

National Aeronautics and Space Administration



**Academy of Program / Project  
& Engineering Leadership**  
Annual Report for  
Fiscal Year 2010

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# Mission

The NASA Academy of Program/Project & Engineering Leadership (APPEL) supports NASA's mission by promoting individual, team, and organizational excellence in program/project management and engineering through the application of learning strategies, methods, models, and tools.

# Goals

- 1) Provide a common frame of reference for NASA's program/project and engineering workforce.
- 2) Provide and enhance critical job skills.
- 3) Support engineering, program, and project teams in the field.
- 4) Promote organizational learning across the agency.
- 5) Supplement formal education programs.

# Leadership Team



## Dr. Edward J. Hoffman

As the founding director of the Academy of Program/Project and Engineering Leadership, Dr. Hoffman is responsible for the development of program and project leaders and teams within NASA. This includes the development and maintenance of a comprehensive program and project management competency model, training curriculum, consulting services for project management teams, knowledge sharing strategies, and research and advanced concepts. In this capacity, Dr. Hoffman works both within

NASA and externally with leaders of industry, academia, associations, and other government agencies to establish priorities and enhance capabilities in program/ project management and engineering.



## Mr. Roger Forsgren

As deputy director of the Academy of Program/Project and Engineering Leadership, Mr. Forsgren is responsible for the contractual and financial management of the Academy. He manages all contract, procurement, and budget issues, along with the daily operations of the Academy, and leads the development of new discipline engineering training courses.



## Ms. Christine Williams

Ms. Williams manages the Academy's systems engineering training and development activities, including the Systems Engineering Leadership Development Program (SELDLP). She also manages Project HOPE (Hands-On Project Experience), and has led studies to identify the behaviors of effective systems engineers and executives at NASA.



## Dr. Pat Patterson

Dr. Patterson provides oversight for Project HOPE and expertise in the development of training for engineers. He was the founding director of the NASA Engineering Training (NET) program before it merged with the Academy.



A group of people are seated around a large conference table in a meeting room. In the foreground, a man with glasses and a mustache, wearing a light blue shirt and a dark tie, is speaking into a microphone. He is looking towards the right. Behind him, several other people are seated, some looking towards the speaker and others looking down at papers or devices. The room has large windows in the background, and the overall atmosphere is professional and collaborative.

# Executive Summary

2010 was a year of dramatic change for NASA. With major programmatic changes in human spaceflight, proposed significant investments in technology development, a new National Space Policy, and the pending retirement of the space shuttle, the agency operated in a highly dynamic environment.

In short, 2010 demanded a workforce ready to respond to these adaptive challenges now and for years to come. The Academy was well positioned to anticipate and support new and emerging workforce needs in a number of areas:

- Extensive engagement with international partners
- Increased emphasis on supporting young professionals
- Increased opportunities for hands-on learning and project team development
- Expanded support for activities related to green engineering and sustainability
- Cutting-edge research about young professionals pursuing careers in aerospace, the behaviors of high-performing executives at NASA, and trends in project management



# New Academy Activities that Align with National Space Policy Goals

Several new Academy activities aligned with the goals of the National Space Policy released in June 2010.

## NATIONAL SPACE POLICY GOAL:

### ENERGIZE COMPETITIVE DOMESTIC INDUSTRIES

to participate in global markets and advance the development of: satellite manufacturing; satellite based services; space launch; terrestrial applications; and increased entrepreneurship.

## NEW ACADEMY ACTIVITIES IN FY 2010

Hosted the Chief Technology Officer in Masters Forum and Masters with Masters events to enable discussion of future technology development plans with the workforce.

## NATIONAL SPACE POLICY GOAL:

### EXPAND INTERNATIONAL COOPERATION

on mutually beneficial space activities to: broaden and extend the benefits of space; further the peaceful use of space; and enhance collection and partnership in sharing of space derived information.

Hosted first international track at PM Challenge 2010.

Initiated International Project Management Committee under auspices of the International Astronautical Federation.

Conducted full review of course content for "International Project Management" with input from international partners.

## NATIONAL SPACE POLICY GOAL:

### STRENGTHEN STABILITY IN SPACE

through: domestic and international measures to promote safe and responsible operations in space; improved information collection and sharing for space object collision avoidance; protection of critical space systems and supporting infrastructures, with special attention to the critical interdependence of space and information systems; and strengthening measures to mitigate orbital debris.

Introduced "Orbital Debris Mitigation and Reentry Risk Management" course.

**NATIONAL SPACE POLICY GOAL:**

**INCREASE ASSURANCE AND RESILIENCE OF MISSION ESSENTIAL FUNCTIONS**

enabled by commercial, civil, scientific, and national security spacecraft and supporting infrastructure against disruption, degradation, and destruction, whether from environmental, mechanical, electronic, or hostile causes.

**NEW ACADEMY ACTIVITIES IN FY 2010**

Introduced “Orbital Debris Mitigation and Reentry Risk Management” course.

**NATIONAL SPACE POLICY GOAL:**

**PURSUE HUMAN AND ROBOTIC INITIATIVES**

to develop innovative technologies, foster new industries, strengthen international partnerships, inspire our Nation and the world, increase humanity's understanding of the Earth, enhance scientific discovery, and explore our solar system and the universe beyond.

Hosted first international track at PM Challenge 2010.

Initiated International Project Management Committee under auspices of the International Astronautical Federation.

Hosted the Chief Technology Officer in Masters Forum and Masters with Masters events to enable discussion of future technology development plans with the workforce.

Hosted second Principal Investigator Team Masters Forum in partnership with Science Mission Directorate.

Conducted full review of course content for “International Project Management” with input from international partners.

**NATIONAL SPACE POLICY GOAL:**

**IMPROVE SPACE BASED EARTH AND SOLAR OBSERVATION CAPABILITIES**

needed to conduct science, forecast terrestrial and near Earth space weather, monitor climate and global change, manage natural resources, and support disaster response and recovery.

Hosted second Principal Investigator Team Masters Forum in partnership with Science Mission Directorate.



# Core Business

In FY 2010, the Academy achieved the following in its core areas of activity:

- Trained 3,192 participants in 131 course offerings.
- Provided yearlong hands-on development opportunities for 16 civil servants through the Systems Engineering Leadership Development Program (SELDP) and 14 project team members at the Jet Propulsion Laboratory through Project HOPE (Hands-One Project Experience).
  - Within four months of returning to their home centers, 92% of SELDP graduates transitioned to more complex positions where they are using the leadership and systems engineering knowledge and experience gained in the program.
- Provided support to 264 project and engineering teams.
- Reached 1,555 participants in five knowledge sharing forums and PM Challenge 2010 (co-sponsored with the Office of Safety and Mission Assurance).
- Published *ASK Magazine* quarterly (5,500 hard copies and 18,461 e-subscribers) and the ASK the Academy e-newsletter monthly (22,095 e-subscribers).

2010

3,192

COURSE PARTICIPANTS

2009

2,228

COURSE PARTICIPANTS

2008

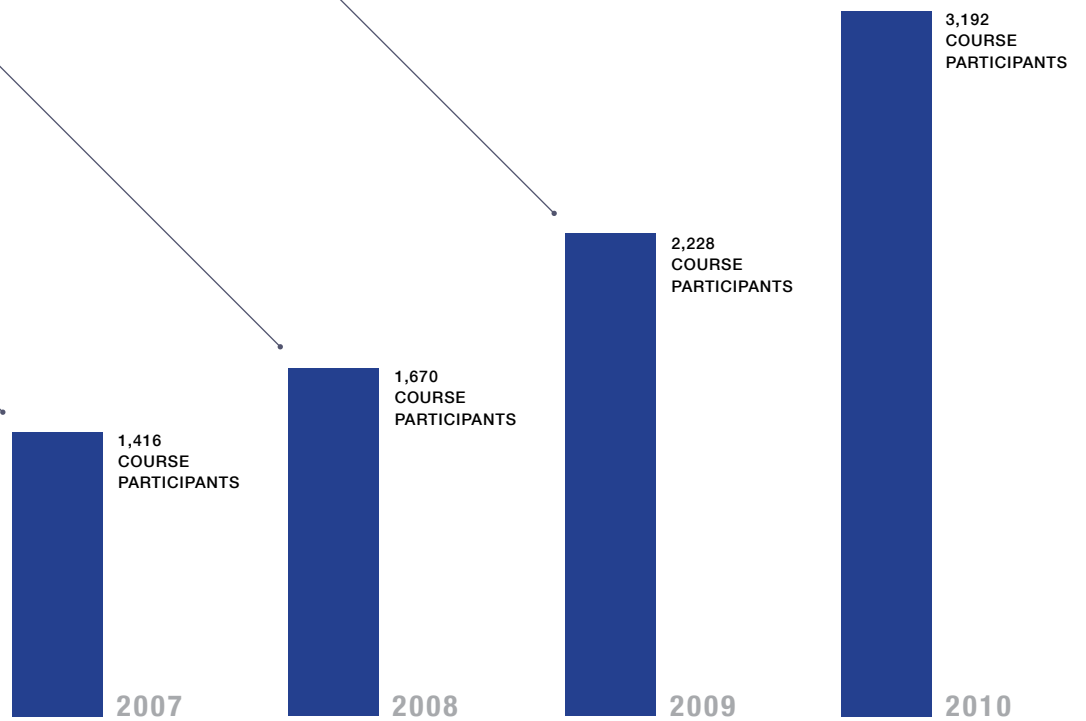
1,670

COURSE PARTICIPANTS

2007

1,416

COURSE PARTICIPANTS



The record number of 3,192 course participants in FY 2010 reflects a leap of 43% from the 2,228 participants in FY 2009, a 91% increase over the 1,670 participants in FY 2008, and a 125% increase since FY 2007, when 1,416 participated in the Academy's courses.



# Innovation


The Academy continued to innovate by expanding the range and scope of its activities and offerings.

The Academy expanded its course offerings and learning activities with international partners in FY 2010.

## Training

Received accreditation from the American Council on Education (ACE) for twelve courses, resulting in recommendation for graduate credits for:

- Advanced Project Management and Advanced Systems Engineering
- Concept Exploration and Systems Architecting
- Decision Analysis
- Design for Manufacturability and Assembly
- Fundamentals of Systems Engineering
- Innovative Design for Engineering Applications (IDEA)
- International Project Management
- Leading Complex Projects
- Life-Cycle Processes and Systems Engineering
- Project Acquisition Workshop
- Project Management Leadership Lab
- Seven Axioms of Good Engineering (SAGE)



### Introduced new in-depth courses:

- Project Acquisition Workshop
- Essentials of Astronomy for NASA Engineers
- NASA Missions: Engineering Exploration
- Orbital Debris Mitigation and Reentry Risk Management
- Strategic Thinking for Project Success

### Formal Development Programs and Hands-On Learning

- Graduated the second class of Systems Engineering Leadership Development Program (SELDP), which has a 92% success rate of participants transitioning to more complex positions where they are using the leadership and systems engineering knowledge and experience gained in the program. (Three participants remain on developmental assignments.)
- Sponsored the first Project HOPE team (launch delayed due to weather and range availability until December 2010).
- Selected two multi-center Project HOPE teams for 2010–2011.
- Provided continuing support to Johnson Space Center's Program/Project Management Development (PPMD) program.

### Knowledge

- Hosted first-ever international track at PM Challenge.
- Initiated International Project Management Committee (IPMC) with other space agencies and organizations interested in promoting improved project management on international spaceflight projects.
- Held three knowledge forums, the second with co-host MITRE and the third with co-host Educational Testing Service.

### Hosted Masters with Masters events with:

- NASA Administrator Charlie Bolden and European Space Agency Director-General Jean-Jacques Dordain
- NASA Chief Technology Officer Bobby Braun and Johnson Space Center Engineering Director Steve Altemus
- Deputy Associate Administrator for Space Operations Lynn Cline and Associate Administrator for Independent Program and Cost Evaluation Mike Hawes
- Nobel Prize-winning COBE Project Scientist John Mather and former COBE Deputy Project Manager Dennis McCarthy

## Research

- Presented findings of the most comprehensive survey to date of technical workforce development to the NASA Program Management Council in April 2010.
- Collaborated with Aviation Week on inaugural “Young Professional and University Student Research Study,” published in August 2010.
- Published Systems Engineering Leadership Development Program’s (SELDLP) “Executive Behavior Study,” published in June 2010.
- Published annual “Trends in Project Management” study, published in February 2010.

## Communications

Academy team members presented to a wide range of professional associations and external organizations, including:

- International Astronautical Congress
- Project Management Institute
- 4th Symposium on Project Governance
- American Society for Training and Development
- Korea Aerospace Research Institute
- United Kingdom Ministry of Defense
- American Society of Engineering Education
- Stevens Institute of Technology
- Neuroleadership Summit
- UK Leadership Coaching Conference
- The Conference Board
- Harrisburg University’s Project Leadership Forum



Steve Altemus (*left*) and Bobby Braun participate in Masters with Masters at NASA Headquarters.



# Recognition






The Academy and its people also received recognition for excellence.

- The Academy was recognized as the top project academy in the world in a benchmarking study conducted by Human Systems International (UK).
- The American Council on Education recommended graduate credit for participation in 12 Academy courses.
- *ASK Magazine* received awards including the 2010 Astrid Gold Award for outstanding achievement in design communications for employee magazine and the 2010 APEX Award for publication excellence.
- Dr. Ed Hoffman received the NASA Outstanding Leadership Medal.
- Rob Clairmont, Maureen Dale, and Donna Wilson received the NASA Space Flight Awareness Award.

## Measuring Effectiveness

The Academy measures its effectiveness in five primary ways:

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- ... Accreditation (Registered Education Provider of Professional Development Units (PDUs) for Project Management Institute—all participants in project management courses receive PDUs; American Council on Education recommends graduate credits for 12 Academy courses)
- ... Assessment and Testing (workforce needs analysis; baseline and post-service assessment results for teams and individuals, including 360-degree feedback)
- ... Customer Feedback (utilization metrics and user surveys, demand for courses and project team services; new assignment data and supervisor interviews; meetings with senior leaders at NASA centers and mission directorates; requests from senior leadership for studies, papers, articles, case studies and lessons learned)
- ... External Validation (benchmarking with organizations such as Human Systems International (UK), General Motors, Aerospace Corporation, Perot Systems, MIT, and the Management Operations Working Group)
- ... Alignment with NASA Policies and External Requirements (Office of Management and Budget approval of project management certification process; activities supporting NASA's Corrective Action Plan to remove NASA Acquisition Management from the General Accountability Office's (GAO) High Risk List; briefings to the NASA Program Management Council, the Engineering Management Board, and the Program/Project Management Board)

# Advancing Development on Three Levels

The Academy focuses its learning activities at three levels: individual practitioners, project teams, and the organization.

- Individual practitioners. The Academy offers competency-based training, developmental assignments, and hands-on opportunities to help individual practitioners develop their skills at each level of their careers.
- Project teams. Since most learning takes place within the project team, the best chance of facilitating project success is at the team level. In 2010 the Academy supported 264 project and engineering teams by offering a variety of tools and services: online assessments measuring team performance, workshops focusing on team effectiveness, technical life-cycle support, and intensive coaching, mentoring, and consulting with expert practitioners.
- Organization. At the agency-wide level, the Academy invests in knowledge sharing strategies that emphasize the power of telling stories through forums and publications in order to help create a community of practitioners who are reflective and geared toward sharing.

## KNOWLEDGE SHARING

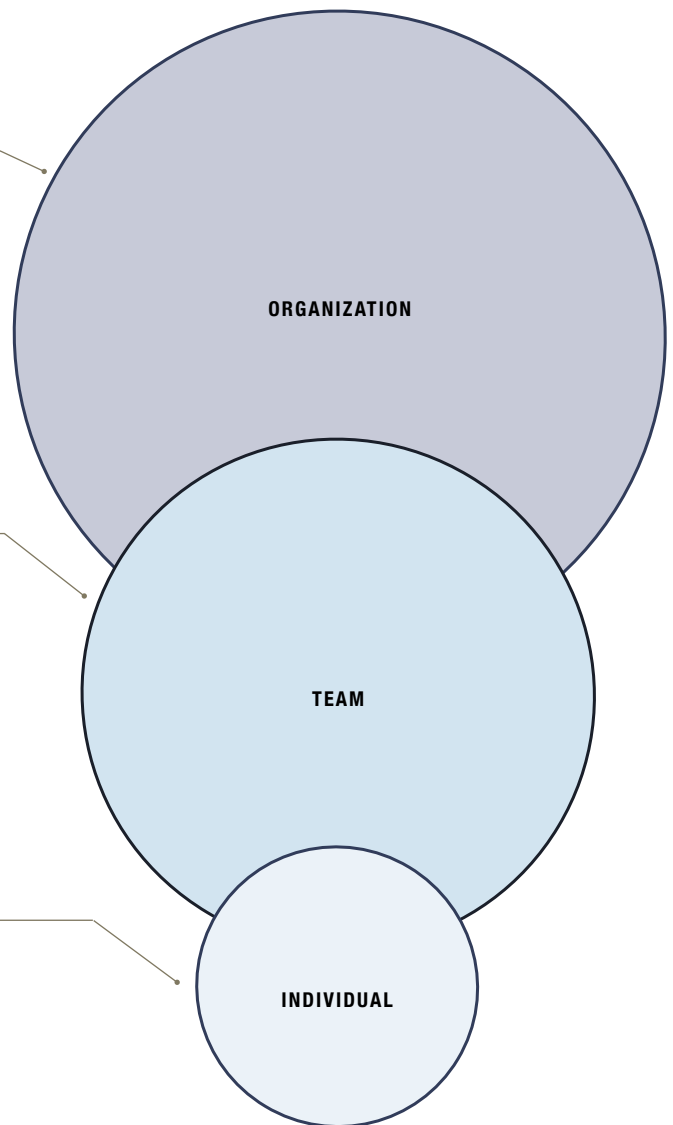
- Forums for project managers, systems engineers, and principal investigators
- Publications
- Case studies
- Communities of practice

## DIRECT SUPPORT TO PROJECT TEAMS

- Online assessments
- Workshops
- Mentoring and coaching
- Expert practitioners and technical lifecycle support
- Team building and process support

## TRAINING CURRICULUM HANDS-ON LEARNING

- Core curriculum for 4 career levels
- In-depth offerings in subject areas
- Hands-on opportunities and developmental assignments



The Academy builds individual competence, team performance, and organizational community across NASA.



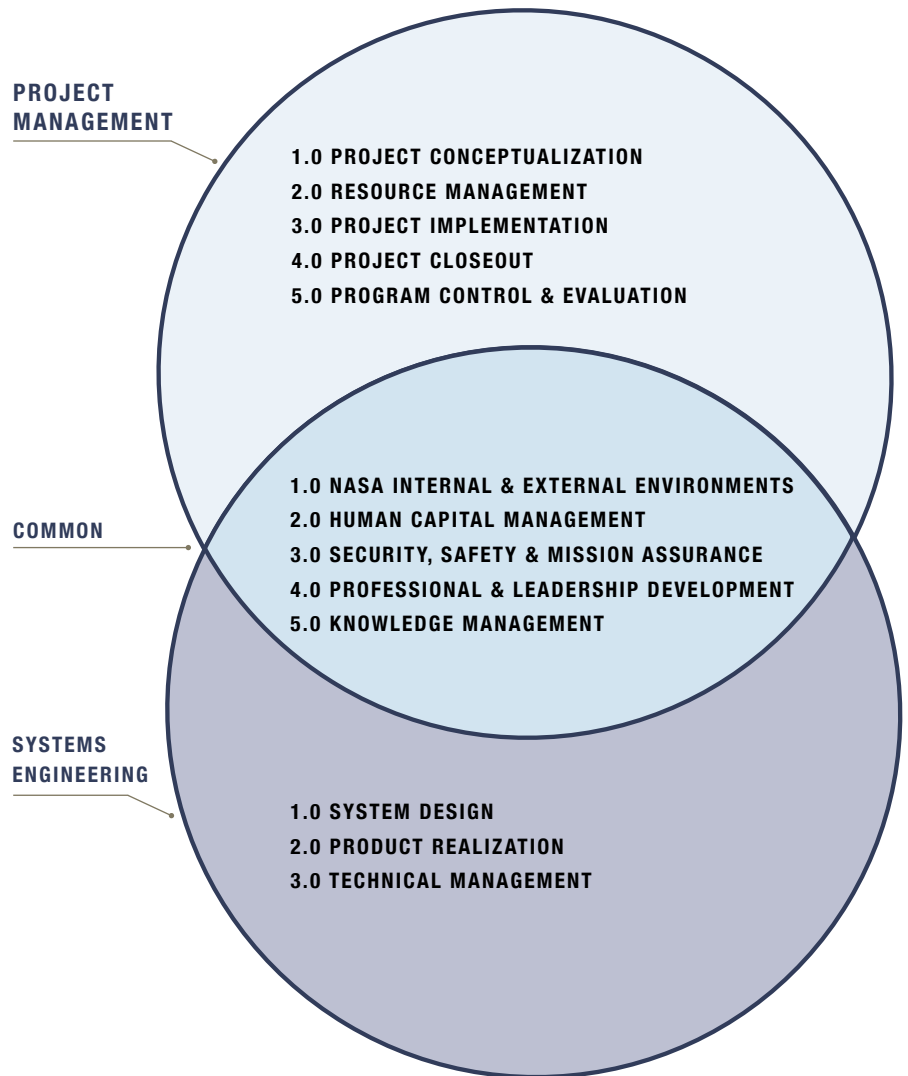
An audience member asks a question at a Masters with Masters event.

# Building Individual Capability Through Training

The Academy's training curriculum enables NASA's technical workforce to develop NASA-specific expertise and capability in project management and engineering. It is intended to supplement an individual's academic and professional work experience. The curriculum draws extensively on best practices and the knowledge of NASA subject-matter experts to ensure it addresses the needs of the agency's practitioners. The courses are developed following established instructional design processes and include rigorous annual audits and revisions and incorporation of participant feedback.

## Competency Model

The Academy's project management and systems engineering competency model provides the basis for all course objectives. The competencies align with the NASA governance model as well as NASA standards, policies, and requirements. Within the past year, the Academy reviewed and consolidated its existing competency models for project management and systems engineering into a single integrated competency model consisting of five project management competency areas, three systems engineering competency areas, and five competency areas common to both disciplines.



The Academy employs an integrated competency model that addresses project management, systems engineering, and shared competencies.

••••• During 2010, the Academy received accreditation from the American Council on Education (ACE) for 12 courses, resulting in recommendation for graduate credits.

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The Academy collaborated with the Office of Human Capital Management to incorporate the new consolidated competency model into the NASA Competency Management System (CMS) Workforce Competency Dictionary, which is used to monitor and measure the agency's knowledge base.

The Academy's competencies align with the NASA governance model as well as with agency standards, policies, and requirements.

The curriculum includes both core courses and in-depth offerings. Core courses offer a comprehensive, integrated approach to learning and are designed to help participants expand their thinking—to make connections among many systems engineering and project management principles and concepts, see the “big picture,” and understand the context and interrelationships of the topics. Topics covered in core courses range from the foundations of aerospace to advanced project management and systems engineering. The Academy also offers a wide variety of in-depth courses in five domains: project management, systems engineering, engineering, communication and leadership, and program control.

### Recognition for Quality

A critical measure of the quality of the Academy's curriculum is external validation. As part of its Registered Education Provider status under the Project Management Institute, the Academy offers professional development units (PDUs) for participation in more than 30 courses. During 2010, the Academy also received accreditation from the American Council on Education (ACE) for 12 courses, resulting in recommendation for graduate credits for:

- Advanced Project Management and Advanced Systems Engineering
- Concept Exploration and Systems Architecting
- Decision Analysis
- Design for Manufacturability and Assembly
- Fundamentals of Systems Engineering
- Innovative Design for Engineering Applications (IDEA)
- International Project Management
- Leading Complex Projects
- Life-Cycle Processes and Systems Engineering
- Project Acquisition Workshop
- Project Management Leadership Lab
- Seven Axioms of Good Engineering (SAGE)



## Innovative Offerings

The Academy continued to innovate and address new and emerging needs through its in-depth offerings. Building on the success of recently added engineering courses such as “Earth, Moon, and Mars,” “Design for Manufacturability and Assembly,” and “Space Systems Development: Lessons Learned,” the Academy introduced three new engineering courses in FY 2010:

- Essentials of Astronomy for NASA Engineers
- NASA Missions: Engineering Exploration
- Orbital Debris Mitigation and Reentry Risk Management

“Essentials of Astronomy for NASA Engineers” provides a deeper understanding of the universe for NASA engineers and technicians with minimal astronomy training to supplement their work supporting space exploration. Most undergraduate engineering degrees do not require a foundational background in astronomy, even though such engineers will develop the instruments to make astronomical observations. The ultimate goal is to offer a physical and philosophical understanding of our universe and instill a sustaining interest in astronomy.

“NASA Missions: Engineering Exploration” offers detailed synopses of key NASA missions, focusing on past accomplishments, current undertakings, and potential future endeavors as seen from engineering, scientific, historical, and human perspectives. Attendees learn the roles that innovation, teamwork, persistence, and passion play in an engineer’s daily work and how to ultimately apply these insights to their own daily thinking.

“Orbital Debris Mitigation and Reentry Risk Management” introduces participants to orbital debris environment characterization and mitigation, including: characterization and future growth of the orbital debris environment; collision risks; and orbital debris

mitigation policies, processes, requirements, and standards. It also explains reentry risks and design-for-demise methodology. The course is designed for all practitioners involved in spacecraft design and operations and interested in orbital debris issues and mitigation approaches.

The Academy also introduced two project management courses:

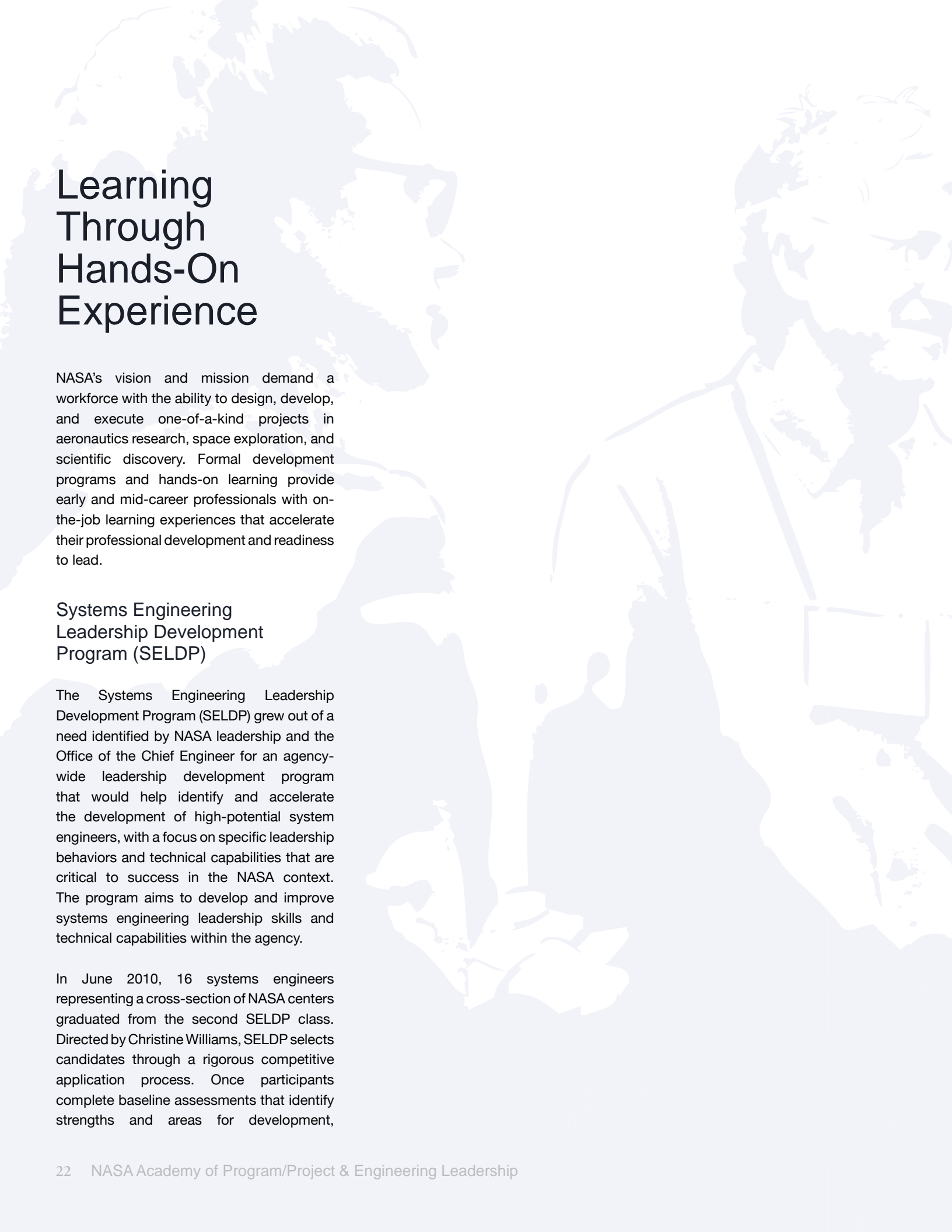
- Project Acquisition Workshop
- Strategic Thinking for Project Success

“Project Acquisition Workshop” supports efforts defined in NASA’s Corrective Action Plan to remove NASA Acquisition Management from the General Accountability Office’s (GAO) High Risk List. The course gives members of the technical workforce a basic understanding of the NASA acquisition and procurement process across the complete project life cycle, from agency strategic planning to contract management and completion. It also addresses how to develop an optimal acquisition/procurement strategy, get contracts awarded, solve problems during contract performance, and understand roles and responsibilities as a member of the project’s acquisition team.

“Strategic Thinking for Project Success” introduces concepts and methods for using strategic thinking as a logical foundation upon which to shape project definition and management. Participants learn how to explain the elements of strategy, illustrate systems thinking, define key performance parameters tied to the strategic objectives, interpret organizational dynamics in a strategic context, create a strategic decision model, identify and implement relevant performance guideposts, and evaluate project outcomes based on strategic performance.



Amy DeBonis of Educational Testing Service (*left*), and Jon Verville and Emma Antunes of Goddard Space Flight Center review knowledge networks at a forum hosted by the Educational Testing Service.




# Learning Through Hands-On Experience

NASA's vision and mission demand a workforce with the ability to design, develop, and execute one-of-a-kind projects in aeronautics research, space exploration, and scientific discovery. Formal development programs and hands-on learning provide early and mid-career professionals with on-the-job learning experiences that accelerate their professional development and readiness to lead.

## Systems Engineering Leadership Development Program (SELDP)

The Systems Engineering Leadership Development Program (SELDP) grew out of a need identified by NASA leadership and the Office of the Chief Engineer for an agency-wide leadership development program that would help identify and accelerate the development of high-potential system engineers, with a focus on specific leadership behaviors and technical capabilities that are critical to success in the NASA context. The program aims to develop and improve systems engineering leadership skills and technical capabilities within the agency.

In June 2010, 16 systems engineers representing a cross-section of NASA centers graduated from the second SELDP class. Directed by Christine Williams, SELDP selects candidates through a rigorous competitive application process. Once participants complete baseline assessments that identify strengths and areas for development,



they embark upon a year of learning, developing, and practicing the qualities of a systems engineering leader: creativity, curiosity, self-confidence, persistence, and an understanding of human dynamics. Program activities include a 6- to 12-month developmental assignment, mentoring and coaching, technical training, leadership development exercises, benchmark site visits, and forums.

The core of the SELDP experience is a hands-on developmental assignment away from the participant's home center and area of expertise. Participants take on systems engineering roles that expand their horizons by challenging them to develop new knowledge and skills in an unfamiliar organizational setting.

The third SELDP class began its program in August 2010, with 20 participants from eight NASA centers, the largest class to date.

## Project HOPE

Project HOPE (Hands-On Project Experience) is a cooperative workforce development program sponsored by the Academy and the Science Mission Directorate (SMD). Project HOPE provides an opportunity for a team of early entry NASA managers and engineers to propose, design, develop, build, and launch a suborbital flight project over the course of a year. The purpose of the program is to enable practitioners in the early years of their careers to gain the

knowledge and skills necessary to manage NASA's future flight projects.

Five NASA centers responded to the first Project HOPE Announcement of Opportunity in the spring of 2009. The winning proposal, the Jet Propulsion Laboratory's (JPL) Terrain-Relative Navigation and Employee Development (TRaiNED) project, sought to improve terrain-relative navigation by collecting ground imagery during a sounding rocket flight. Since the project built on a previous sounding rocket mission, it promised to accomplish its scientific goals while limiting its scope by reusing much of the technology from an earlier flight. The TRaiNED submission also leveraged an existing early-career hire development program at JPL called Phaeton, which provided significant resources.

A mission initiation conference took place in May 2009 at Wallops Flight Facility. The project then proceeded through its Systems Requirement Review (July 2009), Preliminary Design Review (September 2009), Critical Design Review (December 2009), and Mission Readiness Review (May 2010) in preparation for launch at White Sands Missile Range (WSMR) on June 22, 2010. The June 22 launch was scrubbed due to bad weather. The launch date is currently set for December 2010.

The team reported learning gains in interviews with the Academy. One member noted, “Less than three months ago, I had never worked on NASA projects. If I went on to another project now, I would hit the ground running. I would know what to expect, what to do, and what I need to get done.”

The second Announcement of Opportunity attracted six proposals, and in early August, two teams were selected for 2010–2011: Coastal and Ocean Airborne Science Testbed (COAST), a partnership between Ames Research Center and Goddard Space Flight Center; and Development and Evaluation of satellite ValidatiOn Tools by Experimenters (DEVOTE), a partnership between Langley Research Center and Goddard Space Flight Center.

### Support for Program/Project Management Development (PPMD-2) Program

The Academy continued its collaboration with Johnson Space Center on the second module of the Program/Project Management Development program (PPMD-2). A senior Academy team member assisted in the identification of key speakers for various modules and sessions, and two Academy team members participated in a PPMD module offering. Instructors from Academy courses also taught key subjects in the program.





Participants network at a Knowledge Forum.



# Increasing Team Effectiveness

Since most learning at NASA takes place within project teams, the best opportunity for facilitating project success is at the team level. The Academy's services increase a project's probability of success by delivering the right support to a project team at the right time. Through one-on-one assistance, focused workshops, or large group sessions, these activities achieve immediate project goals while enhancing long-term team capabilities.

In FY 2010 the Academy supported 264 project and engineering teams across NASA. Team support includes a variety of tools and services:

- Online assessments measuring team performance
- Workshops focusing on team building, team effectiveness, and leadership
- Technical life-cycle support
  - Requirements development
  - Planning and scheduling
  - Program control analysis
  - Systems integration support
  - Risk management
  - Software management
  - Technical review support
- Coaching
- Mentoring
- Expert practitioner consultations

The success of the Academy's support to its project teams led to invitations in 2010 to present its methodology and data to organizations ranging from the Central Intelligence Agency (CIA) to the American Society of Training and Development (ASTD).



Kevin Gannon of the U.S. Navy and Don Cohen, *ASK Magazine* Managing Editor, share ideas at a forum.

# Promoting a Learning Organization Through Knowledge Sharing

The problems that NASA projects seek to solve are novel in nature—they are often “firsts” or “onlies” that demand innovation, knowledge, and learning. The Academy’s knowledge sharing activities promote excellence in project management and engineering by using the power of stories to build a community of practitioners who are reflective and geared toward sharing. By facilitating agency-wide knowledge sharing through forums, conferences, publications, and multimedia offerings, the Academy helps ensure that critical lessons and knowledge remain accessible. The Academy’s knowledge network extends beyond NASA to include expert practitioners from industry, academia, other government agencies, research and professional organizations, and international space agencies.

## Masters Forum 19 – “Passing the Torch 2”

As NASA anticipated the retirement of the Space Shuttle, 2010 was an important time to reflect on some of the lessons learned from the formulation, development, and operations of the program and its many contributions to human exploration and science. “Passing the Torch 2” was an encore of the highly successful Masters Forum 18 held in May 2009. This second forum provided an opportunity for master practitioners from the Space Shuttle and Constellation programs to reflect on their experiences and look into the future to anticipate space transportation systems requirements and NASA’s new

mission-enabling, technology portfolio investment strategy.

Masters Forum 19, which took place May 12–15, 2010, in Melbourne, Florida, was a collaborative effort among the Academy, NASA Headquarters Public Affairs Office, and Kennedy Space Center’s Public Affairs Office. The program included several panel discussions, including one dedicated to future explorers—young students ranging in age from 7 to 17 years who share a passion for space. Other important dialogues included a discussion of attributes for the next-generation space transportation system and a review of NASA’s technology development agenda by the agency’s Chief Technologist Dr. Bobby Braun. In the evening, master storyteller Jay O’Callahan presented his original story “Forged in the Stars—A NASA Story,” specially commissioned by the Academy on the occasion of NASA’s 50th anniversary.

### Principal Investigator Team Masters Forum 2

The Academy conducted its second Principal Investigator (PI) Team Masters Forum April 27–29, 2010, in Annapolis, Maryland. The forum, a collaborative effort between the Academy and NASA’s Science Mission Directorate, brought together teams from the New Frontiers Mission-3 and the Mars Scout-2 Mission, as well as others selected for a future Mission of Opportunity, to gain a better understanding of the role of a PI at NASA. Master practitioners from past science

missions shared stories, perspectives, lessons learned, and best practices with their colleagues.

### Seventh Annual PM Challenge

The Project Management (PM) Challenge is an annual training event that brings together the best speakers, discussion panels, case studies, and networking opportunities in program/project management, systems engineering, safety and mission assurance, team building, business management, and many other key aerospace disciplines. The Academy co-sponsored PM Challenge 2010 with the Office of Safety and Mission Assurance.

The 2010 event, which took place February 9–10, 2010, in Galveston, Texas, featured more than 100 learning sessions on topics ranging from earned value management to best practices for external Standing Review Boards. Highlights included the first-ever track dedicated to international project management, and lessons learned from the success of the Ares I-X and the failure of the Orbiting Carbon Observatory.

### Masters with Masters

Masters with Masters events bring together two expert practitioners to share insights, stories, lessons learned, and best practices in a moderated conversation. The Academy develops podcast-quality videos of the events that are distributed through multiple

channels, including its website, the NASA Engineering Network (NEN), and YouTube.

The Academy built on the success of its first Masters with Masters event featuring Associate Administrator Chris Scolese and Chief Engineer Mike Ryschkewitsch by hosting four events in 2010:

- John Mather, former project scientist, Cosmic Background Explorer (COBE), and Dennis McCarthy, former deputy project manager, COBE
- Mike Hawes, associate administrator for Independent Program and Cost Evaluation, and Lynn Cline, deputy associate administrator for Space Operations
- Bobby Braun, chief technologist, and Steve Altemus, director of the Johnson Space Center Engineering Directorate
- Charlie Bolden, NASA Administrator, and Jean-Jacques Dordain, Director-General of the European Space Agency (ESA)

The Masters with Masters featuring the NASA Administrator and the Director-General of ESA, which took place at the 61st International Astronautical Congress in Prague, was a co-production with the European Space Agency and the International Astronautical Federation.

## Knowledge Forums

The effective use of knowledge is critical to the success of NASA's missions and the organization's long-term sustainability. Knowledge forums are small, engaging one-day events that address different aspects of knowledge acquisition, capture, and transfer. The forums feature leading experts and practitioners who deal directly with knowledge-related challenges, and emphasize informal discussions and networking in order to cultivate a vibrant knowledge network that can benefit NASA.

The Academy hosted three knowledge forums in 2010:

- Knowledge Strategy and Knowledge Effectiveness (Washington, D.C., October 2009)
- Knowledge in Projects (hosted by MITRE in San Diego, CA, April 2010)
- Expanding Knowledge Networks (hosted by the Educational Testing Service in Princeton, NJ, September 2010)

Participants at these forums included representatives from NASA centers; knowledge experts from MITRE, the World Bank, Educational Testing Service, MWH, Fluor, the Department of Energy, Petrobras, and the International Centre for Complex Project Management; and thought leaders from academia and the private sector.

## Special Events

The Academy facilitated a special event focusing on knowledge transfer between the X-15 and the Space Shuttle. Major General Joe Engle, the only man to fly both vehicles, spoke at the James E. Webb Auditorium at NASA Headquarters in February 2010 about lessons learned from the X-15 and the impact that it had on the design and development of the Space Shuttle.

The Academy also facilitated performances by master storyteller Jay O'Callahan of his tale "Forged in the Stars—A NASA Story" at Johnson Space Center and Kennedy Space Center, following his successful debut performance at the Green Engineering Masters Forum in September 2009. The Academy commissioned O'Callahan to develop the story in 2008 in celebration of NASA's 50th anniversary. Performances were also planned for Goddard Space Flight Center and NASA Headquarters.





Jean-Jacques Dordain, Director-General of the European Space Agency (*left*) and Charlie Bolden, NASA Administrator (*center*), take part in a Masters with Masters event with Academy Director Dr. Ed Hoffman at the 2010 International Astronautical Congress in Prague.



# Learning and Working Through International Collaboration

Space exploration has always been an international endeavor. NASA's first international mission dates back nearly 50 years, and throughout its history the agency has had more than 3,000 agreements with over 100 countries. What has changed in recent years is the complexity of today's projects, the capabilities of NASA's partners, and the number of nations seeking the benefits of space.

In recognition of the increasing importance of international collaboration in space, and in consideration of the mutual benefit of sharing experiences and best practices, the Academy has undertaken new efforts, in close collaboration with the Office of International and Interagency Relations, to learn from and with NASA's international partners. The Academy's initiation of these activities in early 2010 positioned it to anticipate the agency's needs in this area before the National Space Policy called for expanding international collaboration in space.

## International Track at PM Challenge

PM Challenge's first-ever international track featured representatives from more than a half dozen space agencies as well as industry, academia, and nonprofit organizations. With international cooperation and collaboration poised to play an increasing role in NASA's future, the international forum at PM Challenge 2010 provided an opportunity for NASA to bring together partners from around

the world to share perspectives, challenges, and opportunities.

Topics for the track included sharing lessons learned from working on the International Space Station, new opportunities for international collaboration in space exploration, the future of Earth exploration, and the variation among international approaches to spaceflight project management.

Speakers included representatives from: the European Space Agency (ESA); Japan Aerospace Exploration Agency (JAXA); Canadian Space Agency (CSA); Russian Space Agency (RSA); Brazilian Space Agency (AEB); Indian Space Research Organization (ISRO); the Committee on Space Research (COSPAR); Project Management Institute (PMI); and United Launch Alliance. NASA speakers included senior leaders from the Space Operations Mission Directorate and the Office of International and Interagency Relations.

### International Project Management Committee (IPMC)

Following preliminary discussions at the PM Challenge, a group of space agencies, companies, and professional organizations agreed in March 2010 to establish an International Program/Project Management Committee (IPMC) under the auspices of the International Astronautical Federation. Member space agencies currently include AEB, Canadian Space Agency (CSA), Czech Space Office, ESA, German Aerospace

Center (DLR), ISRO, JAXA, Korea Aerospace Research Institute (KARI), NASA, and the National Research Foundation/South African Astronomical Observatory (SAAO).

As a first activity, IPMC members agreed to review materials from the Academy's "International Project Management" course, with a view toward identifying common principles and practices that might be incorporated into an international project management curriculum. Based on feedback from the review, which was completed in June, the Academy examined and revised the course curriculum in anticipation of its next offering in January–February 2011 at Kennedy Space Center. A select number of IPMC members will be invited to attend the training on a space-available basis.

One area of interest for NASA and its partner agencies is cross-participation in training courses. AEB, which has collaborated with NASA on missions ranging from Aqua to the International Space Station, sent three of its employees to the Kennedy Space Center for two weeks in August to attend "Foundations of Aerospace at NASA," the first course in the Academy's core curriculum.

IPMC members elected Academy Director Dr. Ed Hoffman as the committee's first chairman. Dr. Hoffman made a presentation about the status of the IPMC at the 2010 International Astronautical Congress in Prague, Czech Republic.

# Enabling Innovation and Improvement

Research is essential to the Academy's commitment to innovation and continuous improvement of its ability to serve NASA's workforce. Through quantitative and qualitative studies of select topics, the Academy ensures that its products and services leverage the latest methodologies and knowledge. Research also contributes to agency efforts to design learning strategies that anticipate future needs for workforce development.

The Academy's third annual study of trends in project management identified five key themes that are reshaping the discipline.

## Technical Workforce Development Study

In April 2010, Academy Director Dr. Ed Hoffman presented to the NASA Program Management Council findings from the most comprehensive survey to date of NASA's technical workforce development efforts and activities. The study, based on data from 19 NASA organizations, found strong alignment with the best characteristics of learning organizations as identified by the American Society of Training and Development.





## Young Professional and University Student Research Study

The Academy collaborated with Aviation Week and industry leaders on the launch of an inaugural Young Professional and University Student Research Study. With a 15.7% voluntary attrition rate for young professionals in 2009, an advisory board of industry and academic leaders and young professionals took on the challenge of understanding this critical population of the workforce. The result was a survey of young professionals (under 35 years old) and university students that shed new light on this critical demographic in the aerospace workforce.

## Executive Behavior Study

Executive Leadership at NASA: A Behavioral Framework identified the behaviors and personal attributes of successful NASA executives. Conducted by the Office of the Chief Engineer, the study investigated the behaviors and personal attributes of 14 NASA executives regarded by senior leaders as highly effective in their roles. The research team identified a shared set of effective executive behaviors and attributes that fall under six broad themes: leadership; attitudes and attributes; communication; problem solving and systems thinking; political savvy; and strategic thinking. The study of executives builds on the NASA Systems Engineering Behavior Study (2008), which focused on high-performing systems engineers.

## Trends in Project Management

The Academy completed its third annual study of trends in project management, which Academy Director Dr. Ed Hoffman presented at PM Challenge 2010 in February. Five key themes—team diversity, virtual work, innovation, portfolio management, and sustainability—are reshaping the practice of project management today as a result of the increasing complexity and globalization of projects. The trends analysis draws on an extensive literature review as well as exchanges with colleagues in the global project management community.

## Revised Systems Engineering 360 Assessment Instrument

The Academy released a revised version of the NASA Systems Engineering 360 Assessment Instrument. The revisions make the process more user-friendly, reports easier to read, and key learning needs easier to identify. NASA centers are now beginning to use this instrument. The 360 Assessment is derived from the findings of the 2008 NASA Systems Engineering Behavior Study, which studied the behaviors and characteristics of outstanding systems engineers.


# Facilitating Open Communication and Dialogue

A background image showing a group of people in a meeting. In the foreground, a woman with dark hair is looking at a laptop screen. Behind her, several other people are visible, some looking at the screen and others looking away. The setting appears to be a professional meeting or conference.

Communication is central to all leadership and management challenges. The complexity of NASA's programs and projects demands an open, vigorous culture in which communication is continuous, empowering individuals at all levels to ask questions, share information, and raise concerns. The Academy is committed to promoting open communication through a number of channels.

*ASK Magazine* received the  
2010 Astrid Gold Award and  
the 2010 APEX Award.

ASK the Academy, a monthly e-newsletter, serves as a means of regular communication with the agency's technical workforce about best practices, lessons learned, and new developments at NASA and throughout the world. In 2010 it reached more than 22,000 online subscribers. *ASK Magazine* delivers insight each quarter with stories recounting real-life experiences that communicate important practical wisdom and best practices. Reaching 5,500 print subscribers and more than 18,500 online subscribers, ASK allows NASA managers, scientists, and engineers, as well as global practitioners, to share valuable experience-based knowledge and foster a reflective community. It received the 2010 Astrid Gold Award for outstanding achievement in design communications for employee magazine and the 2010 APEX Award for publication excellence.



The Academy also develops case studies about NASA missions that emphasize practitioner perspectives about key decision points. Cases published in 2010 included “Lunar CRater Observation and Sensing Satellite (LCROSS)” and “Collaborative Problem Solving: The STS-119 Flow Control Valve Issue.”

In 2010, Academy team members received numerous invitations to present to professional associations and external organizations.

- Dr. Ed Hoffman presented to:
  - International Astronautical Congress
  - Project Management Institute
  - 4th Symposium on Project Governance
  - American Society for Training and Development
  - Korea Aerospace Research Institute
  - United Kingdom Ministry of Defense
- Roger Forsgren and Lauren Miller presented “Unique Education & Workforce Development for NASA Engineers” at two American Society of Engineering Education (ASEE) conferences.
- Christine Williams presented at the Stevens Institute of Technology, the Neuroleadership Summit, the UK Leadership Coaching Conference, the

Conference Board, and at a meeting of the Project Management Institute’s Global Executive Council.

- Matthew Kohut presented Academy case studies at a meeting of the Project Management Institute’s Global Executive Council and at Harrisburg University’s Project Leadership Forum.

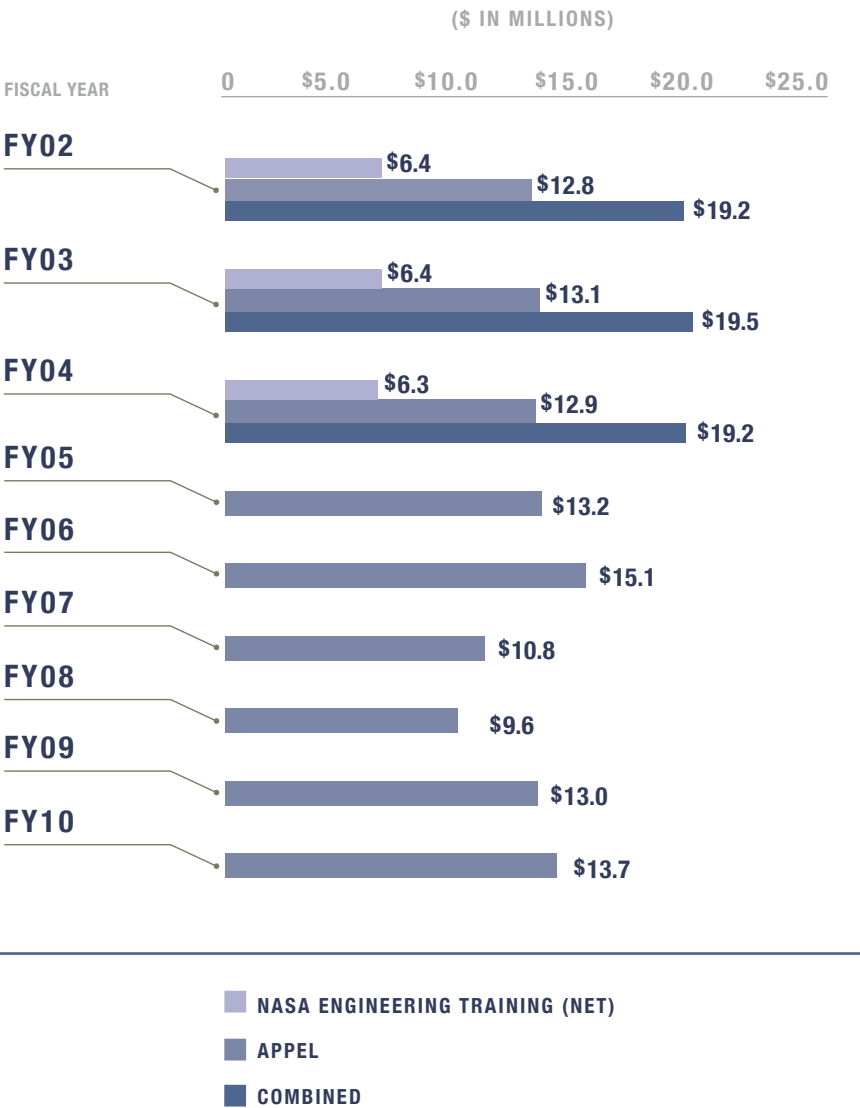
The Academy uses social media sites to spread the word about its events, forums, publications, and multimedia offerings and to expand its community through online engagement. As of September 2010, the Academy had more than 1,700 Twitter followers and 1,300 friends on Facebook. The NASA APPEL YouTube Channel offers over 65 videos from events such as Masters with Masters and Masters Forums. The Academy also employs a Flickr photo-sharing site to tell stories of NASA history, projects, and forums through photographs and images.




# Financial Review

The Academy’s funding in FY 2010 enabled it to respond to 29% of requests from NASA centers for course offerings. Demand for team support and knowledge sharing forums also outstripped available resources.

The Academy’s long-term ability to meet the needs of NASA’s workforce calls for critical investments in technology-enabled learning in the near term. Strategic investments in this area will increase the Academy’s efficiency, outreach, and performance by saving resources currently used for travel, enabling greater participation across the agency as well as with international partners, and addressing emerging demands from young professionals for more interactive and immersive learning.







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