Develop the capability to predict space weather; and Find extraterrestrial resources and assess the suitability of Solar System locales for future human exploration. (2S8) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand forces and processes, such as impacts, that affect habitability of Earth; Develop the capability to predict space weather; and Find extraterrestrial resources and assess the suitability of Solar System locales for future human exploration. (3S8) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Theme: Solar System Exploration (SSE)

Objective 5.1: Learn how the solar system originated and evolved to its current diverse state.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>Orbit Eros closer than 50 kilometers, 20-30 times closer than previous asteroid flybys. (NEAR) (9S6) | Green<br>NEAR will successfully orbit 433 Eros and meet primary scientific objectives while not exceeding projected mission cost by more than 10%. (OS16) | Green<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: Cassini, Voyager, Ulysses, SAMPEX, FAST, TRACE, Stardust, Mars Global Surveyor, and ISTP spacecraft; also, if successfully launched, TIMED, HESSI, IMAGE, Genesis, and Mars Odyssey ('01 Orbiter). (1S5) |
| Green<br>Measure the shape of Eros to an accuracy of 1 kilometer or better, about 10 times better than previous measurements, and measure the asteroid's mass to an accuracy of 20 percent. (NEAR) (9S7) | Green<br>Complete Genesis spacecraft assembly and start functional testing in November 1999. (OS31) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in space physics rocket and balloon flights, and by making satisfactory research progress in related R&A and DA programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs: Solar-B, STEREO, Solar Probe, Future Solar Terrestrial Probes, Future Deep Space Technology, CISM, X2000, Sounding Rockets, and Balloons. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S6) |
| Yellow<br>Complete the first direct compositional measurements of an asteroid. (NEAR) (9S8) | Green<br>Conduct research and analysis. (OS68) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives and by making satisfactory research progress in the related R&A program, including the Astrobiology program. Meet no fewer than two of the three performance objectives for Europa Orbiter, Astrobiology, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S8) |
| Green<br>Map the 75 to 80 percent of the Moon's surface not accessible during the Apollo missions conducted from 1969 to 1972. (Lunar Prospector) (9S9) | Green<br>Conduct data analysis. (OS69) | Blue<br>Investigate the composition, evolution, and resources of Mars, the Moon, and small bodies by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by making satisfactory progress in related R&A and DA programs. Meet no fewer than 75% of the performance objectives for Mars Odyssey ('01 Orbiter), CONTOUR, Mars Global Surveyor, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S10) |
| Blue<br>Successfully launch seven spacecraft, within 10% of budget, on average. (9S1) | | Green<br>Successfully develop and launch no fewer than one of two missions within 10% of budget and schedule. Missions are: Mars Odyssey ('01 Orbiter) and Genesis. (Indicators have also been established for other projects in development.) (1S4) |

Theme: Solar System Exploration (SSE)

Objective 5.1: Learn how the solar system originated and evolved to its current diverse state.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Observe the formation of galaxies and determine the role of gravity in this process; Establish how the evolution of a galaxy and the life cycle of stars influence the chemical composition of material available for making stars, planets, and living organisms; Observe the formation of planetary systems and characterize their properties; Use the exotic space environments within our Solar System as natural science laboratories and cross the outer boundary of the Solar System to explore the nearby environment of our galaxy. (2S3) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Observe the formation of galaxies and determine the role of gravity in this process; Establish how the evolution of a galaxy and the life cycle of stars influence the chemical composition of material available for making stars, planets, and living organisms; Observe the formation of planetary systems and characterize their properties; Use the exotic space environments within our Solar System as natural science laboratories and cross the outer boundary of the Solar System to explore the nearby environment of our galaxy. (3S3) | |
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Inventory and characterize the remnants of the original material from which the Solar System formed, Learn why the planets in our Solar System are so different from each other, and Learn how the Solar System evolves. (2S5) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Inventory and characterize the remnants of the original material from which the Solar System formed, Learn why the planets in our Solar System are so different from each other, and Learn how the Solar System evolves. (3S5) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
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Theme: Solar System Exploration (SSE)

Objective 5.1: Learn how the solar system originated and evolved to its current diverse state.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Provide definitive measurements of the weak lunar magnetic field. (Lunar Prospector) (9S10) | Green<br>Release an AO for the next Discovery mission. (OS32) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| Green<br>Successfully complete and receive scientific data from at least 8 of 10 planned data-taking encounters with Europa. (Galileo) (9S13) | Green<br>Successfully complete the breadboard of the imager instrument for CONTOUR and award the contract for the propulsion system after a PDR that confirms the design and maintains 15% margins for mass and power. (OS42) | |
| Green<br>Bring the total mapping coverage to about 1 percent of the surface at about 30-meter resolution, and multispectral coverage distributed over 50 percent of the surface at lower resolution. (Galileo) (9S14) | Blue<br>The baseline Galileo mission ended in 1997; the target for FY00 is to recover at least 90% of playback data from at least one Galileo flyby of Io. (OS45) | |
| | Green<br>Cassini: Continue operations during the quiescent cruise phase without major anomalies, conduct planning for the Jupiter gravity-assist flyby, and explore early science data collection opportunities. The following in-flight activities will be completed: Instrument Checkout #2; uplink Articulation and Attitude Control Subsystem (AACS) software update with Reaction Wheel Authority capability; Command and Data Subsystem Version 8; and Saturn tour designs for selection by the Program Science Group. (OS34) | |
| | Red<br>The Advanced Radioactive Power Source (ARPS), which is a partnership with the Department of Energy to develop small, robust, highly efficient radioisotope power sources, will accomplish the following five objectives on time and within budget in 2000: fabricate and test 15 prototype AMTEC cells by January; complete the final design of the AMTEC cells by March; complete the final design for a 75-watt ARPS by April; begin the prototype AMTEC four-cell lifetime test by April; and begin qualification unit fabrication by September. (OS58) | |
| | Red<br>Successfully complete a preliminary design for either the Europa Orbiter or Pluto-Kuiper Express mission (whichever is planned for earlier launch) that is shown to be capable of achieving the Category 1A science objectives with adequate cost, mass, power, and other engineering margins. (OS64) | |
| | Red<br>The first engineering model (EM-1) of the X2000 First Delivery will be delivered in September 2000. Successful development includes the integration of all EM-1 hardware, the functional verification of delivered hardware and software, and the ability to support ongoing testing, hardware integration, and software verification for delivered software. (OS70) | |
| | Blue<br>The baseline Galileo mission ended in 1997; the target for FY00 is to recover at least 90% of playback data from at least one Galileo flyby of Io. (OS45) | |

Theme: Solar System Exploration (SSE)

Objective 5.1: Learn how the solar system originated and evolved to its current diverse state.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Theme: Solar System Exploration (SSE)

Objective 5.1: Learn how the solar system originated and evolved to its current diverse state.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Red<br>The Europa Orbiter project will successfully complete a PDR in March 2000 and will begin the integration and test of the Avionics Engineering Model in July 2000. (OS56) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |
| | Yellow<br>The Remote Exploration and Experimentation element of the HPCC program will demonstrate software-implemented fault tolerance for science teams' applications on a first-generation embedded computing testbed, with the applications' sustained performance degraded by no more than 25% at fault rates characteristic of deep space and low-Earth orbit. (OS50) | |
| | Red<br>In April 2000, the Center for Integrated Space Microelectronics will deliver to the X2000 First Delivery project the first engineering model of an integrated avionics system that includes the functionality of command and data handling, attitude control, power management and distribution, and science payload interface. The system will be used on the Europa Orbiter and other missions. (OS57) | |

Objective 5.2: Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life.

| 1999 | 2000 | 2001 |
|---|---|---|
| Blue<br>Successfully launch seven spacecraft, within 10% of budget, on average. (9S1) | Green<br>Conduct research and analysis. (OS68) | Green<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: Cassini, Voyager, Ulysses, SAMPEX, FAST, TRACE, Stardust, Mars Global Surveyor, and ISTP spacecraft; also, if successfully launched, TIMED, HESSI, IMAGE, Genesis, and Mars Odyssey ('01 Orbiter). (1S5) |
| Green<br>Successfully complete and receive scientific data from at least 8 of 10 planned data-taking encounters with Europa. (Galileo) (9S13) | Green<br>Conduct data analysis. (OS69) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in space physics rocket and balloon flights, and by making satisfactory research progress in related R&A and DA programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs: Solar-B, STEREO, Solar Probe, Future Solar Terrestrial Probes, Future Deep Space Technology, CISM, X2000, Sounding Rockets, and Balloons. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S6) |

Theme: Solar System Exploration (SSE)

Objective 5.1: Learn how the solar system originated and evolved to its current diverse state.

| 2002 | 2003 | 2004 |
|---|---|---|
| | | |
| | | |
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| | | |

Objective 5.2: Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Investigate the origin and early evolution of life on Earth, and explore the limits of life in terrestrial environments that might provide analogues for conditions on other worlds; Determine the general principles governing the organization of matter into living systems and the conditions required for the emergence and maintenance of life; Chart the distribution of life-sustaining environments within our Solar System, and search for evidence of past and present life; Identify plausible signatures of life on other worlds. (2S6) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Investigate the origin and early evolution of life on Earth, and explore the limits of life in terrestrial environments that might provide analogues for conditions on other worlds; Determine the general principles governing the organization of matter into living systems and the conditions required for the emergence and maintenance of life; Chart the distribution of life-sustaining environments within our Solar System, and search for evidence of past and present life; Identify plausible signatures of life on other worlds. (3S6) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |

Theme: Solar System Exploration (SSE)

Objective 5.2: Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Bring the total mapping coverage to about 1 percent of the surface at about 30-meter resolution, and multispectral coverage distributed over 50 percent of the surface at lower resolution. (Galileo) (9S14) | Green<br>The Rosetta project will deliver the electrical qualification models for the four U.S.-provided instruments to ESA in May 2000 for integration with the Rosetta Orbiter. (OS20) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives and by making satisfactory research progress in the related R&A program, including the Astrobiology program. Meet no fewer than two of the three performance objectives for Europa Orbiter, Astrobiology, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S8) |
| | Green<br>Release an AO for the next Discovery mission. (OS32) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Blue<br>The baseline Galileo mission ended in 1997; the target for FY00 is to recover at least 90% of playback data from at least one Galileo flyby of Io. (OS45) | |
| | Green<br>Cassini: Continue operations during the quiescent cruise phase without major anomalies, conduct planning for the Jupiter gravity-assist flyby, and explore early science data collection opportunities. The following in-flight activities will be completed: Instrument Checkout #2; uplink Articulation and Attitude Control Subsystem (AACS) software update with Reaction Wheel Authority capability; Command and Data Subsystem Version 8; and Saturn tour designs for selection by the Program Science Group. (OS34) | |
| | Green<br>Stardust: Continue spacecraft cruise operations without major anomalies and perform interstellar dust collection for at least 36 days. (OS37) | |
| | Red<br>Complete the system CDR for the New Millennium Deep Space-4 (Champollion) project before the end of FY00, including successful completion of the avionics subsystem CDR and the mechanical subsystem CDR. (OS47) | |
| | Red<br>The Advanced Radioactive Power Source (ARPS), which is a partnership with the Department of Energy to develop small, robust, highly efficient radioisotope power sources, will accomplish the following five objectives on time and within budget in 2000: fabricate and test 15 prototype AMTEC cells by January; complete the final design of the AMTEC cells by March; complete the final design for a 75-watt ARPS by April; begin the prototype AMTEC four-cell lifetime test by April; and begin qualification unit fabrication by September. (OS58) | |

Theme: Solar System Exploration (SSE)

Objective 5.2: Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Theme: Solar System Exploration (SSE)

Objective 5.2: Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Red<br>Successfully complete a preliminary design for either the Europa Orbiter or Pluto-Kuiper Express mission (whichever is planned for earlier launch) that is shown to be capable of achieving the Category 1A science objectives with adequate cost, mass, power, and other engineering margins. (OS64) | |
| | Red<br>The first engineering model (EM-1) of the X2000 First Delivery will be delivered in September 2000. Successful development includes the integration of all EM-1 hardware, the functional verification of delivered hardware and software, and the ability to support ongoing testing, hardware integration, and software verification for delivered software. (OS70) | |
| | Blue<br>The baseline Galileo mission ended in 1997; the target for FY00 is to recover at least 90% of playback data from at least one Galileo flyby of Io. (OS45) | |
| | Red<br>The Europa Orbiter project will successfully complete a PDR in March 2000 and will begin the integration and test of the Avionics Engineering Model in July 2000. (OS56) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |
| | Yellow<br>The Remote Exploration and Experimentation element of the HPCC program will demonstrate software-implemented fault tolerance for science teams' applications on a first-generation embedded computing testbed, with the applications' sustained performance degraded by no more than 25% at fault rates characteristic of deep space and low-Earth orbit. (OS50) | |
| | Red<br>In April 2000, the Center for Integrated Space Microelectronics will deliver to the X2000 First Delivery project the first engineering model of an integrated avionics system that includes the functionality of command and data handling, attitude control, power management and distribution, and science payload interface. The system will be used on the Europa Orbiter and other missions. (OS57) | |

Theme: Solar System Exploration (SSE)

Objective 5.2: Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life.

| 2002 | 2003 | 2004 |
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Theme: Solar System Exploration (SSE)

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green | Green | Green |
| Each new Space Science Enterprise mission initiated in FY 1999 will have a funded education and outreach program. (9S28) | Successful achievement of at least seven of the following eight objectives will be made. (1) Each new Space Science mission will have a funded education and outreach program. (2) By the end of FY00, 10% of all Space Science research grants will have an associated education and outreach program under way. (3) 26 states will have Enterprise-funded education or outreach programs planned or underway. (4) At least five research, mission development/ operations, or education programs will have been planned/undertaken in Historically Black Colleges and Universities, Hispanic Serving Institutions, or Tribal Colleges, with at least one project underway in each group. (5) At least three national and two regional educational or outreach conferences will be supported with a significant Space Science presence. (6) At least three exhibits or planetarium shows will be on display. (7) An online directory providing enhanced access to major Space Science-related products and programs will be operational by end of the fiscal year. (8) A comprehensive approach to assessing the effectiveness and impact of the Space Science education and outreach efforts will be under development, with a pilot test of the evaluation initiated. (0S67) | Continue and expand the integration of education and enhanced public understanding of science with Enterprise research and flight mission programs. Meet no fewer than 75% of the eight performance objectives for education and public outreach. (1S9) |

Theme: Solar System Exploration (SSE)

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| Blue<br>Earn external review rating of "green," on average, on making progress in the following focus areas: Incorporate a substantial, funded education and outreach program into every space science flight mission and research program; Increase the fraction of the space science community that contributes to a broad public understanding of science and is directly involved in education at the pre-college level; Establish strong and lasting partnerships between the space science and education communities; Develop a national network to identify high-leverage education and outreach opportunities and to support long-term partnerships; Provide ready access to the products of space science education and outreach programs; Promote the participation of underserved and underutilized groups in the space science program by providing new opportunities for minorities and minority universities to compete for and participate in space science missions, research, and education programs; Develop tools for evaluating the quality and impact of space science education and outreach programs. (2S12) | Earn external review rating of "green," on average, on making progress in the following focus areas: Incorporate a substantial, funded education and outreach program into every space science flight mission and research program; Increase the fraction of the space science community that contributes to a broad public understanding of science and is directly involved in education at the pre-college level; Establish strong and lasting partnerships between the space science and education communities; Develop a national network to identify high-leverage education and outreach opportunities and to support long-term partnerships; Provide ready access to the products of space science education and outreach programs; Promote the participation of underserved and underutilized groups in the space science program by providing new opportunities for minorities and minority universities to compete for and participate in space science missions, research, and education programs. (3S12) | |

Theme: Mars Exploration (MEP)

Objective 5.3: Understand the current state and evolution of the atmosphere, surface, and interior of Mars.

| 1999 | 2000 | 2001 |
|---|---|---|
| Blue<br>Successfully launch seven spacecraft, within 10% of budget, on average. (9S1) | Yellow<br>Deliver the Mars '01 Orbiter and Lander science instruments that meet capability requirements by June 1, 2000; prelaunch Gamma Ray Spectrometer (GRS) tests shall determine abundances in known calibration sources to 10% accuracy. (OS29) | Green<br>Successfully develop and launch no fewer than one of two missions within 10% of budget and schedule. Missions are: Mars Odyssey ('01 Orbiter) and Genesis. (Indicators have also been established for other projects in development.) (1S4) |
| Green<br>Achieve the final science orbit. (MGS) (9S15) | Yellow<br>Assuming the Mars Surveyor program architecture is confirmed, meet the milestones for the Mars 03 instrument selection and initiate implementation of the Lander mission. Deliver engineering models of the radio-frequency subsystem and antennae for the radar sounder instrument to ESA (if ESA approves the Mars Express mission), and select the contractors for the major system elements of the Mars Surveyor 05 mission. (OS30) | Green<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: Cassini, Voyager, Ulysses, SAMPEX, FAST, TRACE, Stardust, Mars Global Surveyor, and ISTP spacecraft; also, if successfully launched, TIMED, HESSI, IMAGE, Genesis, and Mars Odyssey ('01 Orbiter). (1S5) |
| Blue<br>Measure the topography with 10-meter precision, about 100 times more accurate than previous measurements. (MGS) (9S19) | Red<br>The Mars Climate Orbiter (MCO) will aerobrake from its initial insertion orbit into a near-polar, Sun-synchronous, approximately 400-km circular orbit and will initiate mapping operations no later than May 2000, acquiring 70% of the available science data and relaying to Earth 70% of the data transmitted at adequate signal levels by the Mars Polar Lander (MPL). (OS40) | Blue<br>Advance the search for life beyond Earth by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by performing innovative technology development. Meet no fewer than two of the three performance objectives for Mars Odyssey ('01 Orbiter), Mars Global Surveyor, and Terrestrial Planet Finder. (1S14) |
| Green<br>Provide high-resolution 1.5-meter imaging data, 10 times more detailed than the best imaging from the 1976 Viking mission. (MGS) (9S20) | Green<br>The Mars Global Surveyor (MGS) will acquire 70% of science data available, conduct at least two five-day atmospheric mapping campaigns, and relay to Earth at least 70% of data transmitted at adequate signal levels by the Deep Space-2 Mars microprobes. (OS46) | Blue<br>Investigate the composition, evolution, and resources of Mars, the Moon, and small bodies by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by making satisfactory progress in related R&A and DA programs. Meet no fewer than 75% of the performance objectives for Mars Odyssey ('01 Orbiter), CONTOUR, Mars Global Surveyor, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S10) |
| Green<br>Provide the first thermal infrared spectrometry of the planet. (MGS) (9S21) | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| Green<br>Demonstrate an advanced robotic manipulator with an order of magnitude performance improvement compared to the manipulator used on Viking in 1976. (Robotic Manipulator, Mars Polar Lander) (9S25) | Green<br>Conduct research and analysis. (OS68) | |
| | Green<br>Conduct data analysis. (OS69) | |

Theme: Mars Exploration (MEP)

Objective 5.3: Understand the current state and evolution of the atmosphere, surface, and interior of Mars.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Inventory and characterize the remnants of the original material from which the Solar System formed, Learn why the planets in our Solar System are so different from each other, and Learn how the Solar System evolves. (2S5) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Inventory and characterize the remnants of the original material from which the Solar System formed, Learn why the planets in our Solar System are so different from each other, and Learn how the Solar System evolves. (3S5) | |
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Theme: Mars Exploration (MEP)

Objective 5.4: Determine if life exists or has ever existed on Mars.

| 1999 | 2000 | 2001 |
|---|---|---|
| Blue<br>Successfully launch seven spacecraft, within 10% of budget, on average. (9S1) | Green<br>Conduct research and analysis. (OS68) | Green<br>Successfully develop and launch no fewer than one of two missions within 10% of budget and schedule. Missions are: Mars Odyssey ('01 Orbiter) and Genesis. (Indicators have also been established for other projects in development.) (1S4) |
| Green<br>Achieve the final science orbit. (MGS) (9S15) | Green<br>Conduct data analysis. (OS69) | Green<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: Cassini, Voyager, Ulysses, SAMPEX, FAST, TRACE, Stardust, Mars Global Surveyor, and ISTP spacecraft; also, if successfully launched, TIMED, HESSI, IMAGE, Genesis, and Mars Odyssey ('01 Orbiter). (1S5) |
| Green<br>Demonstrate an advanced robotic manipulator with an order of magnitude performance improvement compared to the manipulator used on Viking in 1976. (Robotic Manipulator, Mars Polar Lander) (9S25) | Yellow<br>Deliver the Mars '01 Orbiter and Lander science instruments that meet capability requirements by June 1, 2000; prelaunch Gamma Ray Spectrometer (GRS) tests shall determine abundances in known calibration sources to 10% accuracy. (OS29) | Blue<br>Advance the search for life beyond Earth by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by performing innovative technology development. Meet no fewer than two of the three performance objectives for Mars Odyssey ('01 Orbiter), Mars Global Surveyor, and Terrestrial Planet Finder. (1S14) |
| | Yellow<br>Assuming the Mars Surveyor program architecture is confirmed, meet the milestones for the Mars 03 instrument selection and initiate implementation of the Lander mission. Deliver engineering models of the radio-frequency subsystem and antennae for the radar sounder instrument to ESA (if ESA approves the Mars Express mission), and select the contractors for the major system elements of the Mars Surveyor 05 mission. (OS30) | Blue<br>Investigate the composition, evolution, and resources of Mars, the Moon, and small bodies by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by making satisfactory progress in related R&A and DA programs. Meet no fewer than 75% of the performance objectives for Mars Odyssey ('01 Orbiter), CONTOUR, Mars Global Surveyor, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S10) |
| | Red<br>The Mars Climate Orbiter (MCO) will aerobrake from its initial insertion orbit into a near-polar, Sun-synchronous, approximately 400-km circular orbit and will initiate mapping operations no later than May 2000, acquiring 70% of the available science data and relaying to Earth 70% of the data transmitted at adequate signal levels by the Mars Polar Lander (MPL). (OS40) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Red<br>MPL will successfully land on Mars in December 1999 and operate its science instruments for the 80-day prime mission with at least 75% of planned science data returned. (OS41) | |
| | Green<br>The Mars Global Surveyor (MGS) will acquire 70% of science data available, conduct at least two five-day atmospheric mapping campaigns, and relay to Earth at least 70% of data transmitted at adequate signal levels by the Deep Space-2 Mars microprobes. (OS46) | |

Theme: Mars Exploration (MEP)

Objective 5.4: Determine if life exists or has ever existed on Mars.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Investigate the origin and early evolution of life on Earth, and explore the limits of life in terrestrial environments that might provide analogues for conditions on other worlds; Determine the general principles governing the organization of matter into living systems and the conditions required for the emergence and maintenance of life; Chart the distribution of life-sustaining environments within our Solar System, and search for evidence of past and present life; Identify plausible signatures of life on other worlds. (2S6) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Investigate the origin and early evolution of life on Earth, and explore the limits of life in terrestrial environments that might provide analogues for conditions on other worlds; Determine the general principles governing the organization of matter into living systems and the conditions required for the emergence and maintenance of life; Chart the distribution of life-sustaining environments within our Solar System, and search for evidence of past and present life; Identify plausible signatures of life on other worlds. (3S6) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Theme: Mars Exploration (MEP)

Objective 5.4: Determine if life exists or has ever existed on Mars.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |

Objective 5.5: Develop an understanding of Mars in support of possible future human exploration.

| 1999 | 2000 | 2001 |
|---|---|---|
| Blue<br>Successfully launch seven spacecraft, within 10% of budget, on average. (9S1) | Green<br>Conduct research and analysis. (OS68) | Green<br>Successfully develop and launch no fewer than one of two missions within 10% of budget and schedule. Missions are: Mars Odyssey ('01 Orbiter) and Genesis. (Indicators have also been established for other projects in development.) (1S4) |
| Green<br>Achieve the final science orbit. (MGS) (9S15) | Green<br>Conduct data analysis. (OS69) | Green<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: Cassini, Voyager, Ulysses, SAMPEX, FAST, TRACE, Stardust, Mars Global Surveyor, and ISTP spacecraft; also, if successfully launched, TIMED, HESSI, IMAGE, Genesis, and Mars Odyssey ('01 Orbiter). (1S5) |
| | Yellow<br>Deliver the Mars '01 Orbiter and Lander science instruments that meet capability requirements by June 1, 2000; prelaunch Gamma Ray Spectrometer (GRS) tests shall determine abundances in known calibration sources to 10% accuracy. (OS29) | Blue<br>Advance the search for life beyond Earth by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by performing innovative technology development. Meet no fewer than two of the three performance objectives for Mars Odyssey ('01 Orbiter), Mars Global Surveyor, and Terrestrial Planet Finder. (1S14) |
| | Yellow<br>Assuming the Mars Surveyor program architecture is confirmed, meet the milestones for the Mars 03 instrument selection and initiate implementation of the Lander mission. Deliver engineering models of the radio-frequency subsystem and antennae for the radar sounder instrument to ESA (if ESA approves the Mars Express mission), and select the contractors for the major system elements of the Mars Surveyor 05 mission. (OS30) | Blue<br>Investigate the composition, evolution, and resources of Mars, the Moon, and small bodies by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by making satisfactory progress in related R&A and DA programs. Meet no fewer than 75% of the performance objectives for Mars Odyssey ('01 Orbiter), CONTOUR, Mars Global Surveyor, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S10) |
| | Red<br>The Mars Climate Orbiter (MCO) will aerobrake from its initial insertion orbit into a near-polar, Sun-synchronous, approximately 400-km circular orbit and will initiate mapping operations no later than May 2000, acquiring 70% of the available science data and relaying to Earth 70% of the data transmitted at adequate signal levels by the Mars Polar Lander (MPL). (OS40) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Red<br>MPL will successfully land on Mars in December 1999 and operate its science instruments for the 80-day prime mission with at least 75% of planned science data returned. (OS41) | |

Theme: Mars Exploration (MEP)

Objective 5.4: Determine if life exists or has ever existed on Mars.

| 2002 | 2003 | 2004 |
|---|---|---|
| | | |

Objective 5.5: Develop an understanding of Mars in support of possible future human exploration.

| 2002 | 2003 | 2004 |
|---|---|---|
| Blue<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand forces and processes, such as impacts, that affect habitability of Earth; Develop the capability to predict space weather; Find extraterrestrial resources and assess the suitability of Solar System locales for future human exploration. (2S8) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand forces and processes, such as impacts, that affect habitability of Earth; Develop the capability to predict space weather; Find extraterrestrial resources and assess the suitability of Solar System locales for future human exploration. (3S8) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Theme: Mars Exploration (MEP)

Objective 5.5: Develop an understanding of Mars in support of possible future human exploration.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>The Mars Global Surveyor (MGS) will acquire 70% of science data available, conduct at least two five-day atmospheric mapping campaigns, and relay to Earth at least 70% of data transmitted at adequate signal levels by the Deep Space-2 Mars microprobes. (OS46) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals |

Theme: Mars Exploration (MEP)

Objective 5.5: Develop an understanding of Mars in support of possible future human exploration.

| 2002 | 2003 | 2004 |
|---|---|---|
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Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals | |

Theme: Astronomical Search for Origins (ASO)

Objective 5.8: Learn how galaxies, stars, and planetary systems form and evolve.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Measure the Hubble constant within an accuracy of about 10 percent, as compared to previous measurements that differ among themselves by a factor of two. (R&A) (9S2) | Green<br>Conduct research and analysis. (OS68) | Blue<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: HST, CXO, XTE, ACE, FUSE, SWAS, and, if successfully launched, GALEX, and GP-B. (1S2) |
| | Green<br>Conduct data analysis. (OS69) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in astronomy rocket and balloon flights, and by making satisfactory research progress in related Research and Analysis (R&A) and Data Analysis (DA) programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs NGST, Herschel (FIRST), GLAST, Sounding Rockets, Balloons, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S3) |
| | Yellow<br>Successfully install and activate three key Hubble upgrades during the third servicing mission: flight computer, advanced camera, and solar arrays. Maintain an average on-target pointing efficiency of 35% during FY00 operations before they are interrupted for the third servicing mission, presently scheduled for May 2000. (OS4) | Green<br>Perform innovative scientific research and technology development by meeting interferometry technology development objectives and by making satisfactory research progress in related R&A programs. Meet no fewer than 66% of the performance objectives for SIM, TPF, ST-3, Keck, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S7) |
| | Green<br>Complete the SOFIA 747 Section 46 mockup test activity during June 2000, with no functional test discrepancies that would invalidate CDR-level designs and cause significant design rework, with attendant cost and schedule impact. (OS43) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Yellow<br>Deliver the SIRTF Infrared Array Camera (IRAC), Multiband Imaging Photometer (MIPS), and Infrared Spectrograph (IRS) instruments during April 2000. The instruments shall perform at their specified levels at delivery. (OS5) | |
| | Green<br>The 3-year FUSE mission will complete at least one-third of the observations needed for its minimum science program, with six of the eight instrument performance parameters being met. (OS12) | |

Theme: Astronomical Search for Origins (ASO)

Objective 5.8: Learn how galaxies, stars, and planetary systems form and evolve.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Discover the sources of gamma ray bursts and high energy cosmic rays; Test the general theory of relativity near black holes and in the early universe, and search for new physical laws, using the universe as a laboratory; Reveal the nature of cosmic jets and relativistic flows. (2S2) | Earn external review rating "green," on average, on making progress in the following research focus areas: Discover the sources of gamma ray bursts and high energy cosmic rays (two phenomena that astronomers believe are the most energetic events in the universe); Test the general theory of relativity near black holes and in the early universe, and search for new physical laws, using the universe as a laboratory; Reveal the nature of cosmic jets and relativistic flows (Understand the physical mechanisms that can accelerate matter to near the speed of light, as observed in cosmic jets and other relativistic flows.) (3S2) | |
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Observe the formation of galaxies and determine the role of gravity in this process, Establish how the evolution of a galaxy and the life cycle of stars influence the chemical composition of material available for making stars, planets, and living organisms, Observe the formation of planetary systems and characterize their properties, and Use the exotic space environments within our Solar System as natural science laboratories and cross the outer boundary of the Solar System to explore the nearby environment of our galaxy. (2S3) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Observe the formation of galaxies and determine the role of gravity in this process, Establish how the evolution of a galaxy and the life cycle of stars influence the chemical composition of material available for making stars, planets, and living organisms, Observe the formation of planetary systems and characterize their properties, and Use the exotic space environments within our Solar System as natural science laboratories and cross the outer boundary of the Solar System to explore the nearby environment of our galaxy. (3S3) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Theme: Astronomical Search for Origins (ASO)

Objective 5.8: Learn how galaxies, stars, and planetary systems form and evolve.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Assemble and lab-test the interferometer beam combiner. This state-of-the-art system will approximately double observational efficiency by using a new approach to fringe detection. (Keck) (9S12) | Red<br>Complete the NGST Developmental Cryogenic Active Telescope Testbed (DCATT) phase 1, measure ambient operation with off-the-shelf components, and make final preparations for phase 2, the measurement of cold telescope operation with selected "flight-like" component upgrades. (OS53) | |
| | Red<br>Based on an overall goal of successfully launching 25 sounding rocket missions, at least 23 payloads shall successfully achieve their required altitude and orientation, and at least 21 investigators shall achieve their minimum mission success goals. (OS65) | |
| | Red<br>Based on an overall goal of conducting 26 worldwide science and technology demonstration balloon missions, at least 23 campaigns shall successfully achieve altitude and distance, and investigators' instrumentation shall function as planned for at least 19 missions. (OS66) | |
| | Red<br>Select two Small Explorer (SMEX) missions and release a University Explorer (UNEX) Announcement of Opportunity (AO). (OS28) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |
| | Yellow<br>Demonstrate performance of the Superconductor-Insulator-Superconductor (SIS) mixer to at least 8hv/k at 1,120 GHz and 10hv/k at 1,200 GHz. The U.S. contribution to the ESA FIRST is the heterodyne instrument, which contains the SIS receiver. (OS62) | |

Theme: Astronomical Search for Origins (ASO)

Objective 5.8: Learn how galaxies, stars, and planetary systems form and evolve.

| 2002 | 2003 | 2004 |
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Theme: Astronomical Search for Origins (ASO)

Objective 5.8: Learn how galaxies, stars, and planetary systems form and evolve.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>Demonstrate an improvement in measurement precision for optical path lengths in laser light to the 100-picometer (million-millionths of a meter) range. (Micro-Arcsecond Metrology Testbed) (9S24) | Green<br>Release an AO for the next Discovery mission. (OS32) | Blue<br>Advance the search for life beyond Earth by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by performing innovative technology development. Meet no fewer than two of the three performance objectives for Mars Odyssey ('01 Orbiter), Mars Global Surveyor, and Terrestrial Planet Finder. (1S14) |
| | Yellow<br>Development of the interferometer program for connecting the twin Keck 10-meter telescopes with an array of four two-meter class outrigger telescopes will be tested by detecting and tracking fringes with two test siderostats at two- and ten-micron wavelengths. (OS55) | |
| | Green<br>The Space Interferometry Mission (SIM) System Testbed (STB) will demonstrate, in May 2000, that an rms optical path difference can be controlled at 1.5 nanometers, operating in an emulated on-orbit mode. (OS52) | |
| | Red<br>Complete and deliver a technology development plan for the Terrestrial Planet Finder (TPF) mission by June 2000. This infrared interferometer mission is projected for a 2010 launch and requires the definition of technologies that will not be developed or demonstrated by precursor missions. (OS54) | |

Objective 5.9: Understand the diversity of worlds beyond our solar system and search for those that might harbor life.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>Demonstrate an improvement in measurement precision for optical path lengths in laser light to the 100-picometer (million-millionths of a meter) range. (Micro-Arcsecond Metrology Testbed) (9S24) | Green<br>Conduct data analysis. (OS69) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in astronomy rocket and balloon flights, and by making satisfactory research progress in related Research and Analysis (R&A) and Data Analysis (DA) programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs NGST, Herschel (FIRST), GLAST, Sounding Rockets, Balloons, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S3) |
| Green<br>Assemble and lab-test the interferometer beam combiner. This state-of-the-art system will approximately double observational efficiency by using a new approach to fringe detection. (Keck) (9S12) | Green<br>Conduct research and analysis. (OS68) | Blue<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: HST, CXO, XTE, ACE, FUSE, SWAS, and, if successfully launched, GALEX, and GP-B. (1S2) |
| | Yellow<br>Successfully install and activate three key Hubble upgrades during the third servicing mission: flight computer, advanced camera, and solar arrays. Maintain an average on-target pointing efficiency of 35% during FY00 operations before they are interrupted for the third servicing mission, presently scheduled for May 2000. (OS4) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives and by making satisfactory research progress in the related R&A program, including the Astrobiology program. Meet no fewer than two of the three performance objectives for Europa Orbiter, Astrobiology, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S8) |

Theme: Astronomical Search for Origins (ASO)

Objective 5.8: Learn how galaxies, stars, and planetary systems form and evolve.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Discover planetary systems of other stars and their physical characteristics and Search for worlds that could or do harbor life. (2S4) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Discover planetary systems of other stars and their physical characteristics and Search for worlds that could or do harbor life. (3S4) | |
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Objective 5.9: Understand the diversity of worlds beyond our solar system and search for those that might harbor life.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Investigate the origin and early evolution of life on Earth, and explore the limits of life in terrestrial environments that might provide analogues for conditions on other worlds; Determine the general principles governing the organization of matter into living systems and the conditions required for the emergence and maintenance of life; Chart the distribution of life-sustaining environments within our Solar System, and search for evidence of past and present life; Identify plausible signatures of life on other worlds. (2S6) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Investigate the origin and early evolution of life on Earth, and explore the limits of life in terrestrial environments that might provide analogues for conditions on other worlds; Determine the general principles governing the organization of matter into living systems and the conditions required for the emergence and maintenance of life; Chart the distribution of life-sustaining environments within our Solar System, and search for evidence of past and present life; Identify plausible signatures of life on other worlds. (3S6) | |
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Discover planetary systems of other stars and their physical characteristics and Search for worlds that could or do harbor life. (2S4) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Discover planetary systems of other stars and their physical characteristics and Search for worlds that could or do harbor life. (3S4) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |

Theme: Astronomical Search for Origins (ASO)

Objective 5.9: Understand the diversity of worlds beyond our solar system and search for those that might harbor life.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Red<br>Complete the NGST Developmental Cryogenic Active Telescope Testbed (DCATT) phase 1, measure ambient operation with off-the-shelf components, and make final preparations for phase 2, the measurement of cold telescope operation with selected "flight-like" component upgrades. (OS53) | Blue<br>Advance the search for life beyond Earth by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by performing innovative technology development. Meet no fewer than two of the three performance objectives for Mars Odyssey ('01 Orbiter), Mars Global Surveyor, and Terrestrial Planet Finder. (1S14) |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Yellow<br>Development of the interferometer program for connecting the twin Keck 10-meter telescopes with an array of four two-meter class outrigger telescopes will be tested by detecting and tracking fringes with two test siderostats at two- and ten-micron wavelengths. (OS55) | |
| | Green<br>The Space Interferometry Mission (SIM) System Testbed (STB) will demonstrate, in May 2000, that an rms optical path difference can be controlled at 1.5 nanometers, operating in an emulated on-orbit mode. (OS52) | |
| | Red<br>Complete and deliver a technology development plan for the Terrestrial Planet Finder (TPF) mission by June 2000. This infrared interferometer mission is projected for a 2010 launch and requires the definition of technologies that will not be developed or demonstrated by precursor missions. (OS54) | |
| | Red<br>Select two Small Explorer (SMEX) missions and release a University Explorer (UNEX) Announcement of Opportunity (AO). (OS28) | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals |

Theme: Astronomical Search for Origins (ASO)

Objective 5.9: Understand the diversity of worlds beyond our solar system and search for those that might harbor life.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals |

Theme: Structure and Evolution of the Universe (SEU)

Objective 5.10: Discover what powered the Big Bang and the nature of the mysterious dark energy that is pulling the universe apart.

| 1999 | 2000 | 2001 |
|---|---|---|
| Blue<br>Successfully launch seven spacecraft, within 10% of budget, on average. (9S1) | Green<br>The Chandra X-ray Observatory (formerly AXAF) instrument will meet nominal performance expectations, and science data will be taken with 70% efficiency, with at least 90% of science data recovered on the ground. (OS1) | Yellow<br>Successfully develop and launch no fewer than three of four planned missions within 10% of budget and schedule. Missions are: GALEX, MAP, GP-B, and CATSAT. (Indicators have also been established for other missions in development.) (1S1) |
| Green<br>Record 25 images and spectra at a resolution of better than an arcsecond, five to ten times sharper than images gathered earlier by the Einstein Observatory. (CXO) (9S3) | Yellow<br>Assemble and successfully test the breadboard cooler for ESA's Planck mission in April 2000. (OS7) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in astronomy rocket and balloon flights, and by making satisfactory research progress in related Research and Analysis (R&A) and Data Analysis (DA) programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs NGST, Herschel (FIRST), GLAST, Sounding Rockets, Balloons, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S3) |
| | Green<br>Begin system-level environmental testing of the MAP spacecraft during July 2000. (OS9) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Red<br>Based on an overall goal of successfully launching 25 sounding rocket missions, at least 23 payloads shall successfully achieve their required altitude and orientation, and at least 21 investigators shall achieve their minimum mission success goals. (OS65) | |
| | Red<br>Based on an overall goal of conducting 26 worldwide science and technology demonstration balloon missions, at least 23 campaigns shall successfully achieve altitude and distance, and investigators' instrumentation shall function as planned for at least 19 missions. (OS66) | |
| | Red<br>Select two Small Explorer (SMEX) missions and release a University Explorer (UNEX) Announcement of Opportunity (AO). (OS28) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |
| | Green<br>Conduct research and analysis. (OS68) | |
| | Green<br>Conduct data analysis. (OS69) | |

Theme: Structure and Evolution of the Universe (SEU)

Objective 5.10: Discover what powered the Big Bang and the nature of the mysterious dark energy that is pulling the universe apart.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Identify dark matter and learn how it shapes galaxies and systems of galaxies and Determine the size, shape, age, and energy content of the universe. (2S1) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Identify dark matter and learn how it shapes galaxies and systems of galaxies and Determine the size, shape, age, and energy content of the universe. (3S1) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Theme: Structure and Evolution of the Universe (SEU)

Objective 5.11: Learn what happens to space, time, and matter at the edge of a black hole.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Observe physical phenomena 25,000 times closer to the event horizon of black holes than permitted with optical wavelength measurements. (RXTE) (9S5) | Green<br>The baseline RXTE mission ended in 1997; the target for FY00 is to operate at least three of the five instruments at an efficiency of 45%, with 95% data recovery; All Sky Monitor data will be posted on the web within 7 days, and Proportional Counter Array and High-Energy X-ray Timing Experiment data will be released within 60 days. (OS2) | Blue<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: HST, CXO, XTE, ACE, FUSE, SWAS, and, if successfully launched, GALEX, and GP-B. (1S2) |
| Green<br>Record 25 images and spectra at a resolution of better than an arcsecond, five to ten times sharper than images gathered earlier by the Einstein Observatory. (CXO) (9S3) | Yellow<br>Complete final integration and test of the Gravity Probe-B science payload with the spacecraft in August 2000. (OS3) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in astronomy rocket and balloon flights, and by making satisfactory research progress in related Research and Analysis (R&A) and Data Analysis (DA) programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs NGST, Herschel (FIRST), GLAST, Sounding Rockets, Balloons, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S3) |
| | Green<br>Prepare the INTEGRAL Science Data Center (ISDC) for data archiving and prepare instrument analysis software for the spectrometer on INTEGRAL (SPI) instrument within 10% of estimated cost. (OS6) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Green<br>The baseline mission of the CGRO ended in 1996; the target for FY00 is to continue to operate those instruments not dependent on expended consumables (Oriented Scintillation Spectrometer Experiment, OSSE; Burst and Transient Source Experiment, BATSE; and Imaging Compton Telescope, COMPTEL) at an average efficiency of at least 60%. (OS11) | |
| Blue<br>Successfully launch seven spacecraft, within 10% of budget, on average. (9S1) | Green<br>The Chandra X-ray Observatory (formerly AXAF) instrument will meet nominal performance expectations, and science data will be taken with 70% efficiency, with at least 90% of science data recovered on the ground. (OS1) | Yellow<br>Successfully develop and launch no fewer than three of four planned missions within 10% of budget and schedule. Missions are: GALEX, MAP, GP-B, and CATSAT. (Indicators have also been established for other missions in development.) (1S1) |
| | Red<br>If launched, activate the XRS and XIS instruments on the Japanese Astro-E spacecraft after launch and collect at least 90% of the XRS and XIS data. (OS14) | |
| | Green<br>The prototype primary instrument for GLAST will demonstrate achievement of the established instrument performance level of angular resolution of 3.5 degrees across the entire 20-MeV to 100-GeV energy range. (OS63) | |

Theme: Structure and Evolution of the Universe (SEU)

Objective 5.11: Learn what happens to space, time, and matter at the edge of a black hole.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Discover the sources of gamma ray bursts and high energy cosmic rays; Test the general theory of relativity near black holes and in the early universe, and search for new physical laws, using the universe as a laboratory; Reveal the nature of cosmic jets and relativistic flows. (2S2) | Earn external review rating "green," on average, on making progress in the following research focus areas: Discover the sources of gamma ray bursts and high energy cosmic rays (two phenomena that astronomers believe are the most energetic events in the universe); Test the general theory of relativity near black holes and in the early universe, and search for new physical laws, using the universe as a laboratory; Reveal the nature of cosmic jets and relativistic flows (Understand the physical mechanisms that can accelerate matter to near the speed of light, as observed in cosmic jets and other relativistic flows.) (3S2) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Theme: Structure and Evolution of the Universe (SEU)

Objective 5.11: Learn what happens to space, time, and matter at the edge of a black hole.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Red<br>Based on an overall goal of successfully launching 25 sounding rocket missions, at least 23 payloads shall successfully achieve their required altitude and orientation, and at least 21 investigators shall achieve their minimum mission success goals. (OS65) | |
| | Red<br>Select two Small Explorer (SMEX) missions and release a University Explorer (UNEX) Announcement of Opportunity (AO). (OS28) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |
| | Green<br>Conduct research and analysis. (OS68) | |
| | Green<br>Conduct data analysis. (OS69) | |

Objective 5.12: Understand the development of structure and the cycles of matter and energy in the evolving Universe.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Record data on approximately 12 compact stellar objects with a sensitivity 50 times greater than the Einstein Observatory. (CXO) (9S4) | Green<br>The baseline RXTE mission ended in 1997; the target for FY00 is to operate at least three of the five instruments at an efficiency of 45%, with 95% data recovery; All Sky Monitor data will be posted on the web within 7 days, and Proportional Counter Array and High-Energy X-ray Timing Experiment data will be released within 60 days. (OS2) | Blue<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: HST, CXO, XTE, ACE, FUSE, SWAS, and, if successfully launched, GALEX, and GP-B. (1S2) |
| Green<br>Record 25 images and spectra at a resolution of better than an arcsecond, five to ten times sharper than images gathered earlier by the Einstein Observatory. (CXO) (9S3) | Green<br>Prepare the INTEGRAL Science Data Center (ISDC) for data archiving and prepare instrument analysis software for the spectrometer on INTEGRAL (SPI) instrument within 10% of estimated cost. (OS6) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in astronomy rocket and balloon flights, and by making satisfactory research progress in related Research and Analysis (R&A) and Data Analysis (DA) programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs NGST, Herschel (FIRST), GLAST, Sounding Rockets, Balloons, and R&A. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S3) |
| Blue<br>Successfully launch seven spacecraft, within 10% of budget, on average. (9S1) | Green<br>The Chandra X-ray Observatory (formerly AXAF) instrument will meet nominal performance expectations, and science data will be taken with 70% efficiency, with at least 90% of science data recovered on the ground. (OS1) | Yellow<br>Successfully develop and launch no fewer than three of four planned missions within 10% of budget and schedule. Missions are: GALEX, MAP, GP-B, and CATSAT. (Indicators have also been established for other missions in development.) (1S1) |

Theme: Structure and Evolution of the Universe (SEU)

Objective 5.11: Learn what happens to space, time, and matter at the edge of a black hole.

| 2002 | 2003 | 2004 |
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Objective 5.12: Understand the development of structure and the cycles of matter and energy in the evolving Universe.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Identify dark matter and learn how it shapes galaxies and systems of galaxies and Determine the size, shape, age, and energy content of the universe. (2S1) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Identify dark matter and learn how it shapes galaxies and systems of galaxies and Determine the size, shape, age, and energy content of the universe. (3S1) | |
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Discover the sources of gamma ray bursts and high energy cosmic rays; Test the general theory of relativity near black holes and in the early universe, and search for new physical laws, using the universe as a laboratory; Reveal the nature of cosmic jets and relativistic flows. (2S2) | Earn external review rating "green," on average, on making progress in the following research focus areas: Discover the sources of gamma ray bursts and high energy cosmic rays (two phenomena that astronomers believe are the most energetic events in the universe); Test the general theory of relativity near black holes and in the early universe, and search for new physical laws, using the universe as a laboratory; Reveal the nature of cosmic jets and relativistic flows (Understand the physical mechanisms that can accelerate matter to near the speed of light, as observed in cosmic jets and other relativistic flows.) (3S2) | |
| | | |

Theme: Structure and Evolution of the Universe (SEU)

Objective 5.12: Understand the development of structure and the cycles of matter and energy in the evolving Universe.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Yellow<br>Deliver the GALEX science instrument from JPL to the Space Astrophysics Laboratory at Caltech during April 2000 for science calibration. The instrument will be fully integrated, functionally tested, and environmentally qualified at the time of the scheduled delivery. (OS8) | |
| | Green<br>Begin system-level environmental testing of the MAP spacecraft during July 2000. (OS9) | |
| | Green<br>The baseline mission of the CGRO ended in 1996; the target for FY00 is to continue to operate those instruments not dependent on expended consumables (Oriented Scintillation Spectrometer Experiment, OSSE; Burst and Transient Source Experiment, BATSE; and Imaging Compton Telescope, COMPTEL) at an average efficiency of at least 60%. (OS11) | |
| | Green<br>The prototype primary instrument for GLAST will demonstrate achievement of the established instrument performance level of angular resolution of 3.5 degrees across the entire 20-MeV to 100-GeV energy range. (OS63) | |
| | Red<br>Select two Small Explorer (SMEX) missions and release a University Explorer (UNEX) Announcement of Opportunity (AO). (OS28) | |
| | Yellow<br>Assemble and successfully test the breadboard cooler for ESA's Planck mission in April 2000. (OS7) | |
| | Green<br>Conduct research and analysis. (OS68) | |
| | Green<br>Conduct data analysis. (OS69) | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals |

Theme: Structure and Evolution of the Universe (SEU)

Objective 5.12: Understand the development of structure and the cycles of matter and energy in the evolving Universe.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
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Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals |

Theme: Sun-Earth Connection (SEC)

Objective 1.3: Understand the origins and societal impacts of variability in the Sun-Earth connection.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Provide data with spatial resolution five times better than were collected from the Yohkoh Soft X-ray Telescope. (TRACE) (9S11) | Green<br>Conduct data analysis. (OS69) | Green<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: Cassini, Voyager, Ulysses, SAMPEX, FAST, TRACE, Stardust, Mars Global Surveyor, and ISTP spacecraft; also, if successfully launched, TIMED, HESSI, IMAGE, Genesis, and Mars Odyssey ('01 Orbiter). (1S5) |
| Green<br>Achieve complete coverage (maximum and minimum) of the solar cycle, an increase from 35 percent. (Space Physics fleet of spacecraft) (9S22) | Green<br>Collect pixel-limited images in all Transition Region and Coronal Explorer (TRACE) wavelength bands, operating 24-hour schedules for sustained periods over eight months. (OS17) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in space physics rocket and balloon flights, and by making satisfactory research progress in related R&A and DA programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs: Solar-B, STEREO, Solar Probe, Future Solar Terrestrial Probes, Future Deep Space Technology, CISM, X2000, Sounding Rockets, and Balloons. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S6) |
| | Red<br>Based on an overall goal of successfully launching 25 sounding rocket missions, at least 23 payloads shall successfully achieve their required altitude and orientation, and at least 21 investigators shall achieve their minimum mission success goals. (OS65) | Green<br>Develop the knowledge to improve the reliability of space weather forecasting by obtaining scientific data from three of five missions and by making satisfactory progress in related areas in R&A and DA programs. Meet no fewer than 75% of the performance objectives for R&A, ACE, SAMPEX, TRACE, ISTP, and, if successfully launched, HESSI. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S11) |
| | Yellow<br>The TIMED mission will be delivered on time for a planned May 2000 launch, within 10% of the planned development budget. (OS18) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Green<br>Conduct research and analysis. (OS68) | |
| | Yellow<br>If successfully launched, the TIMED mission will acquire global data in the mesosphere and lower thermosphere/ionosphere region globally (all the latitudes) for at least 90 days at the required spatial resolution, coverage, and accuracy and for all local solar times. (OS19) | |
| | Green<br>Deliver to the Los Alamos National Laboratory in March 2000 all components for system integration and testing of the first flight system for the TWINS mission. (OS25) | |

Theme: Sun-Earth Connection (SEC)

Objective 1.3: Understand the origins and societal impacts of variability in the Sun-Earth connection.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand the origins of long- and short-term solar variability; Understand the effects of solar variability on the solar atmosphere and heliosphere; Understand the space environment of Earth and other planets. (2S7) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand the origins of long- and short-term solar variability; Understand the effects of solar variability on the solar atmosphere and heliosphere; Understand the space environment of Earth and other planets. (3S7) | |
| Blue<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand forces and processes, such as impacts, that affect habitability of Earth; Develop the capability to predict space weather; Find extraterrestrial resources and assess the suitability of Solar System locales for future human exploration. (2S8) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand forces and processes, such as impacts, that affect habitability of Earth; Develop the capability to predict space weather; Find extraterrestrial resources and assess the suitability of Solar System locales for future human exploration. (3S8) | |
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Theme: Sun-Earth Connection (SEC)

Objective 1.3: Understand the origins and societal impacts of variability in the Sun-Earth connection.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>IMAGE will be delivered on time for a planned February 2000 launch and within 10% of the planned development budget. (OS26) | |
| | Green<br>If launched, IMAGE will acquire critical measurements at minute time scales, returning 85% real-time coverage of Earth's magnetospheric changes. (OS27) | |
| | Red<br>Select two Small Explorer (SMEX) missions and release a University Explorer (UNEX) Announcement of Opportunity (AO). (OS28) | |
| | Green<br>Acquire calibrated observational data from the Japanese Yohkoh high-energy solar physics mission (including the U.S.-provided SXT) for at least 75% of the time permitted by tracking coverage. (OS24) | |
| | Green<br>Collect 85% of data acquired from the International Solar-Terrestrial Physics Program (ISTP) spacecraft and successfully execute the WIND trajectory plan. (OS33) | |
| | Green<br>Capture at least 90% of available Ulysses science data. These will be the only data observed from outside-of-the-ecliptic plane. (OS35) | |
| | Green<br>FAST will return simultaneous data from high-latitude, low-altitude magnetosphere locations in the Sun-Earth connected system through solar maximum at the required resolution and accuracy with at least 85% efficiency. (OS38) | |
| | Yellow<br>Complete and deliver for testing Solar-B's four Electrical Engineering Models in September 2000. (OS60) | |
| | Yellow<br>Complete STEREO Phase A studies by June 2000, including the release of an AO for investigations with specific instruments and selection of the formulation phase payload. (OS61) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |

Objective 5.6: Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Provide data with spatial resolution five times better than were collected from the Yohkoh Soft X-ray Telescope. (TRACE) (9S11) | Green<br>Conduct research and analysis. (OS68) | Green<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: Cassini, Voyager, Ulysses, SAMPEX, FAST, TRACE, Stardust, Mars Global Surveyor, and ISTP spacecraft; also, if successfully launched, TIMED, HESSI, IMAGE, Genesis, and Mars Odyssey ('01 Orbiter). (1S5) |

Theme: Sun-Earth Connection (SEC)

Objective 1.3: Understand the origins and societal impacts of variability in the Sun-Earth connection.

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Objective 5.6: Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.

| 2002 | 2003 | 2004 |
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| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |

Theme: Sun-Earth Connection (SEC)

Objective 5.6: Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>Conduct data analysis. (OS69) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in space physics rocket and balloon flights, and by making satisfactory research progress in related R&A and DA programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs: Solar-B, STEREO, Solar Probe, Future Solar Terrestrial Probes, Future Deep Space Technology, CISM, X2000, Sounding Rockets, and Balloons. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S6) |
| | Green<br>Collect pixel-limited images in all Transition Region and Coronal Explorer (TRACE) wavelength bands, operating 24-hour schedules for sustained periods over eight months. (OS17) | Green<br>Develop the knowledge to improve the reliability of space weather forecasting by obtaining scientific data from three of five missions and by making satisfactory progress in related areas in R&A and DA programs. Meet no fewer than 75% of the performance objectives for R&A, ACE, SAMPEX, TRACE, ISTP, and, if successfully launched, HESSI. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S11) |
| | Green<br>The prime mission of SAMPEX ended in 1995; the FY00 target is to obtain at least 60% data coverage from at least three of SAMPEX's four instruments. (OS15) | Green<br>Further understanding of basic natural processes and the effects of solar variability on humans and technology. Meet no fewer than two of the three performance objectives for: Strategic Plan Development, Solar Dynamics Observatory, and Research and Data Analysis. Achieve a "fully effective' (green) overall science achievement rating from the Space Science external advisory committee. (1S13) |
| | Red<br>Based on an overall goal of successfully launching 25 sounding rocket missions, at least 23 payloads shall successfully achieve their required altitude and orientation, and at least 21 investigators shall achieve their minimum mission success goals. (OS65) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Red<br>Based on an overall goal of conducting 26 worldwide science and technology demonstration balloon missions, at least 23 campaigns shall successfully achieve altitude and distance, and investigators' instrumentation shall function as planned for at least 19 missions. (OS66) | |
| | Green<br>Complete the development of the Cluster-II instrument analysis software for the one U.S. and five U.S.-partnered instruments before launch and, if launch occurs in FY00, activate and verify the wideband data and U.S. subcomponents after launch. (OS21) | |
| | Yellow<br>HESSI will be delivered in time for a planned July 2000 launch, within 10% of the planned development budget. (OS22) | |

Theme: Sun-Earth Connection (SEC)

Objective 5.6: Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand the origins of long- and short-term solar variability; Understand the effects of solar variability on the solar atmosphere and heliosphere; Understand the space environment of Earth and other planets. (2S7) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Understand the origins of long- and short-term solar variability; Understand the effects of solar variability on the solar atmosphere and heliosphere; Understand the space environment of Earth and other planets. (3S7) | |
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Theme: Sun-Earth Connection (SEC)

Objective 5.6: Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.

| 1999 | 2000 | 2001 |
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| | Yellow<br>Assuming launch and normal checkout, HESSI operations will return data to achieve at least the primary science objectives, with at least 80% coverage of the time allowed by orbit. (OS23) | |
| | Red<br>Select two Small Explorer (SMEX) missions and release a University Explorer (UNEX) Announcement of Opportunity (AO). (OS28) | |
| | Green<br>Acquire calibrated observational data from the Japanese Yohkoh high-energy solar physics mission (including the U.S.-provided SXT) for at least 75% of the time permitted by tracking coverage. (OS24) | |
| | Green<br>Collect 85% of data acquired from the International Solar-Terrestrial Physics Program (ISTP) spacecraft and successfully execute the WIND trajectory plan. (OS33) | |
| | Green<br>Capture at least 90% of available Ulysses science data. These will be the only data observed from outside-of-the-ecliptic plane. (OS35) | |
| | Yellow<br>Average 12 hours of Voyager Interstellar Mission data capture per day per spacecraft to characterize the heliosphere and the heliospheric processes at work in the outer solar system as well as the transition from the solar system to interstellar space. (OS36) | |
| | Green<br>Collect and process data from the Interplanetary Monitoring Platform (IMP-8, launched in 1973), making data from at least six instruments available within 15 months and the magnetic field and plasma data available within 2 months. (OS39) | |
| | Green<br>ACE will: measure the composition and energy spectra of heavy nuclei in at least eight solar energetic particle events; maintain real-time solar wind data transmissions at least 90% of the time; measure the isotopic composition of a majority of the “primary” galactic cosmic ray elements from carbon to zinc; and provide browse parameters within three days for 90% of the year. (OS48) | |
| | Yellow<br>Complete and deliver for testing Solar-B’s four Electrical Engineering Models in September 2000. (OS60) | |
| | Yellow<br>Complete STEREO Phase A studies by June 2000, including the release of an AO for investigations with specific instruments and selection of the formulation phase payload. (OS61) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |

Theme: Sun-Earth Connection (SEC)

Objective 5.6: Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.

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Theme: Sun-Earth Connection (SEC)

Objective 5.7: Understand the fundamental physical processes of space plasma systems.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>Conduct research and analysis. (OS68) | Green<br>Obtain expected scientific data from at least 80% of operating missions. Missions are: Cassini, Voyager, Ulysses, SAMPEX, FAST, TRACE, Stardust, Mars Global Surveyor, and ISTP spacecraft; also, if successfully launched, TIMED, HESSI, IMAGE, Genesis, and Mars Odyssey ('01 Orbiter). (1S5) |
| | Green<br>Conduct data analysis. (OS69) | Green<br>Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in space physics rocket and balloon flights, and by making satisfactory research progress in related R&A and DA programs. Meet no fewer than 66% of the performance objectives for the following technology and research programs: Solar-B, STEREO, Solar Probe, Future Solar Terrestrial Probes, Future Deep Space Technology, CISM, X2000, Sounding Rockets, and Balloons. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S6) |
| | Red<br>Based on an overall goal of successfully launching 25 sounding rocket missions, at least 23 payloads shall successfully achieve their required altitude and orientation, and at least 21 investigators shall achieve their minimum mission success goals. (OS65) | Green<br>Develop the knowledge to improve the reliability of space weather forecasting by obtaining scientific data from three of five missions and by making satisfactory progress in related areas in R&A and DA programs. Meet no fewer than 75% of the performance objectives for R&A, ACE, SAMPEX, TRACE, ISTP, and, if successfully launched, HESSI. Achieve a "fully effective" (green) overall science achievement rating from the Space Science external advisory committee. (1S11) |
| | Yellow<br>The TIMED mission will be delivered on time for a planned May 2000 launch, within 10% of the planned development budget. (OS18) | Green<br>Further understanding of basic natural processes and the effects of solar variability on humans and technology. Meet no fewer than two of the three performance objectives for: Strategic Plan Development, Solar Dynamics Observatory, and Research and Data Analysis. Achieve a "fully effective' (green) overall science achievement rating from the Space Science external advisory committee. (1S13) |
| | Yellow<br>If successfully launched, the TIMED mission will acquire global data in the mesosphere and lower thermosphere/ionosphere region globally (all the latitudes) for at least 90 days at the required spatial resolution, coverage, and accuracy and for all local solar times. (OS19) | Yellow<br>Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in the space science core technology programs and by making progress as planned in the Flight Validation program. Meet no fewer than 66% of the performance objectives for Information Systems, High Performance Computing, Explorer Program Technology, and Flight Validation. (1S12) |
| | Green<br>Complete the development of the Cluster-II instrument analysis software for the one U.S. and five U.S.-partnered instruments before launch and, if launch occurs in FY00, activate and verify the wideband data and U.S. subcomponents after launch. (OS21) | |

Theme: Sun-Earth Connection (SEC)

Objective 5.7: Understand the fundamental physical processes of space plasma systems.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (2S10) | Earn external review rating of "green" on making progress in the following technology development area: Focus technology development on a well-defined set of performance requirements covering the needs of near-term to mid-term strategic plan missions. (3S10) | |
| Green<br>Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (2S11) | Earn external review rating of "green" on making progress in the following technology validation area: Formulate and implement cost-effective space demonstrations of selected technologies on suitable carriers. (3S11) | |
| Green<br>Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (2S9) | Earn external review rating of "green" on making progress in the following area: Design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. (3S9) | |
| Green<br>Earn external review rating of "green," on average, on making progress in the following research focus areas: Observe the formation of galaxies and determine the role of gravity in this process; Establish how the evolution of a galaxy and the life cycle of stars influence the chemical composition of material available for making stars, planets, and living organisms; Observe the formation of planetary systems and characterize their properties; Use the exotic space environments within our Solar System as natural science laboratories and cross the outer boundary of the Solar System to explore the nearby environment of our galaxy. (2S3) | Earn external review rating of "green," on average, on making progress in the following research focus areas: Observe the formation of galaxies and determine the role of gravity in this process; Establish how the evolution of a galaxy and the life cycle of stars influence the chemical composition of material available for making stars, planets, and living organisms; Observe the formation of planetary systems and characterize their properties; Use the exotic space environments within our Solar System as natural science laboratories and cross the outer boundary of the Solar System to explore the nearby environment of our galaxy. (3S3) | |
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Theme: Sun-Earth Connection (SEC)

Objective 5.7: Understand the fundamental physical processes of space plasma systems.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>Deliver to the Los Alamos National Laboratory in March 2000 all components for system integration and testing of the first flight system for the TWINS mission. (OS25) | |
| | Green<br>IMAGE will be delivered on time for a planned February 2000 launch and within 10% of the planned development budget. (OS26) | |
| | Green<br>If launched, IMAGE will acquire critical measurements at minute time scales, returning 85% real-time coverage of Earth's magnetospheric changes. (OS27) | |
| | Red<br>Select two Small Explorer (SMEX) missions and release a University Explorer (UNEX) Announcement of Opportunity (AO). (OS28) | |
| | Green<br>Collect 85% of data acquired from the International Solar-Terrestrial Physics Program (ISTP) spacecraft and successfully execute the WIND trajectory plan. (OS33) | |
| | Green<br>Capture at least 90% of available Ulysses science data. These will be the only data observed from outside-of-the-ecliptic plane. (OS35) | |
| | Green<br>Information Systems R&T will demonstrate the search, discovery, and fusion of multiple data products at a major science meeting. Accomplish and document the infusion of five information systems R&T efforts into flight projects or the broad research community. Space science data services shall be acknowledged as enabling for two interdisciplinary collaborations. (OS49) | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals |

Theme: Sun-Earth Connection (SEC)

Objective 5.7: Understand the fundamental physical processes of space plasma systems.

| 2002 | 2003 | 2004 |
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Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| See SSE Theme for Common Enterprise Goals | See SSE Theme for Common Enterprise Goals | |

Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>Collect near-daily measurements of ocean color (index of ocean productivity from which calculations of ocean update of carbon are made). (9Y3) | Yellow<br>SIMBIOS will merge MODIS ocean color data into the global ocean color time series, which began with Ocean Color Temperature Sensor (OCTS) and SeaWiFS. Use time series to understand and predict response of the marine ecosystem to climate change. Make data set available via the Goddard DAAC. (0Y4) | Yellow<br>Increase understanding of the dynamics of the global carbon cycle by developing, analyzing and documenting multi-year data sets and meeting at least 3 of 4 performance indicators in this research area. (1Y3) |
| Yellow<br>Refresh the global archive of 30m land imagery from Landsat 7, two to three times per year. A single global archive has not been constructed since late 1970's. This will include a 15m panchromatic band. (9Y1) | Green<br>Continue the ocean color time series with 60% global coverage every 4 days. (0Y3) | Green<br>Explain the dynamics of global carbon cycle by building improved models and prediction capabilities and meeting 2 of 2 performance indicators in this research area. (1Y4) |
| Green<br>TRMM will begin the second of a 3-year sequence of instantaneous measurements of rainfall rates and monthly accumulations in the global tropics. This will be the first measurement of global tropical rainfall. Current uncertainty is 50 percent. TRMM data will reduce uncertainty to 10 percent. (9Y4) | Green<br>Establish a benchmark for global and regional rainfall measurements by combining TRMM measurements with measurements from other sources. Create maps of the diurnal cycle of precipitation for the first time. Combine the existing ten-year data set with TRMM measurements to validate climate models and demonstrate the impact of rainfall on short-term weather forecasting. Distribute through the Goddard DAAC for ease of access to science and operational users. (0Y9) | Green<br>Increase understanding of the dynamics of global water cycle by developing, analyzing, and documenting multi-year data sets and meeting 2 of 2 performance indicators in this research area. (1Y5) |
| Yellow<br>Collect near-daily global measurements of the terrestrial biosphere (index of terrestrial photosynthetic processes from which calculations of carbon uptake are made) from instruments on TERRA. (9Y2) | Green<br>Continue the development of a global land-cover/use change data set based on Landsat and EOS instrument, at seasonal refresh rate. (0Y1) | |
| | Green<br>Continue to collect near-daily global measurements of the terrestrial biosphere (index of terrestrial photosynthetic processes from which calculations of carbon uptake are made) from instruments on TERRA. (0Y2) | |
| | Green<br>Produce near-real-time fire monitoring and impact assessment based on Landsat and EOS inventory and process monitoring to provide an observational foundation for monitoring change in ecosystem productivity and disturbance. Post near-real-time assessments on a web site for quick access by researchers and regional authorities. (0Y7) | |

Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Increase understanding of global ecosystem change by meeting at least 3 of 4 performance indicators. (2Y3) | Increase understanding of global ecosystems change. Next set of indicators to measure progress toward answering this question will be given in the FY04 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published FY03 report. (3Y3) | |
| Green<br>Increase understanding about the changes in global land cover and land use and their causes by meeting at least 2 of 3 performance indicators. (2Y8) | Increase understanding about the changes in global land cover and land use and their causes. Next set of indicators to measure progress toward answering this question will be given in the FY04 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y8) | |
| Yellow<br>Increase understanding of global precipitation, evaporation and how the cycling of water is changing by meeting at least 3 of 4 performance indicators. (2Y1) | Increase understanding of global precipitation, evaporation and how the cycling of water through the earth system is changing. Next set of indicators to measure progress toward answering this question will be given in the FY04 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y1) | |
| Green<br>Increase understanding of how ecosystems respond to and affect global environmental change and affect the global carbon cycle by meeting at least 4 of 5 performance indicators. (2Y11) | Increase understanding of how ecosystems respond to and affect global environmental change and affect the global carbon cycle. Next set of indicators to measure progress toward answering this question will be given in the FY04 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y11) | |
| Green<br>Increase understanding of the consequence of land cover and land use change for the sustainability of ecosystems and economic productivity by meeting at least 2 of 3 performance indicators. (2Y17) | Increase understanding of the consequence of land cover and land use change for the sustainability of ecosystems and economic productivity. Next set of indicators to measure progress toward answering this question will be given in the FY04 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y17) | |
| Green<br>Increase understanding of the consequences of climate and sea level changes and increased human activities on coastal regions by meeting 2 of 2 performance indicators. (2Y18) | Increase understanding of the consequences of climate and sea level changes and increased human activities on coastal regions. Next set of indicators to measure progress toward answering this question will be given in the FY04 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y18) | |

Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>QuikScat to provide 25km resolution wind speed & direction measurements over at least 90% of the ice-free oceans every two days. Resolution increases by a factor of two, and a 15% increase of coverage over previous measurement. (9Y5) | Green<br>Develop/improve methods to couple state-of-the-art land surface and sea ice models to a global coupled ocean-atmosphere model and use to predict regional climactic consequences of El Nino or La Nina occurrence in the tropical Pacific. Results of research will be published in the open literature and provided to NOAA's National Climate Prediction Center and the U.S. Navy's Fleet Numeric Prediction Center. Ultimate goal: develop a capability to significantly improve the prediction for seasonal-to-interannual climate variations and their regional climate consequences. The main focus is on North America. (0Y10) | Green<br>Explain the dynamics of global water cycle by building improved models and prediction capabilities and meeting at least 2 of 3 performance indicators in this research area. (1Y6) |
| Green<br>The Enterprise will provide the technology and instruments to create the first digital topographic map of 8o percent of Earth's land surface, everything between 60°N and 56°S. SRTM will be ready to launch in September 1999. (9Y6) | Green<br>Use Southern California Global Positioning System (GPS) array data to understand the connection between seismic risk and crustal strain leading to Earthquakes. (0Y37) | Green<br>Increase understanding of the dynamics of the Earth's interior and crust by developing, analyzing, and documenting multi-year data sets and meeting 2 of 2 performance indicators in this research area. (1Y11) |
| | Green<br>Measure production and radiative properties of aerosols produced by biomass burning in Africa based on SAFARI 2000 (field experiment) and EOS instruments. Includes extensive international participation. This burning is estimated to contribute one-half of global atmospheric aerosols. (0Y11) | |
| | Yellow<br>Launch the NASA-CNES Jason-1 mission. This follow-on to TOPEX/ Poseidon is to achieve a factor-of-four improvement in accuracy in measuring ocean basin-scale sea-level variability. This is 1 order of magnitude better than that specified for TOPEX/Poseidon. (0Y12) | |
| | Green<br>Generate the first basin-scale high-resolution estimate of the state of the Pacific Ocean as part of the international Global Ocean Data Assimilation Experiment (GODAE). (0Y47) | |
| | Green<br>Develop a remote-sensing instrument/technique for ocean surface salinity measurements from aircraft. Goal: to improve measurement accuracy to ` order of magnitude better than available in FY98. The ultimate goal is the capability to globally measure sea surface salinity from space. (0Y19) | |

Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Increase understanding of global ocean circulation and how it varies on interannual, decadal, and longer time scales by meeting 2 of 2 performance indicators. (2Y2) | Increase understanding of global ocean circulation and how it varies on interannual, decadal, and longer time scales. (3Y2) | |
| Green<br>Increase understanding of the motions of the Earth, the Earth's interior, and what information can be inferred about the Earth's internal processes by meeting at least 3 of 4 performance indicators. (2Y6) | Increase understanding of the motions of the Earth, the Earth's interior, and what information can be inferred about the Earth's internal processes. Next set of indicators to measure progress toward answering this question will be given in the FY05 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y6) | |
| Green<br>Increase understanding of how climate variations induce changes in the global ocean circulation by meeting at least 4 of 6 performance indicators. (2Y12) | Increase understanding of how climate variations induce changes in the global ocean circulation by meeting at least 2 of 3 performance indicators. (3Y12) | |
| Green<br>Increase understanding of variations in local weather, precipitation and water resources and how they relate to global climate variation by meeting 2 of 2 performance indicators. (2Y16) | Increase understanding of variations in local weather, precipitation and water resources and how they relate to global climate variation. Next set of indicators to measure progress toward answering this question will be given in the FY04 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y16) | |
| Green<br>Increase understanding of the extent that weather forecast duration and reliability can be improved by new space-based observations, data assimilation and modeling by meeting at least 2 of 3 performance indicators. (2Y19) | Increase understanding of the extent that weather forecast duration and reliability can be improved by new space-based observations, data assimilation and modeling. Next set of indicators to measure progress toward answering this question will be given in the FY05 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y19) | |
| Green<br>Increase understanding of the extent that transient climate variations can be understood and predicted by meeting at least 4 of 5 performance indicators. (2Y20) | Increase understanding of the extent that transient climate variations can be understood and predicted. Next set of indicators to measure progress toward answering this question will be given in the FY05 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y20) | |

Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Use GPS array in southern California to monitor crustal deformation on a daily basis with centimeter precision; initiate installation of the next 100 stations. Data will be archived at JPL and run in models, with results given to the California Seismic Safety Commission and FEMA. (9Y7) | Green<br>Develop models to use time-varying gravity observations for the first time in space. (0Y38) | Green<br>Explain the dynamics of the Earth's interior and crust by building improved models and prediction capabilities and meeting 2 of 2 performance indicators in this research area. (1Y12) |
| Green<br>Use GPS data to test improved algorithms for sounding the atmosphere with the occulted GPS signal. Data will be archived at JPL and results published in science literature. (9Y8) | Green<br>Complete the collection of satellite data needed for the 17-year cloud climatology being developed under the International Satellite Cloud Climatology Project. Data will be used to improve the understanding and modeling of role of clouds in climate. Data will be available in the Goddard DAAC. (0Y13) | Green<br>Increase understanding of the dynamics of long term climate variability by developing, analyzing, and documenting multi-year data sets and meeting at least 2 of 3 performance indicators in this research area. (1Y7) |
| Yellow<br>MODIS, MISR, ASTER, CERES (TERRA instruments) will begin to conduct daily observations of cloud properties such as extent, height, optical thickness and particle size. Data will be distributed through the Goddard DAAC. (9Y9) | Green<br>Continue the development of the global aerosol climatology data set and analysis of this climatology in climate models. Data will be available in the Goddard DAAC. (0Y14) | Green<br>Explain the dynamics of long term climate variability by building improved models and prediction capabilities and meeting at least 3 of 4 performance indicators in this research. (1Y8) |
| Yellow<br>TOMS data will be used for new retrieval methods to collect and analyze three new data products, including surface ultraviolet, tropospheric aerosols, and tropospheric columns. With SBUV/2 data, TOMS will make a continuous 20-year data set for total ozone-measuring effectiveness of Montreal Protocol. New and extended data products will be made available on TOMS web site. (9Y12) | Green<br>Implement the SAGE III Ozone Loss and Validation Experiments. Measurements will be made from October 1999 to March 2000 in the Arctic/high-latitude region from the NASA DC-8, ER-2, and balloon platforms. Will acquire correlative data to validate SAGE III data and assess high-latitude ozone loss. (0Y22) | Green<br>Increase understanding of the dynamics of atmospheric composition by developing, analyzing, and documenting multi-year data sets and meeting at least 4 of 5 performance indicators in this research area. (1Y9) |
| Yellow<br>TERRA will map aerosol formation, distribution and sinks over the land and oceans. (9Y10) | Green<br>Provide for the continuation of the long-term, precise measurement of the total solar irradiance with the launch of EOS ACRIM. (0Y15) | |
| Yellow<br>The TERRA instrument will achieve a 40-percent reduction in the uncertainty in Earth's radiation balance (that is improved angular models leading to an estimated error reduction in regional-scale monthly average net radiation of about 50 percent. (9Y11) | Green<br>Acquire, through a Radarsat repeat of Antarctic Mapping Mission conducted in Sept.-Oct. 1997, a second set of high-resolution radar data over all of Antarctica for comparison with baseline data set acquired in 1997, to identify changes on the ice sheet. (0Y16) | |
| | Green<br>Publish the first detailed estimates of thickening/thinning rates for all major ice drainage basins of Greenland ice sheet derived from repeated airborne laser-altimetry surveys. Measures represent the baseline data set to compare with early GLAS data (July 2001 launch). (OY17) | |
| | Green<br>Initiate a program of airborne mapping of layers within the Greenland ice sheet to decipher the impact of past climate variation of polar regions. (0Y18) | |

Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Increase understanding of the Earth's surface and how it is transformed and how such information can be used to predict future changes by meeting at least 4 of 5 performance indicators. (2Y9) | Increase understanding of the Earth's surface and how it is transformed and how such information can be used to predict future changes. Next set of indicators to measure progress toward answering this question will be given in the FY05 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y9) | |
| Green<br>Increase understanding of change occurring in the mass of the Earth's ice cover by meeting at least 3 of 4 performance indicators. (2Y5) | Increase understanding of change occurring in the mass of the Earth's ice cover by meeting at least 3 of 4 performance indicators. (3Y5) | |
| Green<br>Increase understanding of the effects of clouds and surface hydrologic processes on climate change by meeting at least 4 of 5 performance indicators. (2Y10) | Increase understanding of the effects of clouds and surface hydrologic processes on climate change. Next set of indicators to measure progress toward answering this question will be given in the FY04 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y10) | |
| Yellow<br>Increase understanding of stratospheric ozone changes, as the abundance of ozone-destroying chemicals decreases and new substitutes increases by meeting 2 of 2 performance indicators. (2Y4) | Increase understanding of stratospheric ozone changes, as the abundance of ozone-destroying chemicals decreases and new substitutes increases by meeting 2 of 2 performance indicators. (3Y4) | |
| Green<br>Increase understanding of global sea level and how it is affected by climate change by meeting at least 2 of 3 performance indicators. (2Y14) | Increase understanding of global sea level and how it is affected by climate change. (3Y14) | |
| Green<br>Increase understanding of the extent that long-term climate trends can be assessed or predicted by meeting at least 4 of 5 performance indicators. (2Y21) | Increase understanding of the extent that long-term climate trends can be assessed or predicted. Next set of indicators to measure progress toward answering this question will be given in the FY05 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y21) | |
| | Increase understanding of extent that future concentrations of carbon dioxide and methane and impacts on climate can be predicted. Next set of indicators to measure progress toward answering this question will be given in the FY05 plan. Last set of indicators and associated progress was presented in FY02 performance plan. An assessment of progress toward answering this question will be published in the FY03 report. (3Y23) | |
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Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>Complete initiation of the full Southern Hemisphere Additional Ozonesonde network to obtain the first-ever climatology of upper tropospheric ozone in the tropics. (9Y14) | Green<br>Complete the analysis and publication of the PEM-Tropics-B field experiment. (0Y23) | Green<br>Explain the dynamics of atmospheric chemistry by building improved models and prediction capabilities and meeting at least 2 of 3 performance indicators in this research area. (1Y10) |
| Yellow<br>With data from other atmospheric ozone programs, continue the detailed multi-aircraft study of troposphere chemistry over the tropical Pacific Ocean, especially the contribution of long-range transport of air from South America and Africa to unpolluted areas. Complete the field measurements phase of PEM-Tropics-B (rainy season) with an improved payload that has resulted from an initiative to develop a smaller, lighter payload with equal or better performance than PEM-Tropics-A (dry season). Results will be fully analyzed and published. (9Y15) | Green<br>Complete the Troposphere Chemistry aircraft instrument size and weight reductions (by ~40%) initiative. (0Y24) | |
| Yellow<br>Use SAGE III to improve the collection and analysis of measurements provided by SAGE II, and add: nitrogen trioxide and chlorine dioxide measures; additional wavelength sampling to directly measure and retrieve aerosols throughout the troposphere; and, higher spectral resolution. (9Y13) | Green<br>Complete the planning for major new 2001 airborne/unmanned aerospace vehicle mission that will use a smaller Troposphere Chemistry aircraft instrument. (0Y25) | |
| Yellow<br>With data from other atmospheric ozone programs, measure surface levels of chlorine- and bromine-containing chemical compounds addressed in the Montreal Protocol to document decreasing concentrations of regulated compounds and increasing concentrations of replacement compounds. Analyses will be provided to researchers supporting the WMO assessment process. (9Y16) | Green<br>Continue to improve the design and sophistication of a global climate system model, including use of higher resolution, to make it a state-of-the-art climate system model for projecting the climatic consequences at the regional level. Improvement will be manifested in increased resolution from added computing power and better numerical representations. (0Y20) | |
| Green<br>Make significant contribution to World Meteorological Organization (WMO) Ozone Assessment by providing a lead chapter author and most of the global-scale data. (9Y26) | Green<br>Sponsor two regional national assessment studies of environmental variations and natural resources vulnerability. (0Y48) | |
| Green<br>Contribute model results of climate affects of measured aircraft emissions and provide report to IPCC assessment report. (9Y24) | Green<br>Complete the contribution to the First National Assessment of the Potential Consequences of Climate Variability and Change: provide climate scenario information, support the national synthesis, conduct several regional U.S. analyses, and provide supporting research for sector analyses. Provide information to the U.S. National Assessment Coordination Office. (0Y5) | |
| Green<br>Provide lead chapter author and most of the global-scale data and contributing researchers to the IPCC Assessment Report, sponsored by the United Nations Environment Programme and WMO. (9Y27) | Green<br>Provide the first global, regional and country-by country forest cover inventory in support of national and international needs research, operational and policy communities. Publish and provide to IPCC and the International Geosphere-Biosphere Programme for their 2000 assessment report. (0Y8) | |
| Green<br>Make significant contributions to US. Regional/national assessments in partnership with U.S. Global Change Research Program agencies. (9Y25) | Yellow<br>Conduct the first regional international assessment in South Africa: quantify the effects of climate variability and management practices on the environment, publish in open literature, and provide analyses to IPCC for their 2000 assessment. (0Y6) | |

Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Increase understanding of trends in atmospheric constituents and solar radiation and the role they play in driving global climate by meeting at least 3 of 4 performance indicators. (2Y7) | Increase understanding of trends in atmospheric constituents and solar radiation and the role they play in driving global climate by meeting at least 4 of 5 performance indicators. (3Y7) | |
| Green<br>Increase understanding of stratospheric trace constituents and how respond to change in climate and atmospheric composition by meeting 2 of 2 performance indicators. (2Y13) | Increase understanding of stratospheric trace constituents and how respond to change in climate and atmospheric composition. (3Y13) | |
| Green<br>Increase understanding of the effects of regional pollution on the global atmosphere, and the effects of global chemical and climate changes on regional air quality by meeting at least 4 of 5 performance indicators. (2Y15) | Increase understanding of the effects of regional pollution on the global atmosphere, and the effects of global chemical and climate changes on regional air quality by meeting at least 4 of 5 performance indicators. (3Y15) | |
| Green<br>Increase understanding of the extent that future atmospheric chemical impacts on ozone and climate can be predicted by meeting at least 2 of 3 performance indicators. (2Y22) | Increase understanding of the extent that future atmospheric chemical impacts on ozone and climate can be predicted by meeting at least 2 of 3 performance indicators. (3Y22) | |
| Green<br>Safely operate airborne platforms to gather remote and in situ earth science data for process and calibration/validation studies. (2Y31) | Safely operate airborne platforms to gather remote and in situ earth science data for process and calibration/validation studies. (3Y32) | |
| Red<br>Develop hardware/software tools to demonstrate high-end computational modeling to further our understanding and ability to predict the dynamic interaction of physical, chemical and biological processes affecting the earth. (2Y26) | Develop hardware/software tools to demonstrate high-end computational modeling to further our understanding and ability to predict the dynamic interaction of physical, chemical and biological processes affecting the earth. Success will equate to meeting 2 of 3 performance indicators. (3Y27) | |
| Red<br>Develop baseline suite of multidisciplinary models and computational tools leading to scalable global climate simulations. (2Y27) | Develop baseline suite of multidisciplinary models and computational tools leading to scalable global climate simulations. (3Y28) | |
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Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>The Enterprise will successfully launch three spacecraft within 10% of budget on average. (9Y35) | Green<br>Launch three spacecraft and deliver two instruments for international launches within 10% of budget on average. (0Y36) | Yellow<br>Successfully develop, have ready for launch, and operate instruments on a least two spacecraft within 10 percent of their schedules and budget to enable Earth Science research and applications goals and objectives. (1Y1) |
| Blue<br>Make available data on prediction, land surface, and climate to users within 5 days. (9Y17) | Blue<br>EOSDIS make available data on prediction, land surface, and climate to users within five days. (0Y26) | Blue<br>Successfully disseminate Earth Science data to enable our science research and applications goals and objectives by meeting all performance indicators in this research area. (1Y2) |
| Green<br>Annually advance at least 25% of funded instrument technology developments one TRL. (9Y30) | Blue<br>Advance at least 25% of funded instrument technology development one TRL to enable future science missions and reduce their total cost. (0Y35) | Blue<br>Achieve success with timely development and infusion of technologies. Enable future science missions by increasing technology readiness for mission concepts to reduce their total cost. Do this by meeting at least 3 of 4 performance indicators for this advanced technology area. (1Y13) |
| Blue<br>Increase the volume of data archived by 10% compared to FY97 (target = 139 terabytes). Goddard has been collecting trend data since FY94. (9Y18) | Blue<br>EOSDIS will double the volume of data archived compared to FY98. (0Y27) | |
| Blue<br>Increase the number of distinct customers by 20% compared to FY97 (target = 839,000). Goddard has been collecting trend data since FY94. (9Y19) | Blue<br>EOSDIS will increase the number of distinct customers by 20% compared to FY98. (0Y28) | |
| Blue<br>Increase products delivered from the DAACs by 10% compared to FY97 (target = 3.8 million). Goddard has been collecting trend data since FY94.(9Y20) | Blue<br>EOSDIS will increase products delivered from the DAACs by 10% compared to FY98. (0Y29) | |
| Green<br>Demonstrate a new capability to double the calibration quality for moderate-resolution land imagery. (9Y28) | Green<br>Achieve a 50% reduction in mass for future land imaging instruments. (0Y33) | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| | | Green<br>Increase public understanding of Earth system science through formal and informal education by meeting at least 3 of 4 performance targets in this area. (1Y18) |

Theme: Earth System Science (ESS)

Objective 1.1: Understand how Earth is changing, better predict change, and understand the consequences for life on Earth.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Successfully develop, have ready for launch, and operate instruments on at least two spacecraft to enable Earth Science research and applications goals and objectives. (2Y29) | Successfully develop one spacecraft and have ready for launch. Operate instruments on orbiting spacecraft to enable Earth Science research and applications goals and objectives. (3Y30) | |
| Blue<br>Successfully disseminate Earth Science data to enable our science research and applications goals and objectives. Success will equate to meeting 4 of 5 performance indicators. (2Y30) | Successfully disseminate Earth Science data to enable our science research and applications goals and objectives. Success will equate to meeting 4 of 5 performance indicators. (3Y31) | |
| Green<br>Successfully develop and infuse technologies that will enable future science measurements, and/or improve performance and reduce the cost of existing measurements. Increase the readiness of technologies under development, advancing them to a maturity level where they can be infused into new missions with shorter development cycles. (2Y25) | Successfully develop and infuse technologies that will enable future science measurements, and/or improve performance and reduce the cost of existing measurements. Increase the readiness of technologies under development, retiring risks and advancing them to a maturity level where they can be infused into new missions with shorter development cycles. Success will equate to meeting 3 of 4 performance indicators. (3Y26) | |
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Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Share NASA's discoveries in Earth science with the public to enhance understanding of science and technology. (2Y24) | Share the excitement of NASA's scientific discoveries and the practical benefits of earth science to the public in promoting understanding of science and technology in service to society. Success will equate to meeting 3 of 4 performance targets. (3Y25) | |

Theme: Earth Science Applications (ESA)

Objective 1.2: Expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology.

| 1999 | 2000 | 2001 |
|---|---|---|
| Blue<br>Establish at least five Regional Earth Science Applications Centers (RESACs). (9Y31) | Yellow<br>At least one of seven Regional Earth Science Applications Center (RESAC) becomes self-sustaining. Continue funding for the remaining centers. (0Y41) | Green<br>Provide regional decision-makers with scientific and applications products/tools by meeting at least 7 of 8 performance indicators for this applications research area. (1Y14) |
| Blue<br>Complete solicitation for seven co-operative agreements with State and local governments in areas of land use planning, land capability analysis, critical areas management, and water resource management. (9Y33) | Green<br>Develop two new validated commercial information products as a result of verification and validation partnerships with industry. (0Y46) | Green<br>Improve access to and understanding of remotely sensed data and processing technology by meeting 3 of 3 performance indicators in this area. (1Y15) |
| Blue<br>Establish at least 75 commercial partnerships in "value-added" remote sensing product development; an increase from 37 over FY97. (9Y34) | Yellow<br>Focus EOCAP joint commercial applications research to develop 20 new market commercial products (e.g., oil spill containment software by EarthSat and map sheets products by ERDAS, Inc.). (0Y44) | Green<br>Stimulate the development of a robust commercial remote sensing industry by meeting at least 4 of 5 performance indicators in this area. (1Y16) |
| Blue<br>Establish at least eight new projects, with USDA, in the areas of vegetation mapping and monitoring, risk and damage assessment, resources management and precision agriculture. (9Y32) | Green<br>Implement at least five joint applications research projects/partnerships with State and local governments in remote –sensing applications. (0Y43) | Green<br>Increase efficiencies in food and fiber production with the aid of remote sensing by meeting the performance indicator in this area. (1Y17) |
| Green<br>Annually transfer at least one technology development to a commercial entity for operational use. (9Y29) | Green<br>Transfer at least one technology development to a commercial entity for operational use. (0Y34) | |
| | Green<br>Provide three commercial sources of science data (from the data buy) for global change research and applications. (0Y45) | |

Objective 3.1: Enhance the Nation's security through partnerships with DoD, DHS, and other U.S. or international government agencies.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Green<br>Demonstrate the utility of spaceborne data for floodplain mapping with the Federal Emergency Management Agency. (0Y39) | |
| | Green<br>Develop an automatic volcano cloud/ash detection algorithm employing EOS data sets for use by the Federal Aviation Administration. (0Y40) | |

Theme: Earth Science Applications (ESA)

Objective 1.2: Expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Provide regional decision-makers with scientific and applications products and tools. (2Y23) | Provide regional decision-makers with scientific and applications products and tools by meeting 3 of 3 performance indicators. (3Y24) | |
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Objective 3.1: Enhance the Nation's security through partnerships with DoD, DHS, and other U.S. or international government agencies.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Collaborate with other Federal and international agencies in developing and implementing better methods for using remotely sensed observations. (2Y28) | Collaborate with other domestic and international agencies in developing and implementing better methods for using remotely sensed observations. Success will equate to meeting 4 of 5 performance indicators. (3Y29) | |
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Theme: Biological Sciences Research (BSR)

Objective 4.1: Determine how fundamental biological processes of life respond to gravity and space environments.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Support an expanded research program of approximately 800 investigations, an increase of ~9% over FY 1998. (9H1) | Green<br>Support an expanded research program of approximately 935 investigations, an increase of ~17% over FY 1999. Publish 100 percent of science research progress in the annual OLMSA Life Sciences and Microgravity Research Program Task Bibliographies and make this available on the Internet. (0H1) | Green<br>Support an expanded, productive research community to include 975 investigations annually by 2001. (1H3) |
| Green<br>Publish a report of comparison of 3 different biological models to understand the influence of gravity on the nervous system. (H8) Document Mir data lessons learned to facilitate ISS research in fundamental biology and regenerative life support. (9H5) | Yellow<br>Complete preparations for the initial ISS research capability through the integration of the first rack of the Human Research Facility (HRS-1), five EXPRESS racks with small payload research and the Microgravity Science Glovebox (MSG). (0H20) | Green<br>Successfully complete the majority of the planned research activities in support of initiation of on-orbit research opportunities. (1H13) |
| Green<br>Publish 90% of FY 1998 science research progress in the annual OLMSA Life Sciences and Microgravity Research Program Task Bibliographies and make it available on the Internet. (9H2) | | |
| Green<br>Publish a report defining the time course adaptations in the balance system to altered gravitational environments. (9H6) | | |
| Green<br>Establish a National Center for Evolutionary Biology with participation of at least 5 research institutions and engaging at least 20 investigators. (9H3) | | |

Objective 4.2: Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation.

| 1999 | 2000 | 2001 |
|---|---|---|
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Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| | | |

Theme: Biological Sciences Research (BSR)

Objective 4.1: Determine how fundamental biological processes of life respond to gravity and space environments.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" or "blue" by making progress in the following research focus area: Understand the role of gravity in biological processes at all levels of biological complexity. (2B9) | Earn external review rating of "green" or "blue" by making progress in the following research focus area: Understand the role of gravity and the space environment in biological processes at all levels of biological complexity. (3B7) | |
| Green<br>In close coordination with the research community, allocate flight resources to achieve a balanced and productive research program. (2B10) | In close coordination with the research community, allocate flight resources and develop facilities to achieve a balanced and productive research program. (3B8) | |
| Green<br>Demonstrate progress toward ISS research hardware development. (2H13) | Demonstrate progress toward ISS research hardware development. (3H13) | |
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Objective 4.2: Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation.

| 2002 | 2003 | 2004 |
|---|---|---|
| | Earn external review rating of "green" or "blue" by making progress in the following research focus areas as described in the associated indicators: Advance the scientific understanding of complex biological and physical systems. (3B3) | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Work with media outlets and public institutions to disseminate OBPR information to wide audiences. (2B14) | Work with media outlets and public institutions to disseminate BPRE information to wide audiences. (3B12) | |

Theme: Biological Sciences Research (BSR)

Objective 9.1: Understand human physiological reactions to reduced gravity and develop countermeasures to assure survival of humans traveling far from Earth.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Complete the development of countermeasure research protocols, and begin testing a minimum of three countermeasures intended to protect bone, muscle, and physical work capacity. (9H25) | Green<br>Develop medical protocols and test the capability of the Crew Health Care System as integrated in the ISS U.S. Laboratory. (0H26) | Green<br>Develop new biomedical and technological capabilities to facilitate living and working in space and safe return to Earth. (1H17) |
| Green<br>Document Mir radiation research data to facilitate ISS EVA planning. (9H10) | Green<br>Complete data reduction from the STS-95 Research Module mission. Begin to explore new cooperative efforts with NIH in the area of aging and transfer space-derived research for industry development of a new drug to treat Chagas' disease. (0H9) | Green<br>Continue initial research on the International Space Station by conducting 6 to 10 investigations. (1H5) |
| Green<br>Document Mir data lessons learned to facilitate ISS biomedical and countermeasure research. (9H7) | Green<br>Evaluate and develop for flight testing a minimum of three major research protocols intended to protect bone, muscle, and physical work capacity and prepare a minimum of 10 biomedical research experiments, (utilizing the capabilities of the STS and ISS HRF) to study human responses to the gravitational environment. (0H25) | |

Objective 9.2: Develop new human support systems and solutions to low gravity technological challenges to allow the next generation of explorers to go beyond low Earth orbit.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Perform component and subsystem ground tests without humans in the loop to demonstrate advanced technologies, including biological water processor, and flight test a new electronic “nose” sensor on a chip. (9H29) | Green<br>Complete the first phase (including outfitting three test chambers) of the Advanced Life Support System Integration Test Bed facility that will provide the capability to conduct a series of long duration, human-in-the-loop, advanced technology tests over the next six years. Demonstrate key technology capabilities for human support, such as advanced techniques for water processing using microbes, waste processing using biological degradation and fluidized bed incineration, a no-expendable trace gas contaminant control system, solid waste processing, and flight test of a miniature mass spectrometer. (0H31) | Green<br>Demonstrate, in ground test, at least one technology that could reduce up to 25% of life support logistics over ISS baseline and release report of progress for review on the Internet. (1H18) |
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Theme: Biological Sciences Research (BSR)

Objective 9.1: Understand human physiological reactions to reduced gravity and develop countermeasures to assure survival of humans traveling far from Earth.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of “green” or “blue” by making progress in the following research focus areas as described in the associated indicators: Identify and test biomedical countermeasures that will make space flight safer for humans, and Identify and test technologies that will enhance human performance in space flight. (2B1) | Earn external review rating of “green” or “blue” by making progress in the following research focus areas: Identify and test biomedical countermeasures that will make space flight safer for humans, and Identify and test technologies that will enhance human performance in space flight. (3B1) | |
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Objective 9.2: Develop new human support systems and solutions to low gravity technological challenges to allow the next generation of explorers to go beyond low Earth orbit.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of “green” or “blue” by making progress in the following research focus area: Identify and test new technologies to improve life support systems for spacecraft. (2B2) | Earn external review rating of “green” or “blue” by making progress in the following research focus area: Identify and test new technologies to improve life support systems for spacecraft. (3B2) | |
| Green<br>Earn external review rating of "green" or "blue" by making progress in the following research focus areas: Develop and test cutting-edge methods and instruments to support molecular-level diagnostics for physiological and chemical process monitoring and identify and study changes in biological and physical mechanisms that might be exploited for ultimate application to improving the health and safety of space travelers. (2B3) | | |

Theme: Physical Sciences Research (PSR)

Objective 3.3: Resolve scientific issues in the low gravity environment of space that enrich life on Earth by leading to better design tools in energy, materials, medical, and communication technologies.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Support an expanded research program of approximately 800 investigations, an increase of ~9% over FY 1998. (9H1) | Green<br>Support an expanded research program of approximately 935 investigations, an increase of ~17% over FY 1999. Publish 100 percent of science research progress in the annual OLMSA Life Sciences and Microgravity Research Program Task Bibliographies and make this available on the Internet. (0H1) | Green<br>Support an expanded, productive research community to include 975 investigations annually by 2001. (1H3) |
| Green<br>Use MSL-1 results to eliminate one of the three primary fluid flow regimes from consideration by casting engineers, and publish this result in peer reviewed literature. Casting engineers may use this information to improve metal casting processes in industry. (9H12) | Green<br>The NASA-Sponsored National Space Biomedical Research Institute will conduct an open symposium relaying the results of space-oriented research activities focusing on up to 10 ground-related applications with the participation of interested investigators; publish results in a conference proceedings report. (0H56) | Yellow<br>Conduct outstanding peer-reviewed and commercial research on STS-107 to advance knowledge in the fields of medicine, fundamental biology, biotechnology, fluid physics, materials processing and combustion. (1H4) |
| Green<br>Analyze Mir data to achieve a 3-year jump-start for cell culture and protein crystal growth research and document analyses & lessons learned. (9H9) | Yellow<br>Complete preparations for the initial ISS research capability through the integration of the first rack of the Human Research Facility (HRS-1), five EXPRESS racks with small payload research and the Microgravity Science Glovebox (MSG). (0H20) | Green<br>Successfully complete the majority of the planned research activities in support of initiation of on-orbit research opportunities. (1H13) |
| Green<br>Improve predictive capabilities of soot processes by at least 50% through analysis of MSL-1 data; publish results in peer-reviewed open literature. (9H11) | | |
| Green<br>Publish 90% of FY 1998 science research progress in the annual OLMSA Life Sciences and Microgravity Research Program Task Bibliographies and make it available on the Internet. (9H2) | | |
| Green<br>Conduct at least two demonstrations of the applicability of the “Telemedicine Instrumentation Pack” for health care delivery to remote areas. (9H39) | | |
| Green<br>Demonstrate the application of laser light scattering technology for early detection of eye-tissue damage from Diabetes; publish results in peer-reviewed open literature. (9H40) | | |

Objective 4.2: Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Use data obtained by fluid physics experiments on suspensions of colloidal particles on MSL-1 to answer fundamental questions in condensed matter physics regarding the transition between liquid and solid phases and publish data on the transition from liquids to solids and the results in peer-reviewed open literature. (9H13) | Red<br>Using suborbital rockets, complete one combustion experiment on the flame spread of liquid fuels to better control Earth/space-based fire hazards, and conduct one investigation to test theories of fundamental physics properties and physical laws of fluids to provide key data for earth and space-based processing materials; report the results. (0H11) | Green<br>Continue initial research on the International Space Station by conducting 6 to 10 investigations. (1H5) |
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Theme: Physical Sciences Research (PSR)

Objective 3.3: Resolve scientific issues in the low gravity environment of space that enrich life on Earth by leading to better design tools in energy, materials, medical, and communication technologies.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>In close coordination with the research community, allocate flight resources to achieve a balanced and productive research program. (2B10) | In close coordination with the research community, allocate flight resources and develop facilities to achieve a balanced and productive research program. (3B8) | |
| Blue<br>Earn external review rating of "green" or "blue" by making progress in the following research focus areas as described in the associated indicators: Elucidate the detailed physical and chemical processes associated with macromolecular crystal growth and cellular assembling processes in tissue cultures. (2B5) | Earn external review rating of "green" or "blue" by making progress in the following research focus areas as described in the associated indicators: Elucidate the detailed physical and chemical processes associated with macromolecular crystal growth and cellular assembling processes in tissue cultures. (3B4) | |
| Green<br>Earn external review rating of "green" or "blue" by making progress in the following research focus area: Investigate fundamental and unresolved issues in fluid physics, and materials and combustion sciences using gravity as a theoretical and experimental revealing tool. (2B8) | Earn external review rating of "green" or "blue" by making progress in the following research focus area: Investigate fundamental and unresolved issues in fluid physics, and materials and combustion science using gravity as a theoretical and experimental revealing tool. (3B6) | |
| Green<br>Demonstrate progress toward ISS research hardware development. (2H13) | Demonstrate progress toward ISS research hardware development. (3H13) | |
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Objective 4.2: Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" or "blue" by making progress in the following research focus areas as described in the associated indicators: Advance the scientific understanding of complex biological and physical systems. (2B4) | Earn external review rating of "green" or "blue" by making progress in the following research focus areas as described in the associated indicators: Advance the scientific understanding of complex biological and physical systems. (3B3) | |
| Green<br>Earn external review rating of "green" or "blue" by making progress in the following research focus areas as described in the associated indicators: Initiate a focused research program specifically integrating fluid physics and materials science with fundamental biology. (2B6) | In close coordination with the research community, allocate flight resources and develop facilities to achieve a balanced and productive research program. (3B8) | |

Theme: Physical Sciences Research (PSR)

Objective 4.2: Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation.

| 1999 | 2000 | 2001 |
|---|---|---|
| | | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| | | |

Objective 9.2: Develop new human support systems and solutions to low gravity technological challenges to allow the next generation of explorers to go beyond low Earth orbit.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Initiate a collaborative program to design and develop instruments. (9H26) | Green<br>Complete Radiation Research Instrument for Mars 2001 mission to study transit, orbital, and surface radiation effects and conduct three workshops to define and prioritize research tasks in subjects such as radiation shielding materials, in situ resource utilization, and fluids management and heat transfer technology. Complete the science definition of granular flows, flight, and dust management experiments to begin gathering research data to alleviate critical problems of dust buildup, habitat foundation engineering, and rover performance during planetary exploration. (0H33) | N/A<br>Complete testing and delivery for spacecraft integration of experiments for the Mars Surveyor Program 2001 missions. (1H1) |
| | | Green<br>Initiate implementation of the Bioastronautics Initiative by beginning a NASA /NCI collaboration and conducting a peer review of NSBRI to assess expansion. (1H31) |

Theme: Physical Sciences Research (PSR)

Objective 4.2: Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of “green” or “blue” by making progress in the following research focus area: Investigate fundamental and unresolved issues in condensed matter physics and atomic physics, and carry out atomic clock development for space-based utilization. (2B7) | Earn external review rating of “green” or “blue” by making progress in the following research focus area: Investigate fundamental and unresolved issues in condensed matter physics and atomic physics, and carry out atomic clock development for space-based utilization. (3B5) | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| See BSR Theme for Common Enterprise Goals | See BSR Theme for Common Enterprise Goals | |

Objective 9.2: Develop new human support systems and solutions to low gravity technological challenges to allow the next generation of explorers to go beyond low Earth orbit.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Earn external review rating of "green" or "blue" by making progress in the following research focus areas: Develop and test cutting-edge methods and instruments to support molecular-level diagnostics for physiological and chemical process monitoring and identify and study changes in biological and physical mechanisms that might be exploited for ultimate application to improving the health and safety of space travelers. (2B3) | | |
| | | |

Theme: Research Partnerships and Flight Support (RPFS)

Objective 3.2: Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Support an expanded research program of approximately 800 investigations, an increase of ~9% over FY 1998. (9H1) | Green<br>Support an expanded research program of approximately 935 investigations, an increase of ~17% over FY 1999. Publish 100 percent of science research progress in the annual OLMSA Life Sciences and Microgravity Research Program Task Bibliographies and make this available on the Internet. (0H1) | Green<br>Support an expanded, productive research community to include 975 investigations annually by 2001. (1H3) |
| Green<br>Publish 90% of FY 1998 science research progress in the annual OLMSA Life Sciences and Microgravity Research Program Task Bibliographies and make it available on the Internet. (9H2) | Green<br>Establish up to 2 new Commercial Space Centers. (0H47) | Green<br>Foster commercial endeavors by reviewing and/or implementing new policies and plans such as the Space Station resource pricing policy and intellectual property rights policy. Ensure that Space Station resources allocated to commercial research are utilized by commercial partners to develop commercial products and improve industrial processes. (1H23) |
| Green<br>Increase non-NASA investment (cash and in-kind) in space research from $35M in FY96 to at least $50M in FY 1999, a 40% increase. (9H35) | Green<br>Foster the establishment of a telemedicine hub in Western Europe. NASA and CNES will develop an international telemedicine program to incorporate and connect existing medical informatics capabilities into a user-friendly commercial electronic telemedicine hub and apply lessons learned to human space flight. (0H49) | Blue<br>Establish at least ten new, active industrial partnerships to research tomorrow's space products and improve industrial processes through NASA's Commercial Space Centers, and find opportunities for space experiments. (1H22) |
| Yellow<br>Complete the development of a commercialization plan for the ISS and Space Shuttle in partnership with the research and commercial investment communities and define and recommend policy and legislative changes. (9H30) | Green<br>Utilize at least 30% of Space Shuttle and ISS FY 2000 capabilities for commercial investigations, per the U.S. Partner Utilization Plan. (0H46) | |
| Green<br>Establish a new food technology Commercial Space Center. (9H36) | | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| | | |

Theme: Research Partnerships and Flight Support (RPFS)

Objective 3.2: Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>In close coordination with the research community, allocate flight resources to achieve a balanced and productive research program. (2B10) | In close coordination with the research community, allocate flight resources and develop facilities to achieve a balanced and productive research program. (3B8) | |
| Green<br>Engage the commercial community and encourage non-NASA investment in commercial space research by meeting at least three of four performance indicators. (2B11) | Engage the commercial community and encourage non-NASA investment in commercial space research by meeting at least two of three performance indicators. (3B9) | |
| Green<br>Highlight ISS-based commercial space research at business meetings and conferences. (2B12) | Highlight ISS-based commercial space research at business meetings and conferences. (3B10) | |
| Green<br>Demonstrate progress toward ISS research hardware development. (2H13) | | |
| | | |

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| See BSR Theme for Common Enterprise Goals | See BSR Theme for Common Enterprise Goals | |

Theme: Aeronautics Technology (AT)

## Objective 2.1: Decrease the aircraft fatal accident rate, reduce the vulnerability of the air transportation system to hostile threats, and mitigate the consequences of accidents and hostile acts.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>For the aviation safety areas of Controlled Flight into Terrain, runway incursion, and loss of control, identify the contributing causes to be addressed, potential solutions using current capabilities, and gaps that require technology solutions. (9R5) | Yellow<br>Flight demonstrate a conceptual aircraft flight deck integrated with evolving ground-based runway incursion avoidance technologies installed at a major airport. (0R3) | Yellow<br>NASA's research stresses aviation system monitoring and modeling, accident prevention and accident mitigation. The performance target is to complete 75% of the conceptual designs of systems for preventing and mitigating accidents, and to demonstrate tools for accident analysis and risk assessment. (1R1) |
| Yellow<br>Characterize the Super-cooled Large Droplets (SLD) icing environment, determine its effects on aircraft performance, and acquire and publish data to improve SLD forecasting confidence. (9R2) | | |

## Objective 2.2: Protect local and global environmental quality by reducing aircraft noise and emissions.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Demonstrate an advanced turbine-engine combustor that will achieve up to a 50 percent reduction of Oxides of Nitrogen emissions based on 1996 International Civil Aviation Organization (ICAO) standards. (9R1) | Blue<br>Demonstrate, in a laboratory combustion experiment, an advanced turbine-engine combustor concept that will achieve up to a 70% reduction of oxides of nitrogen emissions based on the 1996 ICAO standard. (0R1) | Green<br>NASA's research stresses engine technology to reduce the emissions of oxides of nitrogen and carbon dioxide. The performance target is to complete one system level technology benefit assessment, one component concept selection and one new material system. (1R2) |
| | Green<br>Validate the technologies to reduce noise for large commercial transports by at least 7 decibels relative to 1992 production technology. (0R2) | Yellow<br>NASA's research has stressed reducing noise in the areas of engines, nacelles, engine/airframe integration, aircraft interiors and flight procedures. The performance target is completion of NASA's research in noise reduction through large scale demonstration of a 2-5 decibel reduction in aircraft noise based on 1997 production technology, and initial assessments of concepts offering additional reduction. (1R3) |

## Objective 2.3: Enable more people and goods to travel faster and farther, with fewer delays.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>Conclude pre-flight ground testing of the general aviation piston and turbofan engines. (9R8) | Green<br>Conclude the Terminal Area Productivity project by field demonstrations of the complete suite of technologies and procedures that enable a 12% increase over 1994 non-visual operations for single-runway throughput. (0R4) | Green<br>NASA's research stresses operations systems for safe, efficient air traffic management and new aircraft configurations for high productivity utilization of existing runways. The performance target is to complete the civil tiltrotor project by validating databases for contingency power, flight paths, and noise reduction, as well as complete at least one demonstration of an airspace management decision support tool. (1R4) |

Theme: Aeronautics Technology (AT)

Objective 2.1: Decrease the aircraft fatal accident rate, reduce the vulnerability of the air transportation system to hostile threats, and mitigate the consequences of accidents and hostile acts.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Complete the interim progress assessment utilizing the technology products of the Aviation Safety program as well as the related Aerospace Base R&T efforts and transfer to industry an icing CD-ROM, conduct at least one demonstration of an aviation safety related subsystem, and develop at least two-thirds of the planned models and simulations. (2R1) | Demonstrate progress in maturing, through flight tests and/or simulations, the critical technologies that will be necessary to meet the aviation safety objective. These tests and simulations are critical steps in the development of a suite of technologies that when completely developed and implemented by the customer, will provide a minimum of 50 percent reduction in fatal accident rate. (3R1) | |
| | | |

Objective 2.2: Protect local and global environmental quality by reducing aircraft noise and emissions.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>NASA's research stresses engine technology to reduce the emissions of oxides of nitrogen (NOx) and carbon dioxide (CO2). The annual performance goal is to complete sector testing of a low-NOx combustor concept capable of a 70% reduction in NOx from the 1996 International Civil Aviation Organization (ICAO) baseline, and demonstrate at least one additional concept for the reduction of other emittants. (2R2) | Complete combustor sector test for concepts capable of achieving the 70% NOx goal by 2007 and select the most promising approaches leading to full annular rig testing for large and regional jet engine applications. Complete an Interim Technology Assessment of the aggregate potential benefits from the engine and airframe technologies to reduce emissions. The results from this analysis will provide a benchmark for measuring overall progress, and guide future investment decisions. (3R2) | |
| Green<br>NASA's research stresses reducing noise in the areas of engines, nacelles, engine-airframe integration, aircraft interiors and flight procedures. The annual performance goal is to assess and establish the strongest candidate technologies to meet the 10 decibel reduction in community noise. (2R3) | Complete development of initial physics-based prediction models to guide the development potential noise reduction technology concepts. Complete an interim technology assessment of the potential benefits for these concepts to reduce noise emissions. The results from this analysis will provide a benchmark for measuring overall progress, and guide future investment decisions. (3R3) | |

Objective 2.3: Enable more people and goods to travel faster and farther, with fewer delays.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>NASA's research stresses operations systems for safe, efficient air traffic management and new aircraft configurations for high productivity utilization of existing runways. The annual performance goal is to develop a decision support tool, and define concepts for future aviation systems. (2R4) | Complete development, initial functionality and evaluate human factors for at least one decision support tool to enable achievement of the planned progress towards the goal of doubling the capacity of the National Airspace System in 10 years. Complete the initial build of a toolbox of state-of-the-art airspace models to enable the planned progress towards the 2022 Objective. (3R4) | |

Theme: Aeronautics Technology (AT)

Objective 2.3: Enable more people and goods to travel faster and farther, with fewer delays.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Produce a complete vehicle system configuration document that includes impact of technology validation efforts from 1990 through 1999. This document will support the evaluation of technology selection decisions for a future High Speed Civil Transport (HSCT). (9R6) | Yellow<br>Perform flight demonstrations of advanced general aviation piston and turbine engines at the annual Oshkosh air show. (0R7) | Yellow<br>NASA's research stresses operations systems for safe, efficient air traffic management and new aircraft configurations for high productivity utilization of existing runways. The performance target is to complete the Advanced General Aviation Transport Experiments project by validating transportation system concepts through flight test and publish design guidelines. (1R7) |

Objective 3.2: Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology.

| 1999 | 2000 | 2001 |
|---|---|---|
| | | Red<br>NASA's research stresses affordable flight demonstrations of revolutionary vehicle concepts (low-cost X-Planes) to accelerate technology advances in laboratory research, new design tools and advanced simulation. The performance target is to demonstrate two new concepts in flight and identify five new concepts for further examination. (1R9) |

Objective 10.5: Create novel aeronautics concepts and technology to support science missions and terrestrial and space applications.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Complete low altitude flights of an Remotely Piloted Aircraft (RPA) with a wingspan greater than 200 feet, suitable for flight to 100,000 feet in altitude once outfitted with high performance solar cells. (9R10) | Green<br>Demonstrate improved remotely piloted aircraft science mission capability by increasing operational deployment time from 3 weeks to 9 with minimum airfield provisions and unrestricted airspace.(Original) Demonstrate continuous over-the-horizon command and control capabilities of an RPA that would extend the operating range from 40 to 200 nautical miles.(Replacement) (0R11) | Red<br>NASA's research stresses affordable flight demonstrations of revolutionary vehicle concepts (low-cost X-Planes) to accelerate technology advances in laboratory research, new design tools and advanced simulation. The performance target is to demonstrate two new concepts in flight and identify five new concepts for further examination. (1R9) |
| Green<br>Conduct RPA flight demonstration to validate the capability for science missions of greater than 4 hours duration in remote deployments to areassuch as<br>the polar regions above 55,000 feet. (9R11) | Green<br>Complete NASA Solar Electric Propulsion Technology Application Readiness (NSTAR) Mission Profile (100% design life) ground testing for Deep Space-1 (concurrent, identical firing of an NSTAR engine in a vacuum chamber with the actual firing sequence of the in-flight propulsion system). (0R10) | |

Theme: Aeronautics Technology (AT)

Objective 2.3: Enable more people and goods to travel faster and farther, with fewer delays.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>NASA's research stresses aircraft technologies which enable the use of existing small community and neighborhood airports, without requiring control towers, radar installations, and more land use for added runway protection zones. The annual performance goal is to baseline, in partnership with the FAA, the system engineering documents for the Small Aircraft Transportation System concept. (2R5) | Select candidate technologies for experimental flight evaluation based on their impact on mobility. Mobility metrics will be measured by accessibility, doorstep-to-destination transit time, system and user costs, and related trip reliability and safety metrics. These flight experiments will evaluate individually, at the sub-system level, the impact of selected technologies on lowering required landing minimums and increasing the volume of operations at non-towered landing facilities in non-radar airspace during instrument meteorological conditions. (3R5) | |

Objective 3.2: Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology.

| 2002 | 2003 | 2004 |
|---|---|---|
| | | |

Objective 10.5: Create novel aeronautics concepts and technology to support science missions and terrestrial and space applications..

| 2002 | 2003 | 2004 |
|---|---|---|
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Theme: Education (EDU)

Objective 6.1: Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>For all new program activities initiated in FY 99, develop an education outreach plan, which includes and results in an educational product. This product shall be consistent with current educational standards and use program content to demonstrate. (9R21) | Blue<br>Continue the implementation of current education outreach plans and establish new plans for all new program activities initiated in FY 00. (0R16) | Green<br>Education Outreach: Continue the implementation of current education outreach plans, and establish new plans for all new program activities initiated in FY 2001. (1R13) |
| Blue<br>Maintain the participation level in Agency-wide educational programs at more than 1 million teachers and students. (9CK3) | Blue<br>Seek to maintain a level of participation involvement of approximately 3 million with teachers, faculty, and students in the education community. (0C1) | Green<br>Use NASA's ability to support meeting the Nation's education goals by meeting 3 of the 4 indicators for this target. (1CK4) |
| Blue<br>Establish an Aeronautics Education Laboratory in at least three new sites in the United States. (9R20) | Green<br>Successful achievement of at least seven of the following eight objectives will be made. (1) Each new Space Science mission will have a funded education and outreach program. (2) By the end of FY00, 10% of all Space Science research grants will have an associated education and outreach program under way. (3) Twenty-six states will have Enterprise-funded education or outreach programs planned or underway. (4) At least five research, mission development/ operations, or education programs will have been planned/undertaken in Historically Black Colleges and Universities, Hispanic Serving Institutions, or Tribal Colleges, with at least one project underway in each group. (5) At least three national and two regional educational or outreach conferences will be supported with a significant Space Science presence. (6) At least three exhibits or planetarium shows will be on display. (7) An online directory providing enhanced access to major Space Science-related products and programs will be operational by end of the fiscal year. (8) A comprehensive approach to assessing the effectiveness and impact of the Space Science education and outreach efforts will be under development, with a pilot test of the evaluation initiated. (OS67) | Green<br>Continue and expand the integration of education and enhanced public understanding of science with Enterprise research and flight mission programs. Meet no fewer than 75% of the eight performance objectives for education and public outreach. (1S9) |
| Green<br>Each new Space Science Enterprise mission initiated in FY 1999 will have a funded education and outreach program. (9S28) | | Green<br>Increase public understanding of Earth system science through formal and informal education by meeting at least 3 of 4 performance targets in this area. (1Y18) |
| | | |

Theme: Education (EDU)

Objective 6.1: Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Continue the implementation of current education outreach plans, and establish new plans for all new program activities initiated in FY 2002. (2R12) | To contribute toward maintaining a well-prepared workforce pipeline, all Enterprise program activities will establish and implement, or continue implementation of, an education outreach plan that results in an educational product. The product shall be consistent with the NASA Implementation Plan for Education and use program content to demonstrate or enhance the learning objectives. (3R16) | |
| Yellow<br>Using NASA's unique resources (mission, people, facilities) to support educational excellence for all, NASA supports the Nation's education goals by meeting 3 of the 4 indicators for this performance goal. (2CK4) | | |
| Blue<br>Earn external review rating of "green," on average, on making progress in the following focus areas: Incorporate a substantial, funded education and outreach program into every space science flight mission and research program; Increase the fraction of the space science community that contributes to a broad public understanding of science and is directly involved in education at the pre-college level; Establish strong and lasting partnerships between the space science and education communities; Develop a national network to identify high-leverage education and outreach opportunities and to support long-term partnerships; Provide ready access to the products of space science education and outreach programs; Promote the participation of underserved and underutilized groups in the space science program by providing new opportunities for minorities and minority universities to compete for and participate in space science missions, research, and education programs; Develop tools for evaluating the quality and impact of space science education and outreach programs. (2S12) | Earn external review rating of "green," on average, on making progress in the following focus areas: Incorporate a substantial, funded education and outreach program into every space science flight mission and research program; Increase the fraction of the space science community that contributes to a broad public understanding of science and is directly involved in education at the pre-college level; Establish strong and lasting partnerships between the space science and education communities; Develop a national network to identify high-leverage education and outreach opportunities and to support long-term partnerships; Provide ready access to the products of space science education and outreach programs; Promote the participation of underserved and underutilized groups in the space science program by providing new opportunities for minorities and minority universities to compete for and participate in space science missions, research, and education programs. (3S12) | |
| Green<br>Share NASA's discoveries in Earth science with the public to enhance understanding of science and technology. (2Y24) | Share the excitement of NASA's scientific discoveries and the practical benefits of earth science to the public in promoting understanding of science and technology in service to society. Success will equate to meeting 3 of 4 performance targets. (3Y25). | |
| Green<br>Initiate the development and implementation of a formal and systematic mechanism to integrate HEDS latest research knowledge into the K-12 and University classroom environment. (2H28) | Initiate the development and implementation of a formal and systematic mechanism to integrate HEDS latest research knowledge into the K-12 / University classroom environment. (3H23) | |

Theme: Education (EDU)

Objective 6.2: Support higher education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Award 50 new graduate student research grants and 20 early career postdoctoral fellowships in Earth Science. (9Y21) | Green<br>Award 50 new graduate student research grants and 20 early career fellowships in Earth Science. (0Y30) | Green<br>Support participation in HEDS research. (1H26) |
| | Red<br>The History Office will target high school students through the use of a History Day competition on "Science, Technology, and Invention." The contest is being conducted in concert with the History Day Organization, with co-sponsored teacher workshops at every NASA Center. (0C14) | |

Objective 6.3: Increase the number and diversity of students, teachers, faculty and researchers from underrepresented and underserved communities in NASA related STEM fields.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Expand the microgravity research program's World Wide Web-based digital image archive established in 1998 by 50%. (9H38) | Blue<br>Conduct at least 300 workshops to train teachers in use of ESE education products. (0Y31) | |
| Green<br>Conduct over 300 teacher workshops to train teachers in use of Earth Science Enterprise education products. (9Y22) | Yellow<br>Increase number of schools participating in GLOBE to 10,500, a 30% increase over FY99; increase participating countries to 77 (from 72). (0Y32) | |
| Green<br>Increase number of schools participating in GLOBE from to 8,000, from 5,900 in FY98, a 35-percent increase; increase participating countries from 70 in FY98 to 72. (9Y23) | | |
| Green<br>Increase the number of educators who participate annually in NEWEST/NEWMAST) to 500 from 400 in FY 98. (9CK1) | | |
| Green<br>Increase the number of students reached through the NEWEST/NEWMAST program to 42,000 students from 33,600 in FY 98. (9CK2) | | |
| Green<br>Initiate a curriculum development program, in partnership with the International Technology Education Association (ITEA), for gravity related educational modules for national distribution which meet the current National Science Teachers Association (NSTA) National Standards for Science for Grades K-12, and the ITEA National Standards for Technology Education to be published June 1999. (9H37) | | |
| Green<br>Account for no less than 25 percent of total contributions to the college textbook Astronomy: From the Earth to the Universe. (9S27) | | |

Theme: Education (EDU)

Objective 6.2: Support higher education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers.

| 2002 | 2003 | 2004 |
|---|---|---|
| | Engage and collaborate with research universities (1) for joint generation of new knowledge in HEDS related areas, (2) for the advancement of the HEDS mission and development of cutting edge technical capabilities, and (3) for ensuring a high quality future workforce. (3H24) | |
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Objective 6.3: Increase the number and diversity of students, teachers, faculty and researchers from underrepresented and underserved communities in NASA related STEM fields.

| 2002 | 2003 | 2004 |
|---|---|---|
| Blue<br>Provide information and educational materials to American teachers. (2B13) | Provide information and educational materials to American teachers. (3B11) | |
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Theme: International Space Station (ISS)

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
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Objective 8.4: Assure capabilities for world-class research on a laboratory in low Earth orbit.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Initiate full-scale Multi-Element Integration Testing (MEIT) for elements in the first four launch. (9H42) | Yellow<br>Deploy and activate the U.S. Laboratory Module to provide a permanent on orbit laboratory capability. (0H16) | Yellow<br>Successfully complete the majority of the ISS planned on-orbit activities such as delivery of mass to orbit and enhanced functionality. (1H11) |
| Green<br>Conduct physical integration of the Z1 Truss launch package and initiate MEIT. (9H44) | Yellow<br>Deploy and activate the Airlock to provide an ISS-based EVA capability. (0H18) | Green<br>Successfully complete the majority of the planned development schedules and milestones required to support the Multi-element Integration Testing. (1H10) |
| Green<br>Deliver the U.S. laboratory module to the launch site in preparation for MEIT. (9H43) | Yellow<br>Deploy and activate the Canadian-built Space Station Remote Manipulator System to provide an ISS-based remote manipulating capability for maintenance and assembly. (0H17) | N/A<br>Successfully complete no less than 85% of the planned Russian Program Assurance schedules and milestones required for the development of the Propulsion Module. (1H14) |
| Green<br>Deploy and activate the Russian-built Functional Cargo Block as the early propulsion and control module. (9H19) | Yellow<br>Deliver to orbit the first of three Italian-build Multi-Purpose Logistic Modules to provide a reusable capability for delivering payload and systems racks to orbit. (0H19) | N/A<br>Successfully complete no less than 75% of the planned crew return capability schedules. FY01 indicators will include accomplishment of program schedule milestones for Phase 1 development of a crew return vehicle (CRV) that could provide the U.S. crew return capability. (1H15) |

Theme: International Space Station (ISS)

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| See SFS Theme for Common Enterprise Goals | See SFS Theme for Common Enterprise Goals | |

Objective 8.4: Assure capabilities for world-class research on a laboratory in low Earth orbit.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Demonstrate ISS on-orbit vehicle operational safety, reliability, and performance. (2H10) | Demonstrate ISS on-orbit vehicle operational safety, reliability, and performance. (3H11) | |
| Green<br>Demonstrate ISS program progress and readiness at a level sufficient to show adequate readiness in the assembly schedule. (2H11) | Demonstrate and document the ISS program progress and readiness at a level sufficient to show adequate support of the assembly schedule. (3H12) | |
| Yellow<br>Develop and execute a management plan and open future Station hardware and service procurements to innovation and cost-saving ideas through competition, including launch services and a Non-Government Organization for Space Station research. (2H19) | Develop and execute a management plan and open future Station hardware and service procurements to innovation and cost-saving ideas. (3H15) | |
| Green<br>Provide an average of five mid-deck lockers on each Space Shuttle mission to the International Space Station for research. (2H17) | Provide for science and technology research on the International Space Station a minimum average of five mid-deck lockers for each Space Shuttle mission to the ISS and maintain 80% availability of Space Station resources to support science and technology research. (3H02) | |

Theme: Space Shuttle Program (SSP)

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
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Objective 8.3: Improve the accessibility of space to better meet research, Space Station assembly, and operations requirements.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Achieve seven or fewer flight anomalies per mission. (9H15) | Green<br>Achieve seven or fewer flight anomalies per mission. (0H12) | Green<br>Achieve 8 or fewer flight anomalies per mission. (1H7) |
| Yellow<br>Achieve 85% on time, successful launches, excluding weather risk. (9H16) | Green<br>Achieve 85% on time, successful launches, excluding weather risk. Changed to: Achieve 100% on-orbit mission success. (0H13) | Green<br>Achieve 100% on-orbit mission success. (1H30) |
| Green<br>Achieve a 60% increase in predicted reliability of Space Shuttle over 1995. (9H18) | Red<br>Have in place an aggressive Shuttle program that ensures the availability of a safe and reliable Shuttle system through the ISS era. (0H15) | Yellow<br>Expedite a safety improvement program to ensure the continued safe operations of the Space Shuttle that ensures the availability of a safe and reliable Shuttle system to support Space Station Assembly milestones and operations. (1H6) |
| Green<br>Achieve a 13-month manifest preparation time. (9H17) | Green<br>Achieve a 12- month manifest preparation time. (0H14) | |
| Yellow<br>Complete the development of a commercialization plan for the ISS and the Space Shuttle in partnership with the research and commercial communities, and define and recommend policy and legislative changes. (9H30) | Red<br>Promote privatization of Space Shuttle operations and reduce civil service resource requirements for operations by 20% (from the FY 1996 FTE levels) in FY 2000. (0H39) | |
| | Green<br>Promote privatization and commercialization of Space Shuttle payload operations through the transition of payload management functions (payload integration managers, payload officers, etc.) by FY 2000. (0H40) | |
| | N/A<br>Within policy limitations and appropriate waivers, pursue the commercial marketing of Space Shuttle payloads by working to allow the Space Flight Operations Contractor to target two reimbursable flights, one in FY 2001 and one in FY 2002. (0H41) | |

Theme: Space Shuttle Program (SSP)

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| See SFS Theme for Common Enterprise Goals | See SFS Theme for Common Enterprise Goals | |

Objective 8.3: Improve the accessibility of space to better meet research, Space Station assembly, and operations requirements.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Assure public, flight crew, and workforce safety for all Space Shuttle operations, measured by the following: Achieve zero type A or B mishaps in FY 2002 and Achieve an average of 8 or fewer flight anomalies per Space Shuttle mission. (2H6) | Assure public, flight crew, and workforce safety for all Space Shuttle operations, measured by the following: Achieve zero type A or B mishaps in FY 2003 and Achieve an average of 8 or fewer flight anomalies per Space Shuttle mission. (3H05) | |
| Green<br>Safely meet the FY 2002 manifest and flight rate commitment. Annual performance goal is measured for Space Shuttle performance only. (2H7) | Safely meet the FY 2003 manifest and flight rate commitment. Annual performance goal is measured for Space Shuttle performance only. (3H06) | |
| Green<br>Have in place a Shuttle safety investment program that ensures the availability of a safe and reliable Shuttle system for ISS assembly and operations. (2H09) | Have in place a Shuttle safety investment program that ensures the availability of a safe and reliable Shuttle system for ISS assembly and operations. (3H08) | |
| Green<br>Maintain a “12-month” manifest preparation time. (2H8) | Maintain a “12-month” manifest preparation time. (3H07) | |
| Green<br>Continue implementation of planned and new privatization efforts and further efforts to safely and effectively transfer civil service positions and responsibilities private industry. (2H21) | NASA will aggressively pursue Space Shuttle competitive sourcing opportunities that improve the Shuttle’s safety and operational efficiency. (3H20) | |
| | Space Shuttle supports exploration by transporting payloads, logistics, and crew to the ISS. (3H25) | |
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Theme: Space and Flight Support (SFS)

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 1999 | 2000 | 2001 |
|---|---|---|
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Objective 8.5: Provide services for space communications, rocket propulsion testing, and launch in support of NASA, other government agencies and industry.

| 1999 | 2000 | 2001 |
|---|---|---|
| Red<br>Develop options and recommendations to commercialize space communications. (9H34) | Green<br>Increase the expenditures for commercial services to 10% of the total space communications budget by FY 2000. (0H42) | Green<br>Increase the percentage of the space operations budget allocated to acquisition of communications and data services from the commercial sector to 15%. (1H20) |
| Green<br>Reduce space communications operations costs by 30 to 35% compared to the FY96 budget, through a consolidated space communications contract to meet established budget targets. (9H33) | Green<br>Reduce the space communications budget submit for FY 2000 by 30-35% from the FY 1996 congressional budget submit. (0H43) | Green<br>Achieve at least 95 percent of planned data delivery from space flight missions as documented in space, ground, deep space, and NASA integrated service networks performance metrics consistent with detailed program and project operations requirements in project service level agreements. (1H21) |
| | Green<br>Invest 25% of the space communications technology budget by FY 2000 in projects that could enable space commercial opportunities, including leveraging through a consortium of industry, academia, and Government. (0H44) | N/A<br>Complete testing and delivery for spacecraft integration of experiments for the Mars Surveyor Program 2001 missions. (1H1) |
| | Red<br>Complete the integration and testing of the Mars In-situ Propellant Production Precursor (MIP) flight unit for the 2001 Mars Surveyor mission. (0H35) | |

Theme: Space and Flight Support (SFS)

Objective 7.1: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| Yellow<br>Expand public access to HEDS missions information (especially ISS) by working with industry to create media projects and public engagement initiatives that allow "first-hand" public participation using telepresence for current missions, and virtual reality or mock-ups for future missions beyond Earth orbit. (2H24) | Expand public access to HEDS missions information (especially ISS) by working with industry, academia, and the media to create media projects and public engagement initiatives that allow "first-hand" public participation using telepresence for current missions, and virtual reality or mock-ups for future missions beyond Earth orbit. (3H22) | |
| | Conduct HEDS related Education and Outreach Programs to improve the engagement/involvement of the formal education, informal education, and the general public communities. (3H21) | |

Objective 8.5: Provide services for space communications, rocket propulsion testing, and launch in support of NASA, other government agencies and industry.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>The Space Communications program will conduct tasks that enable commercialization and will minimize investment in government infrastructure for which commercial alternatives are being developed. (2H15) | The Space Communications program will conduct tasks that enable commercialization and will minimize investment in government infrastructure for which commercial alternatives are being developed. (3H16) | |
| Green<br>Provide reliable launch services for approved missions. NASA success rate at or above a running average of 95% for missions noted on the Flight Planning Board manifest and launched pursuant to commercial launch service contracts. (2H3) | Provide reliable launch services for approved missions. NASA success rate at or above a running average of 95% for missions noted on the Flight Planning Board manifest and launched pursuant to commercial launch service contracts. (3H03) | |
| Blue<br>Performance metrics for each mission will be consistent with detailed program and project operations requirements in project Service Level Agreements · Achieve at least 95 percent of planned data delivery for space flight missions. (2H16) | Space Communications performance metrics for each Space Shuttle and ISS mission/expedition will be consistent with detailed program and project operations requirements in project Service Level Agreements.(3H14) | |
| Green<br>Establish mechanisms to enable NASA access to the use of U.S. commercially developed launch systems. (2H18) | Establish mechanisms to enable NASA access to the use of U.S. commercially developed launch systems.(3H17) | |

Theme: Space and Flight Support (SFS)

Objective 8.5: Provide services for space communications, rocket propulsion testing, and launch in support of NASA, other government agencies and industry.

| 1999 | 2000 | 2001 |
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Objective 8.6: Create concepts, technologies and capabilities for space transportation that enable affordable future infrastructures.

| 1999 | 2000 | 2001 |
|---|---|---|
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Objective 9.4: Develop innovative concepts for systems, infrastructures and missions to extend the duration and boundaries of human space flight.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Yellow<br>In coordination with other Enterprises, develop and implement tests and demonstrations of capabilities for future human exploration in the areas of advanced space power, advanced space transportation, information and automation systems, and sensors and instruments. (0H38) | Green<br>Complete redefinition of the NASA Technology Plan to emphasize investments in the emerging strategic cross-Enterprise technology areas & include roadmaps for each Enterprise to show how Enterprise technology investments are linked to future mission needs. (1P6) |

Theme: Space and Flight Support (SFS)

Objective 8.5: Provide services for space communications, rocket propulsion testing, and launch in support of NASA, other government agencies and industry.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Increase collaboration in space commerce with a variety of industry, academia and non-profit organizations. (2H26) | Increase collaboration in space commerce with a variety of industry, academia and non-profit organizations. (3H19) | |
| | Provide reliable space communication services for Space Science and Earth Science missions be consistent with program and project requirements.(3H04) | |
| | Establish mechanisms to enable NASA to utilize commercial payload processing facilities.(3H18) | |
| | HEDS Enterprise will work with the Second Generation Program to define available opportunities to utilize Office of Space Flight assets to test 2nd Generation Reusable Launch Vehicle enabling technologies.(3H10) | |

Objective 8.6: Create concepts, technologies and capabilities for space transportation that enable affordable future infrastructures.

| 2002 | 2003 | 2004 |
|---|---|---|
| | HEDS will collaborate with NASA's Office of Human Resources and Education, and Second Generation Program Office to establish and implement an agency wide training program for employees that support the Space Launch Initiative needs. The training program will communicate and document lessons learned from other major technology development and operational programs. Lessons learned would be based on but not limited to both government and contractor experience on the Space Shuttle program, Saturn program, and other commercial launch vehicle programs.(3H09) | |

Objective 9.4: Develop innovative concepts for systems, infrastructures and missions to extend the duration and boundaries of human space flight.

| 2002 | 2003 | 2004 |
|---|---|---|
| | The HEDS Advanced Programs office work collaboratively with other NASA Enterprises and Field Centers on advanced planning activities and leverage available resources in advanced technologies that will enable safe, effective, and affordable human/robotic exploration.(3H01) | |

Theme: Space Launch Initiative (SLI)

Objective 8.1: Assure safe, affordable, and reliable U.S.-based crew access and return from the International Space Station.

| 1999 | 2000 | 2001 |
|---|---|---|
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Objective 8.2: Improve the safety, affordability and reliability of future space transportation systems.

| 1999 | 2000 | 2001 |
|---|---|---|
| Green<br>Continue the X-33 Vehicle Assembly in Preparation for Flight Testing. (9R14) | Red<br>Conduct the flight testing of the X-33 vehicle. (0R19) | Red<br>NASA's research stresses highly reliable, fully reusable configurations, advanced materials and innovative structures. The performance target is complete assembly of the third X-34 test vehicle, demonstrate 75% of supporting technology developments, and complete competitive solicitations for expanded 2nd generation reusable launch vehicle efforts. (1R10) |
| Yellow<br>Complete Vehicle Assembly and Begin Flight Testing of the X-34. (9R15) | Red<br>Complete vehicle assembly and begin the flight test of the second X-34 vehicle. (0R12) | |

Theme: Space Launch Initiative (SLI)

Objective 8.1: Assure safe, affordable, and reliable U.S.-based crew access and return from the International Space Station.

| 2002 | 2003 | 2004 |
|---|---|---|
| | The Orbital Space Plane (OSP) Program Level 1 requirements will be approved by the Agency, establishing the critical top-level specifications that the OSP system must meet. (3SLI1) | |
| | Formal agreements with the International Space Station Program and the Kennedy Space Center Launch Services Provider will be established, ensuring an integrated development effort of the Orbital Space Plane system. (3SLI2) | |
| | The design of the Demonstration of Autonomous Rendezvous Technology (DART) flight demonstrator will be certified and the verification approach will be approved, completing a key step toward the demonstration of a critical autonomous rendezvous technology for the Orbital Space Plane system. (3SLI3) | |

Objective 8.2: Improve the safety, affordability and reliability of future space transportation systems.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>NASA's investments emphasize thorough mission needs development, requirements definition, and risk reduction effort leading to commercially owned and operated launch systems to meet NASA needs with commercial application where possible. The annual performance goal is to complete risk reduction and architecture reviews to support design and demonstration decisions. (2R6) | Down-select to a minimum of two launch architectures for detailed development based on their ability to meet the safety and affordability goals. This selection will determine what launch architectures and critical technology developments will be continued through FY 2006. (Cancelled due to Budget Amendment) (3R6) | |
| Green<br>NASA's investments emphasize thorough mission needs development, requirements definition, and risk reduction effort leading to commercially owned and operated launch systems to meet NASA needs with commercial application where possible. The annual performance goal is to complete risk reduction and architecture reviews and initial hardware demonstrations to support design and demonstration decisions. (2R7) | Complete the independent evaluation of three revolutionary hypersonic propulsion technology systems demonstrations and associated ground technologies. This independent evaluation will validate ability of each propulsion system, a rocket-based combined-cycle engine, a turbine-based combined cycle engine and a scramjet engine, to achieve the strategic objectives within cost and schedule. (Cancelled due to Budget Amendment) (3R7) | |

Theme: Space Launch Initiative (SLI)

Objective 8.2: Improve the safety, affordability and reliability of future space transportation systems.

| 1999 | 2000 | 2001 |
|---|---|---|
| | Red<br>Complete small payload focused technologies and select concepts for flight demonstration of a reusable first stage (Bantam). (0R17) | Yellow<br>NASA's research stresses technology for reusable, long life, high power electric and advanced, clean chemical engines for earth orbital transfer and breakthrough propulsion, precision landing systems and aerocapture systems for planetary exploration. The performance target is to commence X-37 vehicle assembly, and complete one Pathfinder flight experiment. (1R11) |
| | Yellow<br>Demonstrate in flight an airframe-integrated, dual-mode, scramjet-powered vehicle. (0R6) | |
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Theme: Space Launch Initiative (SLI)

Objective 8.2: Improve the safety, affordability and reliability of future space transportation systems.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>Review results of NASA and commercial-sector performed launch system architecture studies, related requirements, and refinements in planned risk reduction investments. (2R13) | Down-select to a minimum of two launch architectures for detailed development based on their ability to meet the safety and affordability goals. This selection will determine what RLV architectures and critical technology developments will be continued through FY 2006. (Cancelled due to Budget Amendment) (3R8) | |
| | Complete the independent evaluation of three revolutionary hypersonic propulsion technology systems demonstrations and associated ground technologies. This independent evaluation will validate ability of each propulsion system, a rocket-based combined-cycle engine, a turbine-based combined cycle engine and a scramjet engine, to achieve the strategic objectives within cost and schedule. (Cancelled due to Budget Amendment) (3R9) | |
| | An Integrated Technology Plan (ITP) will be developed for the Next Generation Launch Technology Program, establishing the investment strategy to guide future space-transportation investment decisions. (3SLI4) | |
| | The conceptual design of the Rocket-Based Combined Cycle (RBCC) ground-test engine will be completed, paving the way toward ground demonstration of an air-breathing propulsion system for hypersonic flight. (3SLI5) | |
| | Testing of advanced injectors for a hydrocarbon-fueled rocket engine will be performed, demonstrating progress toward development of a million-pound-thrust-class prototype engine. (3SLI6) | |

Theme: Mission and Science Measurement Technology (MSM)

Objective 10.1: Improve the capability to assess and manage risk in the synthesis of complex engineering systems.

| 1999 | 2000 | 2001 |
|---|---|---|
| | | Green<br>Develop at least three new design tools, accomplish at least four demonstrations of advances in computation and communications, and complete the intelligent synthesis environment proof-of-concept system capability build to technology readiness level. (1R8) |

Objective 10.2: Create system concepts and demonstrate technologies that will enable new science measurements and scientific missions.

| 1999 | 2000 | 2001 |
|---|---|---|
| Blue<br>Demonstrate up to a 200-fold improvement over the 1992 baseline (reduction from 3,200 hours to 15) in the time-to-solution for a full combustor simulation on NASA's National Propulsion System Simulation advanced applications computational testbeds that can be increased to sustain teraFLOPS capability. (9R12) | Green<br>Demonstrate a prototype heterogeneous distributed computing environment. (0R8) | |
| Blue<br>Demonstrate communication testbeds with up to 500-fold improvement over the 1996 baseline (increase from 300 kilobits per second to 150 megabits per second) in end-to-end performance. (9R13) | | |
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Theme: Mission and Science Measurement Technology (MSM)

Objective 10.1: Improve the capability to assess and manage risk in the synthesis of complex engineering systems.

| 2002 | 2003 | 2004 |
|---|---|---|
| | Complete development of an organizational risk model and establish initial high dependability computing testbeds and tools as defined in the following indicators. (3R11) | |

Objective 10.2: Create system concepts and demonstrate technologies that will enable new science measurements and scientific missions.

| 2002 | 2003 | 2004 |
|---|---|---|
| Green<br>NASA's investments emphasize revolutionary technologies such as nanotechnology, information technology and biotechnology which could enable new missions and capabilities. The annual performance goal is to develop at least two new materials concepts and demonstrate the feasibility of at least two nanotechnology concepts and two other concepts. (2R10) | Advance the state-of-the-art in power/propulsion systems, spacecraft systems, and large or distributed space systems and our knowledge of space environmental effects that are required to support future NASA missions. (3R13) | |
| Green<br>NASA's long-term research emphasizes innovative propulsion systems. The performance target is to conduct a test of an advanced ion propulsion engine. (2R8) | Complete initial component tests to provide data for evaluating feasibility of key concepts by completing all of the following indicators. (3R10) | |
| | Advance the state-of-the-art in automated data analysis, mission command and communications, and science sensors and detectors that are potentially beneficial for future NASA missions. (3R12) | |
| | Demonstrate progress toward achievement of systems and systems of systems that can think, reason, make decisions, adapt to change, and cooperate among themselves and with humans to provide safe and successful aerospace processes and mission functions with greatly reduced human participation by successfully demonstrating individual autonomy components. (3R14) | |

Theme: Innovative Technology Transfer Partnerships (ITTP)

Objective 3.2: Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology.

| 1999 | 2000 | 2001 |
|---|---|---|
| Blue<br>Transfer at least 10 new technologies and processes to industry during the fiscal year. (9R19) | Blue<br>Transfer at least 12 new technologies and processes to industry during the fiscal year. (0R15) | |
| | Blue<br>Publish at least 1 industry specific Aerospace Technology Innovation issue per year. (0C22) | |
| | Red<br>The Office of Aero-Space Technology's Aerospace Technology Innovation Publication will be targeting medical facilities for new readership, as well as the automotive industry for new technology transfer opportunities. The organization will attend the Society for Automotive Engineers annual tradeshow in Detroit, Michigan. (0C15) | |

Common Aerospace Technology Enterprise APGs that apply to AT, SLI, MSM, and ITTP.

| 1999 | 2000 | 2001 |
|---|---|---|
| Yellow<br>Complete 90 percent of all Enterprise-controlled milestones within 3 months of schedule. (9R16) | Red<br>Complete 90 percent of all Enterprise-controlled milestones within 3 months of schedule. (0R13) | Green<br>Customer Feedback: Continue the solicitation of customer feedback on the services, facilities, and expertise provided by the Aerospace Technology Enterprise. (1R12) |
| Blue<br>Achieve a facility utilization customer satisfaction rating of 95 percent of respondents at "5" or better and 80 percent at "8" or better based on exit interviews. (9R17) | Green<br>Achieve a facility utilization customer satisfaction rating of 95% of respondents at "5" or better and 80% at "8" or better, based on exit interviews. (0R14) | |
| Green<br>Complete the Triennial Customer Satisfaction Survey, and achieve an improvement from 30 percent to 35 percent in "highly satisfied" ratings from Enterprise customers. (9R18) | | |

Theme: Innovative Technology Transfer Partnerships (ITTP)

Objective 3.2: Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology.

| 2002 | 2003 | 2004 |
|---|---|---|
| | | |
| | | |
| | | |

Common Aerospace Technology Enterprise APGs that apply to AT, SLI, MSM, and ITTP.

| 2002 | 2003 | 2004 |
|---|---|---|
| Blue<br>The annual performance goal is to continue the solicitation of customer feedback on the services, facilities, and expertise provided by the Aerospace Technology Enterprise. (2R11) | Implement an effective oversight process to insure that the research programs are addressing the correct areas, meeting user requirements, have the proper balance, are properly formulated and planned, and are making sufficient process toward the Enterprise goals. (3R15) | |
| | | |
| | | |

Translation Table 1: 2000 Strategic Plan-based Objectives Mapped to 2003 Strategic Plan Objectives.

| 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|
| Discern and describe how the global Earth system is changing. | APG 3Y1 | 1.1 | Understand how Earth is changing, better predict change, and understand the consequence for life on Earth. | ESS |
| | APG 3Y2 | | | |
| | APG 3Y3 | | | |
| | APG 3Y4 | | | |
| | APG 3Y5 | | | |
| | APG 3Y6 | | | |
| Identify and measure the primary causes of change (forcings) in the Earth system. | APG 3Y7 | | | |
| | APG 3Y8 | | | |
| | APG 3Y9 | | | |
| Determine how the Earth system responds to natural and human-induced changes. | APG 3Y10 | | | |
| | APG 3Y11 | | | |
| | APG 3Y12 | | | |
| | APG 3Y13 | | | |
| | APG 3Y14 | | | |
| | APG 3Y15 | | | |
| Identify the consequences of change in the Earth system for human civilization. | APG 3Y16 | | | |
| | APG 3Y17 | | | |
| | APG 3Y18 | | | |
| Enable the prediction of future changes in the Earth system. | APG 3Y19 | | | |
| | APG 3Y20 | | | |
| | APG 3Y21 | | | |
| | APG 3Y22 | | | |
| | APG 3Y23 | | | |
| Develop advanced technologies to reduce the cost and expand the capability for scientific Earth observation. | APG 3Y26 | | | |
| Develop advanced information technologies for processing, archiving, accessing, visualizing, and communicating Earth science data. | APG 3Y27 | | | |
| | APG 3Y28 | | | |
| Enterprise-Wide Activities that enable achievement of Earth Science strategic goals. | APG 3Y30 | | | |
| | APG 3Y31 | | | |
| | APG 3Y32 | | | |
| Demonstrate scientific and technical capabilities to enable the development of practical tools for public and private sector decision-makers. | APG 3Y24 | 1.2 | Expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology. | ESA |
| Understand our changing Sun and its effects throughout the Solar System. | APG 3S7 | 1.3 | Understand the origins and societal impacts of variability in the Sun-Earth connection. | SEC |
| Chart our destiny in the Solar System. | APG 3S8 | | | |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Chart our destiny in the Solar System. | APG 3S8 | 1.4 | Catalog and understand potential impact hazards to Earth from space. | SSE |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |

*Translation Table 1 Continued*

| 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|
| Increase Safety: Make a safe air transportation system even safer by reducing the aircraft accident rate by a factor of 5 by 2007 and by a factor of 10 by 2022. | APG 3R1 | 2.1 | Decrease the aircraft fatal accident rate, reduce the vulnerability of the air transportation system to hostile threats, and mitigate the consequences of accidents and hostile acts. | AT |
| Reduce Emissions: Protect local air quality and our global climate by reducing oxides of nitrogen (NOX) emissions of future aircraft by 70 percent by 2007 and by 80 percent by 2022 (Baseline: 1996 ICAO Standard) and also reducing carbon dioxide (CO2) emissions of future aircraft by 25 percent by 2007 and by 50 percent by 2022. | APG 3R2 | 2.2 | Protect local and global environmental quality by reducing aircraft noise and emissions. | AT |
| Reduce Noise: Benefit airport neighbors, the aviation industry, and travelers by reducing the perceived noise of future aircraft by a factor of two (10 decibels) by 2007 and by a factor of four (20 decibels) by 2022 (using 1997 subsonic aircraft technology as the baseline) thereby confining aircraft noise to within the airport boundary. | APG 3R3 | | | |
| Increase Capacity: Enable the movement of more air passengers with fewer delays by doubling the capacity of the aviation system within 10 years and tripling it within 25 years based on 1997 levels. | APG 3R4 | 2.3 | Enable more people and goods to travel faster and farther, with fewer delays. | AT |
| Increase Mobility: Enable people to travel faster and farther, anywhere, anytime by reducing the time for intercity door-to-door transportation by half by 2007 and by two-thirds by 2022, and reducing long-haul transcontinental travel time by half by 2022 | APG 3R5 | | | |
| Partner with other domestic and international agencies to develop and implement better methods for using remotely sensed observations in Earth system monitoring and prediction. | APG 3Y29 | 3.1 | Enhance the Nation's security through partnerships with DoD, DHS and other U.S. or international government agencies. | ESA |
| Provide technical support for companies to begin space research. Foster commercial research endeavors with the International Space Station and other assets. | APG 3B9 | 3.2 | Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology. | RPFS |
| Systematically provide basic research knowledge to industry. | APG 3B10 | | | |
| Develop strategies to maximize scientific research output on the International Space Station and other space research platforms. | APG 3B8 | | | |
| Develop strategies to maximize scientific research output on the International Space Station and other space research platforms. | APG 3B8 | 3.3 | Resolve scientific issues in the low gravity environment of space that enrich life on Earth by leading to better design tools in energy, materials, medical, and communication technologies. | PSR |
| Investigate chemical, biological, and physical processes in the space environment, in partnership with the scientific community. | APG 3B4 | | | |
| | APG 3B6 | | | |
| Operate the International Space Station to advance science, exploration, engineering, and commerce | APG 3H13 | | | |
| Operate the International Space Station to advance science, exploration, engineering, and commerce. | APG 3H13 | 4.1 | Determine how fundamental biological processes of life respond to gravity and space environments. | BSR |
| Investigate chemical, biological, and physical processes in the space environment, in partnership with the scientific community. | APG 3B7 | | | |
| Develop strategies to maximize scientific research output on the International Space Station and other space research platforms. | APG 3B8 | | | |
| Investigate chemical, biological, and physical processes in the space environment, in partnership with the scientific community. | APG 3B3 | 4.2 | Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation. | BSR |
| | APG 3B3 | 4.2 | Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation. | PSR |
| | APG 3B5 | | | |
| Develop strategies to maximize scientific research output on the International Space Station and other space research platforms. | APG 3B8 | | | |

*Translation Table 1 Continued*

| 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|
| Learn how galaxies, stars, and planets form, interact, and evolve. | APG 3S3 | 5.1 | Learn how the solar system originated and evolved to its current diverse state. | SSE |
| Understand the formation and evolution of the Solar System and the Earth within it. | APG 3S5 | | | |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Probe the origin and evolution of life on Earth, and determine if life exists elsewhere in our Solar System. | APG 3S6 | 5.2 | Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life. | SSE |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Understand the formation and evolution of the Solar System and the Earth within it. | APG 3S5 | 5.3 | Understand the current state and evolution of the atmosphere, surface, and interior of Mars. | MEP |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Probe the origin and evolution of life on Earth, and determine if life exists elsewhere in our Solar System. | APG 3S6 | 5.4 | Determine if life exists or has ever existed on Mars. | MEP |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Chart our destiny in the Solar System. | APG 3S8 | 5.5 | Develop an understanding of Mars in support of possible future human exploration. | MEP |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Understand our changing Sun and its effects throughout the Solar System. | APG 3S7 | 5.6 | Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments. | SEC |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Learn how galaxies, stars, and planets form, interact, and evolve. | APG 3S3 | 5.7 | Understand the fundamental physical processes of space plasma systems. | SEC |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |

*Translation Table 1 Continued*

| 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|
| Explore the ultimate limits of gravity and energy in the Universe. | APG 3S2 | 5.8 | Learn how galaxies, stars, and planetary systems form and evolve. | ASO |
| Learn how galaxies, stars, and planets form, interact, and evolve. | APG 3S3 | | | |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Look for signs of life in other planetary systems. | APG 3S4 | | | |
| Look for signs of life in other planetary systems. | APG 3S4 | 5.9 | Understand the diversity of worlds beyond our solar system and search for those that might harbor life. | ASO |
| Probe the origin and evolution of life on Earth, and determine if life exists elsewhere in our Solar System. | APG 3S6 | | | |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Understand the structure of the Universe, from its earliest beginnings to its ultimate fate. | APG 3S1 | 5.10 | Discover what powered the Big Bang and the nature of the mysterious dark energy that is pulling the universe apart. | SEU |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Explore the ultimate limits of gravity and energy in the Universe. | APG 3S2 | 5.11 | Learn what happens to space, time, and matter at the edge of a black hole. | SEU |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| Understand the structure of the Universe, from its earliest beginnings to its ultimate fate. | APG 3S1 | 5.12 | Understand the development of structure and the cycles of matter and energy in the evolving universe. | SEU |
| Explore the ultimate limits of gravity and energy in the Universe. | APG 3S2 | | | |
| Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |

*Translation Table 1 Continued*

| 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|
| ·Share the excitement of space science discoveries with the public.<br>·Enhance the quality of science, mathematics, and technology education, particularly at the pre-college level.<br>·Help create our 21st Century scientific and technical workforce. | APG 3S12 | 6.1 | Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities. | EDU |
| Objective: Advance the scientific, technological, and academic achievement of the Nation by sharing our knowledge, capabilities, and assets. | APG 3H23 | | | |
| Stimulate public interest in and understanding of Earth system science and encourage young scholars to consider careers in science and technology. | APG 3Y25 | | | |
| Technology Innovation: Enable fundamentally new aerospace system capabilities and missions by enabling a 500 percent increase in useful new science information acquired from NASA science missions, data sources, and science system simulations as compared to equivalent FY 2000-2002 science programs by 2012, and by 2022, a 1000 percent increase. Enable heretofore-impractical or unaffordable mission classes by improving, by a factor of 3 in 2012 and 10 in 2020 over comparable systems and concepts designed using FY 2000 – 2002 flight –ready technology, flight resources including payload mass, volume, and power. By FY 2012, enable mission systems that can operate safely and successfully with less than 10 percent of the human participation required for FY 2000-2002 designs, and by FY 2020 enable missions that can analyze unexpected events and adjust plans and adapt systems accordingly with no human participation. | APG 3R16 | | | |
| Support the Nation's education goals. | APG 3CK4 | 6.1 | Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities. | N/A |
| Objective: Advance the scientific, technological, and academic achievement of the Nation by sharing our knowledge, capabilities, and assets. | APG 3H24 | 6.2 | Support higher education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers. | EDU |
| Advance the scientific, technological, and academic achievement of the Nation by sharing our knowledge, capabilities, and assets. | APG 3B11 | 6.3 | Increase the number and diversity of students, teachers, faculty and researchers from underrepresented and underserved communities in NASA related STEM fields. | EDU |
| ·Share the excitement of space science discoveries with the public.<br>·Enhance the quality of science, mathematics, and technology education, particularly at the pre-college level.<br>·Help create our 21st Century scientific and technical workforce. | APG 3S12 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | SSE<br>MEP<br>ASO<br>SEU<br>SEC |
| Stimulate public interest in and understanding of Earth system science and encourage young scholars to consider careers in science and technology. | APG 3Y25 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | ESS |
| Engage and involve the public in the excitement and the benefits of and in setting the goals for the exploration and development of space. | APG 3H21 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | SFS |
| Provide significantly more value to significantly more people through exploration and space development efforts. | APG 3H22 | | | |

*Translation Table 1 Continued*

| 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|
| Engage and involve the public in research in space. | APG 3B12 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | BSR |
| ·Share the excitement of space science discoveries with the public.<br>·Enhance the quality of science, mathematics, and technology education, particularly at the pre-college level.<br>·Help create our 21st Century scientific and technical workforce. | APG 3S12 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | SSE |
| | | | | MEP |
| | | | | ASO |
| | | | | SEU |
| | | | | SEC |
| Share with the public the knowledge and excitement of NASA's programs in a form that is readily understandable. | APG 3CK1 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | N/A |
| Disseminate scientific information generated by NASA programs to our customers. | APG 3CK2 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | N/A |
| N/A | APG 3SLI1 | 8.1 | Assure safe, affordable, and reliable U.S.-based crew access and return from the International Space Station. | SLI |
| N/A | APG 3SLI2 | | | |
| N/A | APG 3SLI3 | | | |
| Mission Safety: Radically improve the safety and reliability of space launch systems by reducing the incidence of crew loss for a second generation Reusable Launch Vehicle (RLV) to 1 in 10,000 missions (a factor of 40) by 2010 and to less than 1 in 1,000,000 missions (an additional factor of 100) for a third generation RLV by 2025. | APG 3R6 | 8.2 | Improve the safety, affordability, and reliability of future space transportation systems. | SLI |
| | APG 3R7 | | | |
| Mission Affordability: Create an affordable highway to space by reducing the cost of delivering a payload to low-Earth orbit to $1,000 per pound (a factor of 10) by 2010 and to $100 per pound (an additional factor of 10) by 2025 and reducing the cost of inter-orbital transfer by a factor of 10 within 15 years and by an additional factor of 10 by 2025. | APG 3R8 | | | |
| | APG 3R9 | | | |
| N/A | APG 3SLI4 | | | |
| N/A | APG 3SLI5 | | | |
| N/A | APG 3SLI6 | | | |
| Conduct engineering research on the International Space Station to enable exploration beyond Earth orbit. | APG 3H25 | 8.3 | Improve the accessibility of space to better meet research, Space Station assembly, and operations requirements. | SSP |
| Provide and make use of safe, affordable, and improved access to space. | APG 3H05 | | | |
| | APG 3H06 | | | |
| | APG 3H07 | | | |
| | APG 3H08 | | | |
| Develop new capabilities for human space flight and commercial applications through partnerships with the private sector. | APG 3H20 | | | |
| Operate the International Space Station to advance science, exploration, engineering, and commerce. | APG 3H11 | 8.4 | Assure capabilities for world-class research on a laboratory in low Earth orbit. | ISS |
| | APG 3H02 | | | |
| | APG 3H12 | | | |
| Meet sustained space operations needs while reducing costs. | APG 3H15 | | | |

*Translation Table 1 Continued*

| 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|
| Enable human exploration through collaborative robotic missions. | APG 3H03 | 8.5 | Provide services for space communications and rocket propulsion testing, and launch in support of NASA, other Government agencies, and industry. | SFS |
| | APG 3H04 | | | |
| Provide and make use of safe, affordable, and improved access to space. | APG 3H10 | | | |
| Meet sustained space operations needs while reducing costs. | APG 3H14 | | | |
| Improve the accessibility of space to meet the needs of commercial research and development. | APG 3H16 | | | |
| | APG 3H17 | | | |
| Foster commercial endeavors with the International Space Station and other assets. | APG 3H18 | | | |
| | APG 3H19 | | | |
| Provide and make use of safe, affordable, and improved access to space. | APG 3H09 | 8.6 | Create concepts, technologies, and capabilities for space transportation that enable affordable future infrastructures. | SFS |
| Conduct research to ensure the health, safety, and performance of humans living and working in space. | APG 3B1 | 9.1 | Understand human physiological reactions to reduced gravity and develop countermeasures to assure survival of humans traveling far from Earth. | BSR |
| Conduct research to ensure the health, safety, and performance of humans living and working in space. | APG 3B2 | 9.2 | Develop new human support systems and solutions to low gravity technological challenges to allow the next generation of explorers to go beyond low Earth orbit. | BSR |
| Invest in the development of high-leverage technologies to enable safe, effective and affordable human/robotic exploration. | APG 3H01 | 9.4 | Develop innovative concepts for systems, infrastructures and missions to extend the duration and boundaries of human space flight. | SFS |
| Engineering Innovation: Enable rapid, high-confidence, and cost efficient design of revolutionary systems by enabling the capability to predict and alleviate with 95 percent confidence, during mission design, all probable threats to mission success by 2012. By 2022 enable the capability to methodically design missions with safety, cost, technical performance, and life defined with 95 percent confidence. | APG 3R11 | 10.1 | Improve the capability to assess and manage risk in the synthesis of complex engineering systems. | MSM |
| Mission Reach: Extend our reach in space with faster travel times by reducing the time for planetary missions by a factor of 2 by 2015 and by a factor of 10 by 2025. | APG 3R10 | 10.2 | Create system concepts and demonstrate technologies that will enable new science measurements and scientific missions. | MSM |
| Technology Innovation: Enable fundamentally new aerospace system capabilities and missions by enabling a 500 percent increase in useful new science information acquired from NASA science missions, data sources, and science system simulations as compared to equivalent FY 2000-2002 science programs by 2012, and by 2022, a 1000 percent increase. Enable heretofore-impractical or unaffordable mission classes by improving, by a factor of 3 in 2012 and 10 in 2020 over comparable systems and concepts designed using FY 2000 – 2002 flight –ready technology, flight resources including payload mass, volume, and power. By FY 2012, enable mission systems that can operate safely and successfully with less than 10 percent of the human participation required for FY 2000-2002 designs, and by FY 2020 enable missions that can analyze unexpected events and adjust plans and adapt systems accordingly with no human participation. | APG 3R13 | | | |
| | APG 3R12 | | | |
| | APG 3R14 | | | |

*Translation Table 1 Continued*

| 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|
| Invest wisely in our use of human capital, developing and drawing upon the talents of all our people. | APG 3MS7<br>APG 3MS8 | IS 1.1 | Attract and maintain a workforce that is representative of the Nation's diversity and includes the competencies that NASA needs to deliver the sustained levels of high performance that the Agency's challenging Mission requires. | N/A |
| Achieve the most productive application of Federal acquisition policies. | APG 3MS2<br>APG 3MS9 | IS 1.2 | Define and adopt procedures to improve the competitive acquisition of programs, services, and assets to benefit the NASA Mission and the American taxpayer. | N/A |
| Manage our fiscal and physical resources optimally. | APG 3MS3<br>APG 3MS10 | IS 1.3 | Improve and streamline the NASA financial management system to enhance accuracy, timeliness, and accountability. | N/A |
| Enhance Program safety and mission success in the delivery of products and operational services. Improve NASA's engineering capability to remain as a premier engineering research and development organization. Capture engineering and technological best practices and process knowledge to continuously improve NASA's program/project management | APG 3P2 | IS 1.6 | Improve the institutional management of capital assets to ensure that NASA's real property, personal property, processes, and systems are sustained and optimized to support NASA's missions and the capabilities required for today and tomorrow. | N/A |
| Enhance the security, efficiency, and support provided by our information technology resources. | APG 3MS4<br>APG 3MS5 | IS 2.1 | By 2005 provide all NASA operations with secure, highly reliable, interoperable information systems. | N/A |
| Enhance the security, efficiency, and support provided by our information technology resources. | APG 3MS6 | IS 2.3 | By 2005 design and operate a One NASA network to improve organizational interactions and foster improved collaboration and sharing of accumulated NASA knowledge assets. | N/A |
| Facilitate technology insertion and transfer, and utilize commercialization partnerships in research and development to the maximum extent practicable | APG 3P3 | IS 3 | Enhance NASA's core engineering, management, and science capabilities and processes to ensure safety and mission success, increase performance and reduce cost | N/A |
| Protect the safety of our people and facilities and the health of our workforce. | APG 3MS1 | IS 4.1 | Prevent injuries from occurring during the course of NASA activities on NASA facilities or in the use of NASA equipment. | N/A |
| Enhance Program safety and mission success in the delivery of products and operational services. Improve NASA's engineering capability to remain as a premier engineering research and development organization. Capture engineering and technological best practices and process knowledge to continuously improve NASA's program/project management | APG 3P1 | IS 5.2 | Improve processes for cost estimation and the management of major NASA projects and programs. | N/A |
| Technology Innovation: Enable fundamentally new aerospace system capabilities and missions by enabling a 500 percent increase in useful new science information acquired from NASA science missions, data sources, and science system simulations as compared to equivalent FY 2000-2002 science programs by 2012, and by 2022, a 1000 percent increase. Enable heretofore-impractical or unaffordable mission classes by improving, by a factor of 3 in 2012 and 10 in 2020 over comparable systems and concepts designed using FY 2000 – 2002 flight –ready technology, flight resources including payload mass, volume, and power. By FY 2012, enable mission systems that can operate safely and successfully with less than 10 percent of the human participation required for FY 2000-2002 designs, and by FY 2020 enable missions that can analyze unexpected events and adjust plans and adapt systems accordingly with no human participation. | APG 3R15 | N/A | ***Note*: Will be addressed under AT, SLI, MSM, and ITTP objectives. | AT<br>SLI<br>MSM<br>ITTP |

Translation Table 2: 2000 Strategic Plan-based Objectives Mapped to 2003 Strategic Plan Objectives Organized by Enterprise/Crosscutting Process

*Earth Science*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Earth Science | Discern and describe how the global Earth system is changing. | APG 3Y1 | 1.1 | Understand how Earth is changing, better predict change, and understand the consequence for life on Earth. | ESS |
| | | APG 3Y2 | | | |
| | | APG 3Y3 | | | |
| | | APG 3Y4 | | | |
| | | APG 3Y5 | | | |
| | | APG 3Y6 | | | |
| | Identify and measure the primary causes of change (forcings) in the Earth system. | APG 3Y7 | | | |
| | | APG 3Y8 | | | |
| | | APG 3Y9 | | | |
| | Determine how the Earth system responds to natural and human-induced changes. | APG 3Y10 | | | |
| | | APG 3Y11 | | | |
| | | APG 3Y12 | | | |
| | | APG 3Y13 | | | |
| | | APG 3Y14 | | | |
| | | APG 3Y15 | | | |
| | Identify the consequences of change in the Earth system for human civilization. | APG 3Y16 | | | |
| | | APG 3Y17 | | | |
| | | APG 3Y18 | | | |
| | Enable the prediction of future changes in the Earth system. | APG 3Y19 | | | |
| | | APG 3Y20 | | | |
| | | APG 3Y21 | | | |
| | | APG 3Y22 | | | |
| | | APG 3Y23 | | | |
| | Develop advanced technologies to reduce the cost and expand the capability for scientific Earth observation. | APG 3Y26 | | | |
| | Develop advanced information technologies for processing, archiving, accessing, visualizing, and communicating Earth science data. | APG 3Y27 | | | |
| | | APG 3Y28 | | | |
| | Enterprise-Wide Activities that enable achievement of Earth Science strategic goals. | APG 3Y30 | | | |
| | | APG 3Y31 | | | |
| | | APG 3Y32 | | | |
| | Demonstrate scientific and technical capabilities to enable the development of practical tools for public and private sector decision-makers. | APG 3Y24 | 1.2 | Expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology. | ESA |
| | Partner with other domestic and international agencies to develop and implement better methods for using remotely sensed observations in Earth system monitoring and prediction. | APG 3Y29 | 3.1 | Enhance the Nation's security through partnerships with DoD, DHS and other U.S. or international government agencies. | ESA |
| | Stimulate public interest in and understanding of Earth system science and encourage young scholars to consider careers in science and technology. | APG 3Y25 | 6.1 | Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities. | EDU |
| | Stimulate public interest in and understanding of Earth system science and encourage young scholars to consider careers in science and technology. | APG 3Y25 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | ESS |

*Translation Table 2 Continued*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Space Science | Understand our changing Sun and its effects throughout the Solar System. | APG 3S7 | 1.3 | Understand the origins and societal impacts of variability in the Sun-Earth connection. | SEC |
| | Chart our destiny in the Solar System. | APG 3S8 | | | |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Chart our destiny in the Solar System. | APG 3S8 | 1.4 | Catalog and understand potential impact hazards to Earth from space. | SSE |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Learn how galaxies, stars, and planets form, interact, and evolve. | APG 3S3 | 5.1 | Learn how the solar system originated and evolved to its current diverse state. | SSE |
| | Understand the formation and evolution of the Solar System and the Earth within it. | APG 3S5 | | | |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Probe the origin and evolution of life on Earth, and determine if life exists elsewhere in our Solar System. | APG 3S6 | 5.2 | Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life. | SSE |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Understand the formation and evolution of the Solar System and the Earth within it. | APG 3S5 | 5.3 | Understand the current state and evolution of the atmosphere, surface, and interior of Mars. | MEP |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |

*Translation Table 2 Continued*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Space Science | Probe the origin and evolution of life on Earth, and determine if life exists elsewhere in our Solar System. | APG 3S6 | 5.4 | Determine if life exists or has ever existed on Mars. | MEP |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Chart our destiny in the Solar System. | APG 3S8 | 5.5 | Develop an understanding of Mars in support of possible future human exploration. | MEP |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Understand our changing Sun and its effects throughout the Solar System. | APG 3S7 | 5.6 | Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments. | SEC |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Learn how galaxies, stars, and planets form, interact, and evolve. | APG 3S3 | 5.7 | Understand the fundamental physical processes of space plasma systems. | SEC |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Explore the ultimate limits of gravity and energy in the Universe. | APG 3S2 | 5.8 | Learn how galaxies, stars, and planetary systems form and evolve. | ASO |
| | Learn how galaxies, stars, and planets form, interact, and evolve. | APG 3S3 | | | |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Look for signs of life in other planetary systems. | APG 3S4 | | | |

*Translation Table 2 Continued*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Space Science | Look for signs of life in other planetary systems. | APG 3S4 | 5.9 | Understand the diversity of worlds beyond our solar system and search for those that might harbor life. | ASO |
| | Probe the origin and evolution of life on Earth, and determine if life exists elsewhere in our Solar System. | APG 3S6 | | | |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Understand the structure of the Universe, from its earliest beginnings to its ultimate fate. | APG 3S1 | 5.10 | Discover what powered the Big Bang and the nature of the mysterious dark energy that is pulling the universe apart. | SEU |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Explore the ultimate limits of gravity and energy in the Universe. | APG 3S2 | 5.11 | Learn what happens to space, time, and matter at the edge of a black hole. | SEU |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | Understand the structure of the Universe, from its earliest beginnings to its ultimate fate. | APG 3S1 | 5.12 | Understand the development of structure and the cycles of matter and energy in the evolving universe. | SEU |
| | Explore the ultimate limits of gravity and energy in the Universe. | APG 3S2 | | | |
| | Support of Strategic Plan Science Objectives (1-8); Development/ Near-Term Future Investments | APG 3S9 | | | |
| | Acquire new technical approaches and capabilities. Apply and transfer technology. | APG 3S10 | | | |
| | Validate new technologies in space. Apply and transfer technology. | APG 3S11 | | | |
| | ·Share the excitement of space science discoveries with the public.<br>·Enhance the quality of science, mathematics, and technology education, particularly at the pre-college level.<br>·Help create our 21st Century scientific and technical workforce. | APG 3S12 | 6.1 | Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities. | EDU |
| | ·Share the excitement of space science discoveries with the public.<br>·Enhance the quality of science, mathematics, and technology education, particularly at the pre-college level.<br>·Help create our 21st Century scientific and technical workforce. | APG 3S12 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | SSE<br>MEP<br>ASO<br>SEU<br>SEC |

*Translation Table 2 Continued*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Aerospace Technology | Increase Safety: Make a safe air transportation system even safer by reducing the aircraft accident rate by a factor of 5 by 2007 and by a factor of 10 by 2022. | APG 3R1 | 2.1 | Decrease the aircraft fatal accident rate, reduce the vulnerability of the air transportation system to hostile threats, and mitigate the consequences of accidents and hostile acts. | AT |
| | Reduce Emissions: Protect local air quality and our global climate by reducing oxides of nitrogen (NOX) emissions of future aircraft by 70 percent by 2007 and by 80 percent by 2022 (Baseline: 1996 ICAO Standard) and also reducing carbon dioxide (CO2) emissions of future aircraft by 25 percent by 2007 and by 50 percent by 2022. | APG 3R2 | 2.2 | Protect local and global environmental quality by reducing aircraft noise and emissions. | AT |
| | Reduce Noise: Benefit airport neighbors, the aviation industry, and travelers by reducing the perceived noise of future aircraft by a factor of two (10 decibels) by 2007 and by a factor of four (20 decibels) by 2022 (using 1997 subsonic aircraft technology as the baseline) thereby confining aircraft noise to within the airport boundary. | APG 3R3 | | | |
| | Increase Capacity: Enable the movement of more air passengers with fewer delays by doubling the capacity of the aviation system within 10 years and tripling it within 25 years based on 1997 levels. | APG 3R4 | 2.3 | Enable more people and goods to travel faster and farther, with fewer delays. | AT |
| | Increase Mobility: Enable people to travel faster and farther, anywhere, anytime by reducing the time for intercity door-to-door transportation by half by 2007 and by two-thirds by 2022, and reducing long-haul transcontinental travel time by half by 2022 | APG 3R5 | | | |
| | Technology Innovation: Enable fundamentally new aerospace system capabilities and missions by enabling a 500 percent increase in useful new science information acquired from NASA science missions, data sources, and science system simulations as compared to equivalent FY 2000-2002 science programs by 2012, and by 2022, a 1000 percent increase. Enable heretofore-impractical or unaffordable mission classes by improving, by a factor of 3 in 2012 and 10 in 2020 over comparable systems and concepts designed using FY 2000 – 2002 flight –ready technology, flight resources including payload mass, volume, and power. By FY 2012, enable mission systems that can operate safely and successfully with less than 10 percent of the human participation required for FY 2000-2002 designs, and by FY 2020 enable missions that can analyze unexpected events and adjust plans and adapt systems accordingly with no human participation. | APG 3R16 | 6.1 | Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities. | EDU |
| | Mission Safety: Radically improve the safety and reliability of space launch systems by reducing the incidence of crew loss for a second generation Reusable Launch Vehicle (RLV) to 1 in 10,000 missions (a factor of 40) by 2010 and to less than 1 in 1,000,000 missions (an additional factor of 100) for a third generation RLV by 2025. | APG 3R6 | 8.2 | Improve the safety, affordability, and reliability of future space transportation systems. | SLI |
| | | APG 3R7 | | | |
| | Mission Affordability: Create an affordable highway to space by reducing the cost of delivering a payload to low-Earth orbit to $1,000 per pound (a factor of 10) by 2010 and to $100 per pound (an additional factor of 10) by 2025 and reducing the cost of inter-orbital transfer by a factor of 10 within 15 years and by an additional factor of 10 by 2025. | APG 3R8 | | | |
| | | APG 3R9 | | | |

*Translation Table 2 Continued*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Aerospace Technology | Engineering Innovation: Enable rapid, high-confidence, and cost efficient design of revolutionary systems by enabling the capability to predict and alleviate with 95 percent confidence, during mission design, all probable threats to mission success by 2012. By 2022 enable the capability to methodically design missions with safety, cost, technical performance, and life defined with 95 percent confidence. | APG 3R11 | 10.1 | Improve the capability to assess and manage risk in the synthesis of complex engineering systems. | MSM |
| | Mission Reach: Extend our reach in space with faster travel times by reducing the time for planetary missions by a factor of 2 by 2015 and by a factor of 10 by 2025. | APG 3R10 | 10.2 | Create system concepts and demonstrate technologies that will enable new science measurements and scientific missions. | MSM |
| | Technology Innovation: Enable fundamentally new aerospace system capabilities and missions by enabling a 500 percent increase in useful new science information acquired from NASA science missions, data sources, and science system simulations as compared to equivalent FY 2000-2002 science programs by 2012, and by 2022, a 1000 percent increase. Enable heretofore-impractical or unaffordable mission classes by improving, by a factor of 3 in 2012 and 10 in 2020 over comparable systems and concepts designed using FY 2000 – 2002 flight –ready technology, flight resources including payload mass, volume, and power. By FY 2012, enable mission systems that can operate safely and successfully with less than 10 percent of the human participation required for FY 2000-2002 designs, and by FY 2020 enable missions that can analyze unexpected events and adjust plans and adapt systems accordingly with no human participation. | APG 3R13 | | | |
| | | APG 3R12 | | | |
| | | APG 3R14 | | | |
| | Technology Innovation: Enable fundamentally new aerospace system capabilities and missions by enabling a 500 percent increase in useful new science information acquired from NASA science missions, data sources, and science system simulations as compared to equivalent FY 2000-2002 science programs by 2012, and by 2022, a 1000 percent increase. Enable heretofore-impractical or unaffordable mission classes by improving, by a factor of 3 in 2012 and 10 in 2020 over comparable systems and concepts designed using FY 2000 – 2002 flight –ready technology, flight resources including payload mass, volume, and power. By FY 2012, enable mission systems that can operate safely and successfully with less than 10 percent of the human participation required for FY 2000-2002 designs, and by FY 2020 enable missions that can analyze unexpected events and adjust plans and adapt systems accordingly with no human participation. | APG 3R15 | N/A | ***Note*: Will be addressed under AT, SLI, MSM, and ITTP objectives. | AT |
| | | | | | SLI |
| | | | | | MSM |
| | | | | | ITTP |

## *Biological and Physical Research*

*Translation Table 2 Continued*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Biological and Physical Research | Provide technical support for companies to begin space research. Foster commercial research endeavors with the International Space Station and other assets. | APG 3B9 | 3.2 | Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology. | RPFS |
| | Systematically provide basic research knowledge to industry. | APG 3B10 | | | |
| | Develop strategies to maximize scientific research output on the International Space Station and other space research platforms. | APG 3B8 | | | |
| | Develop strategies to maximize scientific research output on the International Space Station and other space research platforms. | APG 3B8 | 3.3 | Resolve scientific issues in the low gravity environment of space that enrich life on Earth by leading to better design tools in energy, materials, medical, and communication technologies. | PSR |
| | Investigate chemical, biological, and physical processes in the space environment, in partnership with the scientific community. | APG 3B4 | | | |
| | | APG 3B6 | | | |
| | Investigate chemical, biological, and physical processes in the space environment, in partnership with the scientific community. | APG 3B7 | 4.1 | Determine how fundamental biological processes of life respond to gravity and space environments. | BSR |
| | Develop strategies to maximize scientific research output on the International Space Station and other space research platforms. | APG 3B8 | | | |
| | Investigate chemical, biological, and physical processes in the space environment, in partnership with the scientific community. | APG 3B3 | 4.2 | Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation. | BSR |
| | | APG 3B3 | 4.2 | Expand understanding of fundamental physical processes and insight into the laws of nature through space-based investigation. | PSR |
| | | APG 3B5 | | | |
| | Develop strategies to maximize scientific research output on the International Space Station and other space research platforms. | APG 3B8 | | | |
| | Advance the scientific, technological, and academic achievement of the Nation by sharing our knowledge, capabilities, and assets. | APG 3B11 | 6.3 | Increase the number and diversity of students, teachers, faculty and researchers from underrepresented and underserved communities in NASA related STEM fields. | EDU |
| | Engage and involve the public in research in space. | APG 3B12 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | BSR |
| | Conduct research to ensure the health, safety, and performance of humans living and working in space. | APG 3B1 | 9.1 | Understand human physiological reactions to reduced gravity and develop countermeasures to assure survival of humans traveling far from Earth. | BSR |
| | Conduct research to ensure the health, safety, and performance of humans living and working in space. | APG 3B2 | 9.2 | Develop new human support systems and solutions to low gravity technological challenges to allow the next generation of explorers to go beyond low Earth orbit. | BSR |

## *Human Exploration and Development of Space*

*Translation Table 2 Continued*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Human Exploration and Development of Space | Objective: Advance the scientific, technological, and academic achievement of the Nation by sharing our knowledge, capabilities, and assets. | APG 3H23 | 6.1 | Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities. | EDU |
| | Objective: Advance the scientific, technological, and academic achievement of the Nation by sharing our knowledge, capabilities, and assets. | APG 3H24 | 6.2 | Support higher education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers. | EDU |
| | Engage and involve the public in the excitement and the benefits of and in setting the goals for the exploration and development of space. | APG 3H21 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | SFS |
| | Provide significantly more value to significantly more people through exploration and space development efforts. | APG 3H22 | | | |
| | Conduct engineering research on the International Space Station to enable exploration beyond Earth orbit. | APG 3H25 | 8.3 | Improve the accessibility of space to better meet research, Space Station assembly, and operations requirements. | SSP |
| | Provide and make use of safe, affordable, and improved access to space. | APG 3H05 | | | |
| | | APG 3H06 | | | |
| | | APG 3H07 | | | |
| | | APG 3H08 | | | |
| | Develop new capabilities for human space flight and commercial applications through partnerships with the private sector. | APG 3H20 | | | |
| | Operate the International Space Station to advance science, exploration, engineering, and commerce. | APG 3H11 | 8.4 | Assure capabilities for world-class research on a laboratory in low Earth orbit. | ISS |
| | | APG 3H12 | | | |
| | | APG 3H02 | | | |
| | Meet sustained space operations needs while reducing costs. | APG 3H15 | | | |
| | Enable human exploration through collaborative robotic missions. | APG 3H03 | 8.5 | Provide services for space communications and rocket propulsion testing, and launch in support of NASA, other Government agencies, and industry. | SFS |
| | | APG 3H04 | | | |
| | Provide and make use of safe, affordable, and improved access to space. | APG 3H10 | | | |

*Translation Table 2 Continued*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Human Exploration and Development of Space | Meet sustained space operations needs while reducing costs. | APG 3H14 | 8.5 | Provide services for space communications and rocket propulsion testing, and launch in support of NASA, other Government agencies, and industry. | SFS |
| | Improve the accessibility of space to meet the needs of commercial research and development. | APG 3H16 | | | |
| | | APG 3H17 | | | |
| | Foster commercial endeavors with the International Space Station and other assets. | APG 3H18 | | | |
| | | APG 3H19 | | | |
| | Provide and make use of safe, affordable, and improved access to space. | APG 3H09 | 8.6 | Create concepts, technologies, and capabilities for space transportation that enable affordable future infrastructures. | SFS |
| | Invest in the development of high-leverage technologies to enable safe, effective and affordable human/robotic exploration. | APG 3H01 | 9.4 | Develop innovative concepts for systems, infrastructures and missions to extend the duration and boundaries of human space flight. | SFS |
| | Operate the International Space Station to advance science, exploration, engineering, and commerce | APG 3H13 | 3.3 | Resolve scientific issues in the low gravity environment of space that enrich life on Earth by leading to better design tools in energy, materials, medical, and communication technologies. | PSR |
| | Operate the International Space Station to advance science, exploration, engineering, and commerce. | APG 3H13 | 4.1 | Determine how fundamental biological processes of life respond to gravity and space environments. | BSR |

## *Space Launch Initiative*

| Enterprise | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Space Launch Initiative | N/A | APG 3SLI1 | 8.1 | Assure safe, affordable, and reliable U.S.-based crew access and return from the International Space Station. | SLI |
| | N/A | APG 3SLI2 | | | |
| | N/A | APG 3SLI3 | | | |
| | N/A | APG 3SLI4 | 8.2 | Improve the safety, affordability, and reliability of future space transportation systems. | SLI |
| | N/A | APG 3SLI5 | | | |
| | N/A | APG 3SLI6 | | | |

## *Manage Strategically*

*Translation Table 2 Continued*

| Crosscutting Process | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Manage Strategically | Invest wisely in our use of human capital, developing and drawing upon the talents of all our people. | APG 3MS7 | IS 1.1 | Attract and maintain a workforce that is representative of the Nation's diversity and includes the competencies that NASA needs to deliver the sustained levels of high performance that the Agency's challenging Mission requires. | N/A |
| | | APG 3MS8 | | | |
| | Achieve the most productive application of Federal acquisition policies. | APG 3MS2 | IS 1.2 | Define and adopt procedures to improve the competitive acquisition of programs, services, and assets to benefit the NASA Mission and the American taxpayer. | N/A |
| | | APG 3MS9 | | | |
| | Manage our fiscal and physical resources optimally. | APG 3MS3 | IS 1.3 | Improve and streamline the NASA financial management system to enhance accuracy, timeliness, and accountability. | N/A |
| | | APG 3MS10 | | | |
| | Enhance the security, efficiency, and support provided by our information technology resources. | APG 3MS4 | IS 2.1 | By 2005 provide all NASA operations with secure, highly reliable, interoperable information systems. | N/A |
| | | APG 3MS5 | | | |
| | Enhance the security, efficiency, and support provided by our information technology resources. | APG 3MS6 | IS 2.3 | By 2005 design and operate a One NASA network to improve organizational interactions and foster improved collaboration and sharing of accumulated NASA knowledge assets. | N/A |
| | Protect the safety of our people and facilities and the health of our workforce. | APG 3MS1 | IS 4.1 | Prevent injuries from occurring during the course of NASA activities on NASA facilities or in the use of NASA equipment. | N/A |

## *Provide Aerospace Products and Capabilities*

| Crosscutting Process | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Provide Aerospace Products and Capabilities | Enhance Program safety and mission success in the delivery of products and operational services. Improve NASA's engineering capability to remain as a premier engineering research and development organization. Capture engineering and technological best practices and process knowledge to continuously improve NASA's program/project management | APG 3P2 | IS 1.6 | Improve the institutional management of capital assets to ensure that NASA's real property, personal property, processes, and systems are sustained and optimized to support NASA's missions and the capabilities required for today and tomorrow. | N/A |
| | Enhance Program safety and mission success in the delivery of products and operational services. Improve NASA's engineering capability to remain as a premier engineering research and development organization. Capture engineering and technological best practices and process knowledge to continuously improve NASA's program/project management | APG 3P1 | IS 5.2 | Improve processes for cost estimation and the management of major NASA projects and programs. | N/A |
| | Facilitate technology insertion and transfer, and utilize commercialization partnerships in research and development to the maximum extent practicable | APG 3P3 | IS 3 | Enhance NASA's core engineering, management, and science capabilities and processes to ensure safety and mission success, increase performance and reduce cost | N/A |

## *Communicate Knowledge*

| Crosscutting Process | 2000 Strategic Plan-based Objective | 2003 APG # | 2003 Objective # | 2003 Objective | Theme |
|---|---|---|---|---|---|
| Communicate Knowledge | Share with the public the knowledge and excitement of NASA's programs in a form that is readily understandable. | APG 3CK1 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | N/A |
| | Disseminate scientific information generated by NASA programs to our customers. | APG 3CK2 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | N/A |
| | Share with the public the knowledge and excitement of NASA's programs in a form that is readily understandable. | APG 3CK1 | 7.1 | Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions. | N/A |
| | Transfer NASA technologies and innovations to private industry and the public sector. | APG 3CK3 | 3.2 | Improve the Nation's economic strength and quality of life by facilitating the innovative use of NASA technology. | N/A |
| | Support the Nation's education goals. | APG 3CK4 | 6.1 | Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities. | N/A |