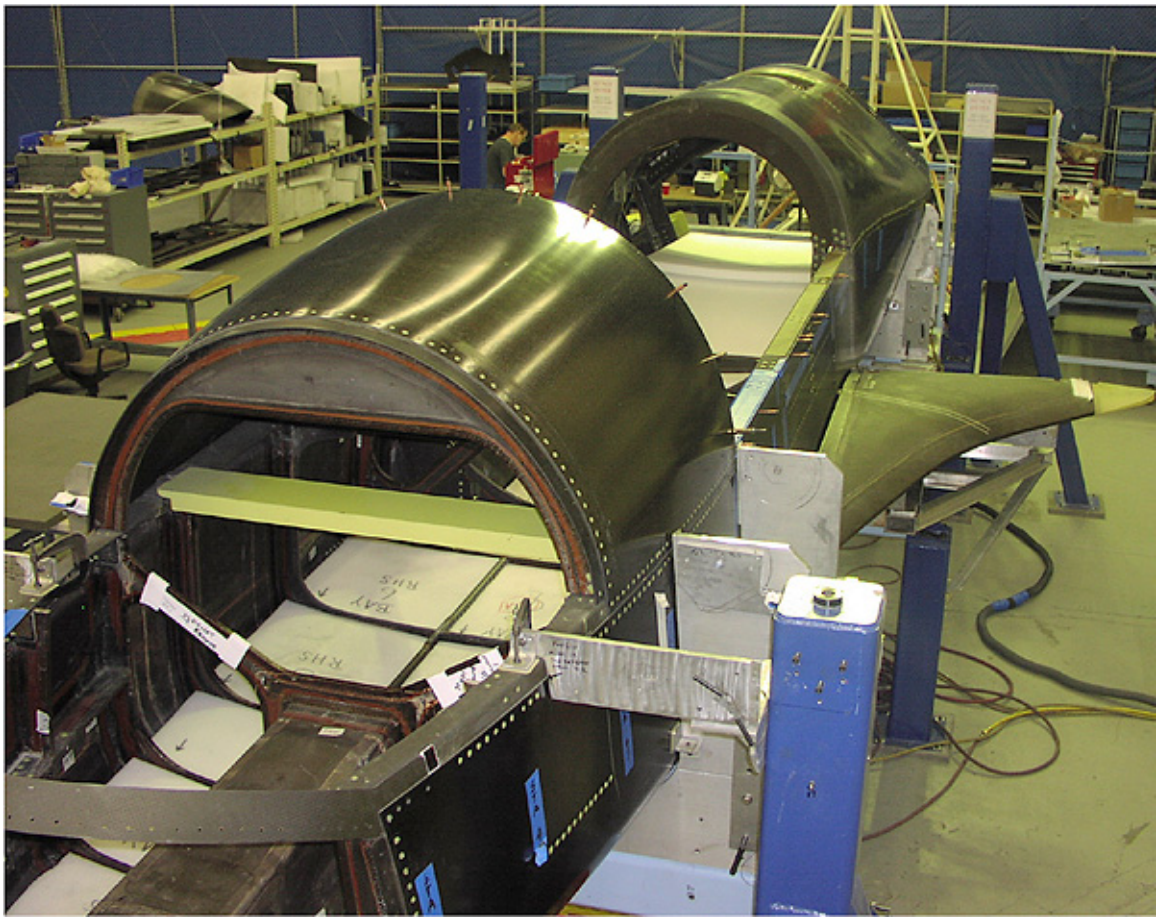
THEME: Space Launch Initiative



As a flight demonstration project for the Orbital Space Plane, the X-37 Approach and Landing Test Vehicle (ATLV) is being assembled for flight demonstrations in 2004. This autonomous flight vehicle will incorporate a wide variety of technologies and experiments, generating data for the Orbital Space Plane and future space transportation launch vehicle systems.

SPACE LAUNCH INITIATIVE

MAJOR EVENTS IN FY 2004

- Test flight of DART vehicle to demonstrate autonomous rendezvous technology between a chase vehicle and an on-orbit satellite.
- Drop test of X-37 vehicle from carrier aircraft to demonstrate autonomous landing capability as a precursor to a planned orbital demonstration.
- Conceptual design review of Orbital Space Plane with sufficient cost, schedule, technical and risk definition to enable a full-scale development decision.

THEME: Space Launch Initiative (SLI)

OVERVIEW

NASA's Integrated Space Transportation Plan (ISTP) has been formulated by the Agency to ensure safe, affordable, capable, and reliable space transportation systems are provided to support NASA's missions. The Space Launch Initiative (SLI) began in 2001as a key component of the ISTP, with a goal to provide the necessary technology development, risk reduction, and systems analysis to enable a NASA decision whether to proceed into full scale development of a 2nd Generation Reusable Launch Vehicle (RLV). The ISTP has been updated based on recent systems analyses, resulting in reprogramming some of the planned SLI funding to help achieve the Agency's International Space Station (ISS), Space Shuttle and science objectives.

The SLI budget is focused on the highest agency space transportation priorities: investing in an Orbital Space Plane (OSP) for assured access to the ISS and maintaining technology investments in space transportation launch technologies through the Next Generation Launch Technology (NGLT) Program in support of a future implementation decision. The OSP Program will develop a new human-crewed vehicle with multi-purpose utility for the Agency. It will initially serve as an ISS Crew Return Vehicle (CRV) launched on an Expendable Launch Vehicle (ELV). It will then evolve into a complement and backup to the Shuttle for taking crew to and from space, and will enable a transition path to future space launch vehicle systems under development in NGLT.

The NGLT Program combines the remaining technology development activities from the former Second Generation RLV with the Space Transfer and Launch Technology Program (3rd Generation Hypersonics) to ensure a coordinated technology development effort. With the FY03 budget amendment, NASA has begun formulation of the OSP and NGLT Programs, transitioning ongoing activities into those programs. NASA will establish the OSP Level 1 requirements in FY03 and initiate concept studies; ongoing flight demonstrators will continue while new flight demonstrators will begin formulation. The NGLT Program will focus on the most critical technology development activities, integrating with the Department of Defense (DoD) through the National Aerospace Initiative (NAI).

Missions	Goals supported by this theme	Objectives supporting those goals	Reference 2003 Strategic Plan
Understand and Protect Our Home Planet	3. Create a more secure world and improve the quality of life by investing in technologies and collaborating with other agencies, industry, and academia.	3.1	Enhance the nation's security by developing and demonstrating critical access-to-space technologies that benefit NASA, DOD, and other government agencies.
Inspire the Next Generation of Explorers	6. Inspire and motivate students to pursue careers in science, technology, engineering, and mathematics.	6.1	Improve student proficiency in science, technology, engineering and mathematics by creating a culture of achievement using educational programs, products and services based on NASA's unique missions, discoveries, and innovations.
	7. Engage the public in shaping and sharing the experience of exploration and discovery.	7.3	Increase public awareness and understanding on how research and innovation in aerospace affect and improve the quality of life.
Space Flight Capabilities	8. Ensure the provision of space access and improve it by increasing safety, reliability, and affordability.	8.1	Assure safe, affordable, and reliable U.S.-based crew access and return from the International Space Station.
		8.2	Improve the safety, affordability and reliability of future space transportation systems.
	9. Extend the duration and boundaries of human space flight to create new opportunities for exploration and discovery.	9.5	Create innovative approaches and concepts to inform future decisions concerning systems, infrastructures and missions for human and robotic exploration of space.

RELEVANCE

New space transportation capabilities are needed to ensure America continues its important leadership role in space, for education, science, defense, and commercial competitiveness. SLI supports NASA's vision by ensuring safe, affordable, and reliable access to space. The United States is currently the only country with reusable launch vehicle capabilities and has a large investment in the International Space Station. The Space Shuttle is the nation's 1st Generation RLV. Based on 25-year-old technology, the Shuttle fleet is expensive to operate and maintain. New U.S. based access to ISS is needed to meet our commitments and assure the full capabilities of the ISS can be realized and its mission objectives are reached. Future space transportation systems are needed to efficiently serve the long term needs of the Agency for safe, reliable, and affordable access to space and to extend the boundaries of human space flight. SLI helps create a more secure world by collaborating with the Department of Defense on critical access to space and hypersonics technologies that support future civil and military aerospace missions.

THEME: Space Launch Initiative (SLI)

RELEVANCE - CONTINUED

Education and Public Benefits

SLI will benefit the Public by dramatically improving access to space for current and future missions and by assuring access to ISS. Improved access to space will enable NASA's vision to improve life here, to extend life there, and to find life beyond. SLI ensures America's superiority on the space frontier in both conventional rocket and air-breathing hypersonics technology fields.

SLI participates in the Student Launch Initiative to inspire students to pursue careers in science and engineering. SLI also provides research funding to several Universities in support of the SLI goals, including two recently established University Research, Engineering, and Technology Institutes (URETIs) at the University of Maryland and the University of Florida.

SLI gives special emphasis to NASA's unique needs, including crew escape and survival systems, which will not be developed by the private sector without Government funding. Therefore, SLI is an investment in the nation's scientific and technological progress, as well as the U.S. aerospace infrastructure.

IMPLEMENTATION

This theme is composed of many integrated parts which work together to achieve the SLI goal of providing safe, affordable, capable, and reliable space transportation systems. Those elements are summarized below. The OSP and NGLT Programs have Technology and Advanced Concept information sheets. Separate Development information sheets are provided for the X-37 Approach and Landing Test Vehicle (ALTV) and the Demonstration of Autonomous Rendezvous Technology (DART) Flight Demonstration projects.

SLI is a two-program (OSP and NGLT) theme, with each program comprised of multiple projects. Theme and program responsibility is in the Office of Aerospace Technology (OAT) at NASA Headquarters. The Enterprise Program Management Council (EPMC) has SLI governing responsibility. The Enterprise official is Dr. Jeremiah F. Creedon, Associate Administrator of Aerospace Technology. The Theme Director and Point of Contact is Dr. John R. (Row) Rogacki, Division Director for Space Transportation Technology. The Acting Program Manager for the OSP Program is Mr. Dennis Smith and the Acting Deputy Program Manager is Mr. Dan Dumbacher. The Acting Program Manager for the NGLT Program is Mr. Garry Lyles and the Acting Deputy Program Manager is Mr. Stephen Cook. Both Program Offices and Program Managers are located at NASA's Marshall Space Flight Center (MSFC). Multiple NASA Centers support SLI by providing project management and technical expertise.

Strategy	Schedule by Fiscal Year 01 02 03 04 05 06 07 08 09 10	Purpose
2nd Generations Reusable Launch Vehicle (RLV) Program		*Note: 2nd Gen RLV was restructured into OSP & NGLT Programs in the FY 2003 NASA Budget Amendment.*
Space Transfer & Launch Technology (STLT) *[Hypersonics]* Program		*Note: SLTL was restructured into OSP & NGLT Programs in the FY 2003 NASA Budget Amendment.*
Orbital Space Plane (OSP) Program	FSD	Provide both early Crew Return Vehicle (CRV, FY 2010) and subsequent Crew Transfer Vehicle (CTV, FY 2012) capabilities to support ISS by providing crew rescue, crew transfer, and limited cargo capability.
Next Generation Launch Technology (NGLT) Program	FSD Decision	Advance the state-of-the-art in critical and high payoff technologies to enable low-cost, reliable and safe future generations of space transportation systems.

Tech. & Adv. Concept Development Operations

Tailoring: No exceptions to NPG 7120.5A have been taken.

THEME: Space Launch Initiative (SLI)

STATUS

The FY2002 accomplishments of the Space Launch Initiative provided the space transportation technology information needed to contibute to the update of the Integrated Space Transportation Plan and establish the joint NASA/DOD National Aerospace Initiative plan and roadmap. The activities conducted within the Second Generation Reusable Launch Vehicle Program and the Space Transfer and Launch Technology Programs have been refocused into the Orbital Space Plane and Next Generation Launch Technology Programs beginning in FY2003. Specific FY2002 accomplishments of the Second Generation Reusable Launch Vehicle Program and the Space Transfer and Launch Technology Programs are listed below:

Integrated Space Transportation Plan (ISTP)

- Contributed to an update of the ISTP to better align the space transportation investments with the Agency priorities.
- Conducted a Crew Transfer Vehicle/Crew Rescue Vehicle study, concluding that a multi-purpose Orbital Space Plane that can perform both the crew transfer and crew return functions for the Station is feasible.

Second Generation Reusable Launch Vehicle Program (2GRLV)

- Completed the initial architecture assessments for a 2GRLV, providing risk reduction results and technology readiness assessments that enabled the update of the ISTP.
    - Focused over 100 candidate 2GRLV architecture designs to the 15 most promising candidates.
    - Identified the key technology drivers and prioritized technology development needs.
- Established the Advanced Engineering Environment (AEE) as a state-of-the-art engineering analysis and modeling tool that provides the capability to conduct high fidelity mission analyses with integrated participation across NASA Center offices, collaborative engineering centers, and contractor offices.
- Completed the joint NASA/U.S. Air Force 120-Day Study and follow-on assessments, identifying complementary areas of access-to-space technology development needs.
- Reached sufficient completion of the Demonstration of Autonomous Rendezvous Technology (DART) design to begin its final design review, establishing the design for a critical technology required to support the OSP.
- Completed the X-37 Approach and Landing Test Vehicle (ALTV) systems verification assessment and began the manufacturing and test of the ALTV, preparing for the 2004 flight demonstrations.
- Progressed toward development of booster, second stage, and on-orbit auxiliary rocket engines in support of the 2GRLV, including baselining the Propulsion Systems Requirements and completing a variety of test article design reviews and component tests.
- Progressed toward development of the 2GRLV Vehicle, with various Airframe, Integrated Vehicle Health Management, Operations, and Vehicle Systems activities. This includes investigations of hot aeroshell/integral tank structures, a self-reacting friction stir welding process for metallic tanks, and a demonstration of flight control software.

Space Transfer and Launch Technology Program (STLT)

- Established a joint NASA/DOD National Aerospace Initiative Hypersonic Science and Technology Plan and Roadmap to guide investments in this field. Continued implementing NASA's responsibilities for this plan.
- Officially established the Rocket Based Combined Cycle (RBCC), X-43C, and Turbine Based Combined Cycle (TBCC) projects.
- Baselined the RBCC Requirements Specification for the Integrated System Test of an Air Breathing Rocket (ISTAR).
- Demonstrated advanced adhesives for non-autoclave composite processing, resulting in potentially significant manufacturing cost reduction and design improvements for space transportation systems.
- Established the requirements for the X-43C Flight Demonstrator, allocating requirements down to the component level, and began the preliminary design of the Ground Test Engine.
- Conducted an independent cost evaluation of the three Hypersonic propulsion technology system demonstrations, including an RBCC engine, a TBCC engine, and a scramjet engine integrated with a flight vehicle.
- Established two University Research, Engineering and Technology Institutes (consortia led by the University of Maryland and the University of Florida) to provide research funding in support of space transportation goals.

THEME: Space Launch Initiative (SLI)

PERFORMANCE MEASURES

Annual Performance Goals	
	OUTCOME: A well managed program in accordance with Agency implementing strategies. (NGLT and OSP)
4SLI1	Each Development project will complete its current phase within 10% of total life-cycle cost.
4SLI2	The Theme will distribute at least 80% of its allocated procurement funding to competitively awarded contracts,
4SLI3	The Theme will complete all of its milestones within 10% of its baseline schedules.
8.1.1	**OUTCOME:** An Orbital Space Plane that provides safe, affordable and reliable access to and from the International Space Station (ISS). (OSP)
4SLI4	The OSP Program Plan will be approved and the OSP Level 2 Requirements will be established and approved.
4SLI5	A conceptual design of the Orbital Space Plane will be completed with sufficient cost, schedule, technical, and risk definition to enable a full-scale development decision.
4SLI6	The X-37 Approach and Landing Test Vehicle will be certified for flight demonstration, establishing it as a test platform for technology demonstrations supporting the OSP.
4SLI7	The Demonstration of Autonomous Rendezvous Technology flight article will be certified for flight demonstration, establishing it as a test platform for demonstrating key technologies required to enable an autonomous (no pilot in the loop) approach of an OSP to the International Space Station.
8.2.1	**OUTCOME:** Technology development and risk reduction results that open up the Nation's access to space by demonstrating substantial improvements in safety, reliability, and cost as compared to current space transportation systems. (NGLT)
4SLI8	The Next Generation Launch Technology (NGLT) Program Plan will be approved, aligning the Program implementation approach with the Space Transportation strategic objectives.
4SLI9	The preliminary design of a reusable hydrocarbon prototype rocket engine will be completed, demonstrating the design's applicability to a reusable launch vehicle.
4SLI10	A LOx/LH2 full flow staged combustion engine cycle will be operationally demonstrated to determine its applicability to a reusable launch vehicle.
4SLI11	The preliminary design of a Rocket Based Combined Cycle (RBCC) ground testbed will be completed, paving the way toward ground demonstration of a hypersonic air-breathing propulsion system.
4SLI12	The preliminary design of a Mach 4 ground turbine testbed will be completed, leading to the development of the primary element of a turbine-based combined-cycle hypersonic air-breathing propulsion system.
4SLI13	The fabrication of the X-43C Mach 5 Multi-Module Flowpath Propulsion Demonstrator will be completed, enabling the ground demonstration of a hydrocarbon dual-mode scramjet powered vehicle applicable for a reusable launch vehicle.
4SLI14	The testing and analysis of a light-weight ceramic composite cooled panel in a scramjet test article will be completed, demonstrating a critical propulsion technology needed for development of an air-breathing reusable launch vehicle.
4SLI15	The design and fabrication of a Mach 15 hypersonic scramjet model platform will be completed, leading to the demonstration of a scramjet engine at high Mach number.
9.5.3	**OUTCOME:** An established space transportation investment strategy that is responsive to the Agency's science-driven missions. (NGLT)
4SLI16	The systems assessment of the Next Generation Launch Technology needs, priorities, and technical performance metrics will be completed, providing an integrated roadmap for space launch technology investments.
3.1.2	**OUTCOME:** An established partnership between NASA and DoD to ensure space technology investments are fully leveraged. (NGLT)
4SLI17	The DoD responsive space lift requirements as defined by the Analysis of Alternatives process will be assessed to determine the potential and priorities for leveraged technology investments that support both NASA and DoD needs.
6.1.1	**OUTCOME:** Kindergarten through graduate students will be more proficient in science, technology, engineering, and mathematics (STEM). (NGLT and OSP)
4SLI18	An instructional video program and standards-based lesson guide highlighting applications of science, technology, engineering and mathematics will be produced for the 'NASA CONNECT" series to help student proficiency in these technical fields.
7.3.1	**OUTCOME:** Increase public awareness and appreciation of the benefits made possible by NASA research and innovation in aerospace technology. (NGLT and OSP)
4SLI19	Space transportation technical exhibits will be sponsored for at least five events reaching over 50,000 participants to improve public appreciation of the ongoing activities and benefits of NASA's space transportation research and technology development efforts.

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
Relevance	ATAC	Nov-02	Feb-03	Serve as an independent panel for the Office of Aerospace Technology Review programs/projects, reporting to the NAC and the Adminstrator.
Quality Review	National Academy	--	2004/2007	Assess the technical quality of research & technology work being performed.

THEME: Space Launch Initiative (SLI)

BUDGET

Budget Authority ($millions)	FY02	FY03	Chng *	FY04	Comments
Space Launch Initiative (Technology)	**535.1**	**879.4**	**185.3**	**1,064.7**	
2nd Generation Reusable Launch Vehicle	465.4	0.0	0.0	0.0	SLI refocused from 2nd Gen RLV and STLT in FY03 NASA Budget Amendment to OSP & NGLT Programs contained in FY03 NASA Budget Amendment.
Space Transfer & Lanuch Technology	69.7	0.0	0.0	0.0	
Orbital Space Plane (OSP) Program	0.0	295.7	254.5	550.2	
Next Generation Launch Technology (NGLT) Program	0.0	583.7	-69.2	514.5	

Indicates budget numbers in Full Cost.

Indicates changes since the FY 2003 Presidents Budget Submit.

Note: For all formats, the FY02 column reflects the FY02 Congressional Operating Plan dated 9/30/02. The FY03 column reflects the FY03 President's Budget Submit (PBS) as Amended. The Change column includes both programmatic and full cost adjustments. The FY04 column is in full cost.

THEME: Space Launch Initiative

TECHNOLOGY AND ADVANCED CONCEPTS: Orbital Space Plane (OSP) Program

PURPOSE

Objectives	Reference 2003 Strategic Plan	Performance Measures
6.1	Improve student proficiency in science, technology, engineering and mathematics by creating a culture of achievement using educational programs, products and services based on NASA's unique missions, discoveries and innovations.	4SLI18
7.3	Increase public awareness and understanding of how research and innovations in aerospace technology affect and improve the qualiy of life.	4SLI19
8.1	Assure safe, affordable, and reliable U.S.-based crew access and return from the ISS.	4SLI1 - 4SLI7

The OSP Program Goal is to provide both early Crew Return Vehicle (CRV, FY 2010) and subsequent Crew Transfer Vehicle (CTV, FY 2012) capabilities to support ISS by providing crew rescue, crew transfer, and limited cargo capability. The Orbital Space Plane (OSP) Program will develop a new vehicle that will provide a multi-purpose utility for the Agency. It will start as a crew return vehicle, launched on an Expendable Launch Vehicle (ELV). Its initial role will be to provide a crew return capability from the ISS by approximately 2010. It will evolve into a complement and backup to the Shuttle for taking crew into space, and will enable a transition path to future reusable launch vehicle systems. The OSP Program will preserve the opportunity to support crew transport to and from space by 2012.

OVERVIEW

The OSP Program of the SLI Theme contains two elements: (1) Technology and Demonstrations, and (2) Design, Development, and Production. The Design, Development, and Production element of the OSP Program began the formulation phase in FY03. Per NPG 7120.5A Guidelines, the Formulation Phase will be utilized to establish the Program schedule and budget plans. The current budget planning is based on formulation concept studies being conducted in FY03 and FY04, preliminary design activities conducted in FY04 and FY05, a System Design Review (SDR) in FY04, and a Preliminary Design Review in FY05. A decision whether to enter into implementation (proceed with the Full Scale Development) of the OSP is scheduled to be made at the end of FY04 following the SDR, completion of the Non-Advocate Review (NAR), and completion of an Independent Cost Review including a Cost Analysis Requirements Document (CARD). At that point, a decision to proceed will result in the OSP Program transitioning from Formulation to Implementation.

The objective of the Technology and Demonstrations program element is to provide the necessary flight demonstrations and technology development activities to enable the OSP development. There are four flight demonstrators currently planned:

1. X-37 Approach and Landing Test Vehicle (ALTV). The purpose is to validate thermal effects during approach & landing (40,000 ft and below) and autonomous approach (no pilot) technology incorporating advanced thermal protection systems and design/ manufacturing techniques. The X-37 ALTV Project is imbedded as a vital portion of the formulation phase OSP.

2. Demonstration of Autonomous Rendezvous Technology (DART). The purpose is to develop and demonstrate autonomous rendezvous and proximity operations (no pilot) between a chase vehicle (DART) and an on-orbit satellite. The DART Project is is imbedded as a vital portion of the formulation phase OSP.

3. Pad Abort Demonstrator (PAD). The purpose is to develop the fundamental capability to test crew escape technologies in a pad abort situation. This full-scale demonstrator is a re-usable flexible testbed that provides a basis for understanding the environments of crew escape. This testbed will include fully instrumented mannequins to provide data on crew environments during demonstration of propulsion systems, parachute systems, orientation and landing techniques, and external aeroshell configurations. The PAD vehicle will be adaptable to test additional maturing crew escape technologies to meet the program goals for crew safety. The PAD Project began the formulation phase in FY03. The current budget planning is based on three demonstration tests in CY2005 and four demonstration tests in CY2006.

Continued on Next Page

OVERVIEW (Continued)

Continued from Prior Page

4. X-37 Orbital Vehicle. The purpose is to provide a versatile technology demonstrator platform on which to mature, through demonstration, critical technologies required by future space transportation systems. It will validate ascent, on-orbit, and re-entry environments incorporating a broad range of technologies including autonomous (no pilot) approach and landing, advanced guidance and navigation, advanced thermal protection systems and power distribution systems, and streamlined flight operations. The Project began the formulation phase in FY03. The current budget planning is based on a Preliminary Design Review (PDR) in CY 2004, a Critical Design Review (CDR) in early 2005, and an orbital flight test in CY 2006.

PROGRAM MANAGEMENT

The Aerospace Technology Enterprise Program Management Council (EPMC) has NGLT governing responsibility. The NASA Enterprise official is Dr. Jeremiah Creedon, Associate Administrator (AA) for Aerospace Technology. The Theme Director is Dr. John Rogacki, Division Director for Space Transportation Technology. The acting OSP Program Manager is Mr. Dennis Smith and the acting OSP Deputy Program Manager is Mr. Dan Dumbacher.

TECHNICAL COMMITMENT

The baseline for this technical commitment is the FY03 budget amendment.

Technical Specifications	FY04 President's Budget	Change from Baseline
Specific Technical Specifications are TBD for OSP Program: they will be established during the early part of the Program Formulation Phase. X-37 and DART Technical Specifications are provided on their Development sheets.		

Schedule	FY04 President's Budget	Change from Baseline
OSP Development:		
Conduct Mission Baseline Review	Jan-03	New
Complete System Requirements Review	Dec-03	New
Complete OSP Phase A Concept Studies - System Design Review **(1)**	Jul-04	New
OSP Full Scale Development Decision **(1)**	Sep-04	New
Complete Preliminary Design Review **(1)**	May-05	New
X-37 ATLV:		
ALTV Structural Proof Test	Jul-03	--
ALTV Roll-out	Jan-04	--
Complete Captive Carry Tests	Jun-04	--
Conduct Drop Test	Aug-04	--
DART Demonstrator:		
System Pre-ship Review	Oct-03	--
Launch	Apr-04	--
Post-Flight Report Complete	May-04	--
X-37 Orbital Vehicle:		
Conduct System Definition Review	Jul-03	New
Conduct Preliminary Design Review	FY 2004 Q2	New
Conduct Critical Design Review **(1)**	2005	New
Perform Orbital Flight Test **(1)**	2006	New
Pad Abort Demonstrator (1):		
Conduct initial demonstration tests	2005	New
Conduct second stage of demonstration tests	2006	New
(1) Schedule is preliminary pending results of formulation activities		

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS

The current acquisition strategy uses the existing SLI architecture contractors to conduct OSP concept studies. Free and open competitive procurements are planned for the follow-on design, development, and procurement of the OSP. Free and open procurements were used for the flight demonstration projects. The X-37 Orbital Vehicle and PAD contracts were awarded as a result of the NRA 8-30 Cycle II NRA competitive announcement that occurred during 2002.

THEME: Space Launch Initiative

TECHNOLOGY AND ADVANCED CONCEPTS: Orbital Space Plane (OSP) Program

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS - CONTINUED

Changes since FY03 Pres. Budget:

- The acquisition strategy for OSP development is a revision to the acquisition strategy resulting from the change in program direction to focus development on the Orbital Space Plane.
- The DART Project has no acquisition strategy changes since the FY03 President's Budget.
- The X-37 Project baseline was changed to incorporate the selection of the X-37 Orbital Vehicle as part of NRA 8-30 Cycle II NRA selections. The cooperative agreement that had been in effect is being closed out with a new cost plus award fee/incentive fee contract to execute the entire X-37 project, including both the ALTV and Orbital Vehicle.
- The PAD contract has been awarded as a result of NRA 8-30 Cycle II selections in FY02.

Current Acquisitions	Actual *	Selection Method	Actual *	Performer	Actual *
Cooperative Agreements	--%	Full & Open Competition	--%	Industry	--%
Cost Reimbursable	--%	Sole Source	--%	Government	--%
Fixed Price	--%		--%	NASA Intramural	--%
Grants	--%			University	--%
Other	--%	Sci Peer Review	--%	Non Profit	--%
* as % of FY02 direct procurement	--%	* as % of FY02 direct procurement		* as % of FY02 direct procurement	--%

Future Acquisitions - Major	Selection	Goals
1. Restructure SLI architecture contracts (1)	FY 2003 Q1	
2. Award new Flight Demonstrator contracts (1)	FY 2003 Q1	100% Full & Open Competition - NRA 8-30 Cycle II
3. Conduct OSP Preliminary Design (2)	FY 2004	100% Full & Open Competition

AGREEMENTS

Internal: The Program is not dependent on other NASA activities outside of the control of the Associate Administrator of the Office of Aerospace Technology (Code R).

External: The X-37 Project is dependent on the Air Force for range activities - Technical Task Agreements (TTA).

Changes since FY03 Pres. Budget: No changes in internal/external agreements.

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
Relevance	ATAC	Nov-02	Feb-03	Independent panel reporting to the NAC and the Adminstrator.
Performance	ERAT	Mar-02	Nov-02	Independent expert, assessments, and studies for intent.
Performance	IPAO IRT	--	2004	Conduct NAR to review the analysis, definition, development, and operations for Full Scale Development decision.
Performance	TBD	--	2004	Independent cost assessment of the OSP including an emphasis on the X-37.
Performane	IPAO IRT	--	2006 & on	Independent annual review and assessment of program technical objectives within cost.

THEME: Space Launch Initiative

TECHNOLOGY AND ADVANCED CONCEPTS: Orbital Space Plane (OSP) Program

BUDGET

Budget Authority ($millions)	FY02	FY03	FY04	Comments
FY 2004 President's Budget (Technology)	**0.0**	**295.7**	**550.2**	SLI refocused from 2nd Gen RLV and STLT in FY03 NASA Budget Amendment to OSP & NGLT Programs contained in FY03 NASA Budget Amendment.
Design & Integration	0.0	75.4	324.2	
Technology & Demonstations	0.0	220.3	226.0	
X-37 Approach & Landing Test Vechicle (ALTV)	*0.0*	*177.6*	*178.0*	
Demonstration of Autonomous Rendezvous Technology (DART)	*0.0*	*19.7*	*18.0*	
PAD - Launch Pad, Crew Excape Demonstration		*23.0*	*30.0*	
Changes since FY 03 Pres. Budget	**+0.0**	**+0.0**	**+108.2**	***Reason for Changes:*** *increase for full cost implications.*
Undefined Orbital Space Plan (in FY03 Budget Amendment)	**+0.0**	**-295.7**	**-442.0**	**Define Projects within OSP (off-set to show detail below).**
Design & Integration	+0.0	+75.4	+324.2	*1st Time to show this level of detail within Orbital Space Plane.*
Technology & Demonstrations				*1st Time to show this level of detail within Orbital Space Plane.*
* *X-37 Approach & Landing Test Vechicle (ALTV)*	*+0.0*	*+177.6*	*+178.0*	*FY02 Budget was reflected in 2nd Generation RLV Project. FY03 is 1st time to show this level of detail within OSP Technology & Demonstrations.*
Demonstration of Autonomous Rendezvous Technology (DART)	*+0.0*	*+19.7*	*+18.0*	*1st Time to show this level of detail within OSP Technology & Demonstrations.*
PAD - Launch Pad, Crew Excape Demonstration		*+23.0*	*+30.0*	*1st Time to show this level of detail within OSP Technology & Demonstrations.*

Indicates budget numbers in Full Cost.

Indicates changes since the FY 2003 President's Budget Submit.

Note: For all formats, the FY02 column reflects the FY02 Congressional Operating Plan dated 9/30/02. The FY03 column reflects the FY03 President's Budget Submit (PBS) as Amended. The Change column includes both programmatic and full cost adjustments. The FY04 column is in full cost.

* The X-37 reflected in FY2003 President's Budget was an X-37 Orbital Vehicle, this X-37 is a Approach & Landing Technology Vehicle (not the same project).

THEME: Space Launch Initiative (SLI)

TECHNOLOGY AND ADVANCED CONCEPTS: Next Generation Launch Technology (NGLT) Program

PURPOSE

Objectives		Reference 2003 Strategic Plan	Performance Measures
3.1	Enhance the nation's security by developing and demonstrating critical access-to-space technologies that benefit NASA, DOD, and other government agencies.		4SLI17
6.1	Improve student proficiency in science, technology, engineering and mathematics by creating a culture of achievement using educational programs, products and services based on NASA's unique missions, discoveries and innovations.		4SLI18
7.3	Increase public awareness and understanding of how research and innovations in aerospace technology affect and improve the qualiy of life.		4SLI19
8.2	Improve the safety, affordability and reliability of future space transportation systems.		4SLI1-3, 4SLI8-15
9.5	Create innovative approaches and concepts to inform future decisions concerning systems, infrastructures and missions for human and robotic exploration of space.		4SLI16

The Next Generation Launch Technology Program will advance the state-of-the-art in critical and high payoff technologies to enable low-cost, reliable and safe future generations of space transportation systems. All elements within NGLT seek to advance enabling technologies that are currently not technically or economically feasible. The missions include safe, routine, earth-to-orbit transportation to enable NASA's exploration and development of space, enable new commercial space markets, and enhance the Nation's security through aerospace technology development.

OVERVIEW

The Next Generation Launch Technology (NGLT) program of the SLI theme contains three elements: (1) Propulsion Technology, (2) Launch Systems Technology and (3) Systems Engineering and Analysis. The NGLT has resulted from the consolidation of the remaining technology development activities from the former Second Generation RLV with the Space Transfer and Launch Technology Program (3rd Generation Hypersonics) to ensure a coordinated technology effort. The goal of the Next Generation Launch Technology program is to develop technology to make next generations of launch systems safer, more affordable and more reliable, in support of the Agency's Integrated Space Transportation Plan RLV decision points.

The *Propulsion Technology* element reduces the most critical, highest payoff technology risks associated with future launch propulsion systems. The core projects in the Propulsion Technology program element will be the development of a LOX/Kerosene rocket booster engine to prototype testing, a Rocket Based Combined Cycle (RBCC) ground engine testbed and a Turbine Based Combined Cycle ground engine testbed. In addition, cross-cutting propulsion component and subsystem technologies will be developed which support these testbeds and operational engine needs.

The *Launch Systems Technology* element reduces the most critical, highest payoff technology risks associated with future launch vehicle systems. This includes aerosciences, propulsion/airframe integration, structures and materials, vehicle subsystems, integrated vehicle health management and operations. The current core project in the Launch Systems Technology program element is the flight demonstration of dual-mode scramjet propulsion system integrated with an airframe (X-43C). The remaining technology investments are being reevaluated during the formulation phase to determine the balance of priorities.

The *Systems Engineering and Analysis* element will provide systems analyses to integrate the activities both within the NGLT and within the SLI Programs. These analyses will focus and guide the technology investments.

PROGRAM MANAGEMENT

The Office of Aerospace Technology (OAT) Enterprise Program Management Council (EPMC) has NGLT governing responsibility. The NASA Enterprise official is Dr. Jeremiah Creedon, Associate Administrator (AA) for Aerospace Technology. The Theme Director is Dr. John Rogacki, Division Director for Space Transportation Technology. The acting OSP Program Manager is Mr. Garry Lyles and the acting OSP Deputy Program Manager is Mr. Stephen Cook.

TECHNICAL COMMITMENT

The baseline for this technical commitment is the FY03 budget amendment. The formulation phase of the NGLT Program will be used to assess the long-term technology funding priorities. The baseline technical commitments below may change based on this assessment.

Technical Specifications		FY04 Budget Submit FY02	FY03	FY04		Change from Baseline
LOX/RP Prototype Engine Development. Deliver a prototype test	TRL	4	4	4	5	--
engine and database	$M		171.0	97.5		--
Current TRL status relative to FY03 plan (R/Y/G/B)						Planned TRL status to FY03 plan

THEME: Space Launch Initiative (SLI)

TECHNOLOGY AND ADVANCED CONCEPTS: Next Generation Launch Technology (NGLT) Program

TECHNICAL COMMITMENT - CONTINUED

Technical Specifications		FY04 President's Budget FY02	FY03	FY04		Change from Baseline
LOX/H2 Integrated Powerhead Demo.	TRL	4	4	5		--
	$M		8.1	2.5		--
RBCC: Deliver a test database that verifies operability of a reusable rocket based combined cycle engine in Air-augmented rocket, Ramjet and Scramjet modes in wind tunnel conditions equivalent to Mach 0-7 flight vehicle operation.	TRL	3	3	3	4	--
	$M		28.5	31.9		--
TBCC: Deliver a test database that verifies operability, performance, and durability of a turbine based combined cycle engine in wind tunnel conditions equivalent to Mach 4 flight vehicle operation.	TRL	3	3	3	3	--
	$M		19.9	24.6		--
X-43C: Deliver a test database and validated design tools for Mach 5 - 7 scramjet powered vehicle in flight.	TRL	3	3	3	4	--
	$M		25.4	34.5		--
System Engineering and Analysis: Deliver an annual update of technology priorities, technical performance metrics, and progress towards program objectives.	TRL	N/A	N/A	N/A	N/A	--
	$M		34.9	30.3		--
Current TRL status relative to FY03 plan (R/Y/G/B)			⇧	⇦		Planned TRL status to FY03 plan

Schedule	FY04 Budget	Chng Base	Schedule	FY04 Budget	Chng Base
RBCC:			**TBCC:**		
Complete Concept Design	2003	--	Define Systems Requirements	2003	--
Complete Preliminary Design	2004	--	Complete High Speed Fan Design	2004	--
Complete Direct Connector Combustor Rig Test	2004	--	Complete Preliminary Design	2004	--
Complete Design	2005	--	Complete Augmentor Rig Test	2005	--
Conduct ground test of Air-Augmented Rocket	2007	--	Complete Design	2006	--
Conduct ground tests of Ramjet and Scramjet Engines	2008	--	Complete Engine #1 Test	2008	--
X-43C:			**LOX/RP Engine:**		
Define Systems Requirements	2003	--	Complete Concept Design	2003	--
Complete Mach 5 Multi-Module Flowpath Propulsion Demonstrator Test Design	2004	--	Complete Preliminary Design	2003	--
Complete Preliminary Design	2005	--	Conduct Interim Design Review	2004	--
Conduct Mach-5 Multi-Module Flowpath Propulsion Demonstrator Ground Test	2005	--	Complete Final Prototype Design	2005	--
Complete Design	2006	--	Complete Powerhead Test	2006	--
Accept Delivery of Demo. Vehicle	2007	--	Complete Breadboard Thrust Chamber	2007	--
Conduct X-43C Flight Test	2008	--	Complete Prototype Engine Test	2007	--

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS

Due to the broad nature of the Next Generation Launch Technology Program, a variety of acquisition instruments will be employed. Procurements will be in accordance with approved procedures at the implementing Centers. Free and open competitive procurements will be used to the maximum extent possible. The NGLT acquisition strategy employs both NASA in-house and contracted activities. Because of the experimental nature of the NGLT program, emphasis will be placed on streamlined procurement approaches. The program will use existing contracts, NRA's, Cooperative Agreements, Space Act Agreements, purchase orders, and support agreements to the greatest extent possible. Multiple procurements are anticipated annually. The acquisition process will allow for government-only, industry/university-only, and government-industry/university teams to bid for NGLT technology tasks. Government-only tasks will use a separate, internal, government selection process. Innovative means of data sharing will be encouraged in order to ensure the fastest possible transition of technology to the end users. The U. S. Government will retain all data rights from Government funded activities.

Changes since FY03 Pres. Budget: None.

THEME: Space Launch Initiative (SLI)

TECHNOLOGY AND ADVANCED CONCEPTS: Next Generation Launch Technology (NGLT) Program

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS

Current Acquisitions	Actual *	Selection Method	Actual *	Performer	Actual *
Cooperative Agreements	--%	Full & Open Competition	--%	Industry	--%
Cost Reimbursable	--%	Sole Source	--%	Government	--%
Fixed Price	--%		--%	NASA Intramural	--%
Grants	--%			University	--%
Other	--%	Sci Peer Review	--%	Other	--%
* as % of FY02 direct procurement	--%	* as % of FY02 direct procurement		* as % of FY02 direct procurement	--%

Future Acquisitions - Major	Selection	Goals
1. X-43C Flight Demonstrator Vehicle	Summer 03	Full and open Competition.
2. Propulsion R&T	Summer 03	Fully competed. 2 competitions - internal and external (NRA).
3. Prototype Engine	Summer 04	Full and open competition for the LOx/RP engine prototype.

Note: Other acquisitions are likely as a result of the systems analyses to be conducted during NGLT formulation.

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator of Aerospace Technology.

External: The programs within NGLT will pursue cooperation with the DoD, Air Force Research Laboratory (AFRL), and the Department of Energy laboratories, where appropriate. A Memorandum of Understanding currently exists between NASA and the AFRL for the development and delivery of the USAF HyTech engine to NASA for integration into the X-43C Hypersonic Flight Demonstrator. Also, there is an Memorandum of Agreement between the Office of Aerospace Technology (OAT) and the Office of the Director, Defense Research and Engineering (DDR&E) regarding the University of Maryland University Research, Engineering and Technology Institute.

Changes since FY03 Pres. Budget: None.

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
Relevance	ATAC	Nov-02	Feb-03	Serve as an independent panel to the Office of Aerospace Technology. Review programs/projects, reporting to the NASA Advisory Council and Administrator.
Performance	IPAO	--	2003	Validate the NGLT's ability to achieve the objectives within cost and schedule through IIR.
Performance	IPAO	--	2004	Validate the NGLT's ability to achieve the objectives within cost and schedule through IIR.
Quality Review	National Academy	--	2004 / 2007	Assess the technical quality of research & technology work being performed.

BUDGET

Budget Authority ($ in millions)	FY02	FY03	FY04	Comments
FY 2004 President's Budget (Technology)	**0.0**	**583.7**	**514.5**	
Changes since FY03 Pres. Budget	**+0.0**	**+30.7**	**+37.5**	***Reason for Change:***
Next Generation Lanuch Technology	+0.0	+30.7	+37.5	Agency Offsets & Full Cost Implications

Indicates budget numbers in Full Cost.

Indicates changes since the FY 2003 Presidents Budget Submit.

Note: For all formats, the FY02 column reflects the FY02 Congressional Operating Plan dated 9/30/02. The FY03 column reflects the FY03 President's Budget Submit (PBS) as Amended. The Change column includes both programmatic and full cost adjustments. The FY04 column is in full cost.