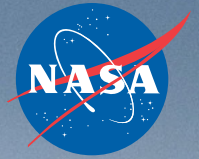National Aeronautics and Space Administration
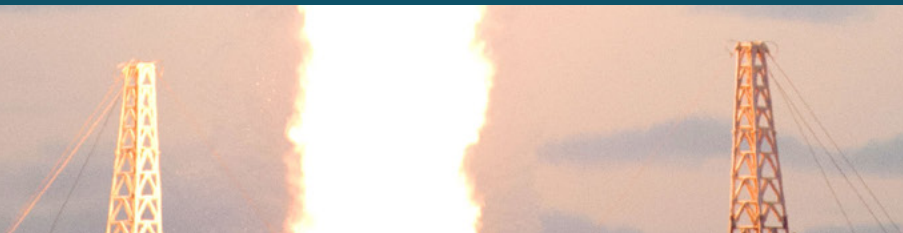
Academy Annual Report
Fiscal Year 2015

∂PPEL academy of program/project
& engineering leadership

chief knowledge office

ON THE FRONT COVER

On December 5, 2014, NASA's Orion spacecraft rocketed into orbit atop a Delta IV Heavy rocket. Exploration Flight Test 1 (EFT-1), in which Orion soared 3,600 miles above Earth, marked the maiden voyage of the first human-rated vehicle designed to go beyond low Earth orbit in more than four decades.

Photo Credit: NASA

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About the Academy

The Academy of Program/Project & Engineering Leadership (APPEL) is NASA's internal resource for project management and systems engineering development and training. APPEL promotes learning through its four business lines: curriculum, hands-on development, strategic communications, and training and support.

APPEL's training initiatives help enhance and refine critical job skills, provide hands-on learning experiences, and supplement formal educational programs. The Academy also offers development and learning resources on its website, which serve as a platform for sharing information, highlighting initiatives, and promoting digital collaboration. In addition, the Academy creates opportunities for project management collaboration through research and exchange with universities, government agencies, professional associations, and industry partners.

The Office of the Chief Knowledge Officer (CKO) leads the agency as a knowledge resource by fostering knowledge management while offering a diverse range of knowledge-sharing opportunities to reinforce NASA as a learning organization.

Mission

The Academy supports NASA's mission by promoting learning across the agency centers through its wide range of courses, resources, and development initiatives to help ensure the agency's technical workforce has the skills and knowledge needed to advance mission success.

Goals

Provide a common frame of reference for NASA's technical workforce.	Refine and enhance critical job skills.	Support program, project, and systems engineering teams.
Promote learning across the agency.	Supplement formal education programs.	

APPEL Leadership

Mr. Roger Forsgren

Mr. Forsgren is the Director of APPEL, with responsibility for the development of program and project leaders within NASA. He also oversees the conception and implementation of new training courses and hands-on development programs for project managers and systems engineers at NASA.

Message from the APPEL Director

Welcome to the FY 2015 Annual Report for the NASA Academy of Program/Project & Engineering Leadership. This past year, the APPEL team continued its support of the project management and systems engineering communities throughout the agency. We began by listening to our customers and introducing four new courses: Agile Project Management, Cost Estimation for Project Managers, Presentation Skills for Technical Professionals, and Project Management for non-Technical Managers. These were offered as part of the 133 courses made available to the agency's technical workforce over the year. In addition, we reached out to our audience beyond the classroom in many ways. We assumed leadership of the NASA Virtual Project Management Challenge, an online discussion series that promotes best practices and lessons learned. We continued to connect with a broader audience by sharing informative, project management-related articles, videos, and social media highlights through the *APPEL News Digest*, a monthly digital publication that reaches over 75,000 subscribers worldwide. And we collaborated and benchmarked with other federal agencies, organizations, and academia to share effective processes and advance efficiencies.

A highpoint for the Academy was learning that the "Overall Customer Satisfaction" rating among APPEL course participants was 4.8 out of 5.0 for FY15. This is extremely important to us as meeting the training needs of NASA's technical workforce is our primary goal. In addition, APPEL earned the prestigious honor of being named the "best academy in the world" by the Project Management Institute, while the International Association for Continuing Education and Training presented APPEL with its Exemplar Award for significant contributions to the field of continuing education and training.

Everything we do is made possible by the enormous support APPEL receives from NASA management and our stakeholders across the agency. Thank you to everyone involved over the past year. We look forward to working with you throughout FY16 as we continue to help ensure NASA's project managers and systems engineers have the skills and knowledge they need to advance mission success.

Roger Forsgren
APPEL Director

Mr. Stephen Angelillo

As the APPEL Deputy Director, Mr. Angelillo is responsible for strategy, outreach, and operations of the Academy. He also leads the Academy's communications efforts, ensuring APPEL resources are available to key stakeholders across multiple platforms.

Message from the APPEL Deputy Director

A key APPEL goal is to support NASA's centers by helping identify training gaps in the program management and systems engineering disciplines, offering courses in support of those training initiatives, and providing professional development opportunities for the NASA technical workforce community. The continued feedback of our stakeholders, through course surveys, reviews, and suggestions, is the cornerstone of APPEL's ability to enable achievement among NASA's practitioners. In Fiscal Year (FY) 15, we used this feedback to reinforce the utility of our online APPEL Catalog and interactive PM&SE Competency Model, while building the foundation for two powerful initiatives introduced on the first day of FY16: a streamlined course registration model and new PM&SE Career Development Framework. Most importantly, APPEL remains committed to maintaining an environmentv of excellence, promoting learning, and fostering professional growth in support of NASA mission success.

Steve Angelillo
APPEL Deputy Director

CKO Leadership

Dr. Edward Hoffman

Dr. Hoffman, the first NASA Chief Knowledge Officer (CKO), is responsible for the agency's knowledge policy and initiatives, integrating knowledge services across projects and programs, and advocating for NASA's commitment to being a learning organization. In addition, he serves as the chair of the Federal Knowledge Management Community and is an instructor for APPEL's International Project Management course.

Message from the Chief Knowledge Officer

In FY 2015, we continued to engage NASA's vibrant knowledge community and the knowledge services capabilities agency-wide. The Knowledge Network, comprising all the centers, mission directorates, and many cross-agency supporting organizations, grew by 20%, and the usage of the CKO website, which includes the expanding Knowledge Map and the new Critical Knowledge Gateway, nearly doubled. Two Knowledge 2020 events, our semi-annual face-to-face conferences, contributed to NASA sharing leading practices and meeting challenges in capturing project and program knowledge. Several new actions, including a series of Critical Knowledge Interviews and Referee process, drove our projects forward to a more integrated knowledge program. We have taken major steps this year towards developing an agency-wide strategy for knowledge to contribute toward mission success and toward processes to identify knowledge most critical for retention and transfer. Our continuing success could not have occurred without the support of the NASA knowledge community and other key partners in fostering a culture of organizational learning.

Ed Hoffman
NASA Chief Knowledge Officer

Executive Summary

FY 2015 was a banner year for NASA and its partners. The agency advanced both its deep space exploration initiatives, including the Journey to Mars, and the Earth science projects that support life on our planet. In December of FY15, the maiden voyage of the Orion Multi-Purpose Crew Vehicle—the first spacecraft in more than 40 years designed to take humans beyond low Earth orbit—lifted off from Cape Canaveral. The highly successful Exploration Flight Test 1 (EFT-1) sent Orion more than 3,600 miles above Earth. Throughout the year, crucial advances were made on the other components of NASA's manned deep space exploration program: the Space Launch System (SLS) and Ground Systems Development and Operations. This work was complemented by the ongoing efforts of the One-Year Mission, in which NASA astronaut Scott Kelly and Russian cosmonaut Mikhail Kornienko became the first crew to spend more than six months on the International Space Station (ISS). The agency also celebrated a historic moment in robotic deep space exploration: the first flyby of Pluto, conducted by the New Horizons mission. Closer to home, NASA's Earth science missions, including the Global Precision Measurement (GPM) core observatory, Orbiting Carbon Observatory 2 (OCO-2), and ISS-RapidScat, continued to advance scientific understanding of our planet.

The Academy demonstrated its commitment to NASA's mission by supporting the learning and development needs of the agency's technical workforce. With a focus on enabling achievement, APPEL expanded opportunities for learning and career development both in and out of the classroom. New courses—based on input from stakeholders and subject matter experts—were introduced to enhance the skills and knowledge needed to advance mission success. Beyond the classroom, a variety of supplemental resources were added to the APPEL Catalog to help practitioners maximize their learning opportunities before and after attending APPEL courses. Online, novel interactive resources such as the PM&SE Competency Model were augmented to better serve practitioners in achieving their development goals. The intent for the year was to meet the learning and development needs of practitioners at every NASA center, online or in the classroom.

FY 2015 was an exciting time for the Academy as its achievements were recognized throughout the year. In December, when NASA was named the "best place to work in the federal government" in a survey by the Partnership for Public Service, its training and development capability—which includes APPEL—ranked #1 as well. APPEL then earned the prestigious honor of being named the "best academy in the world" in a global benchmarking study of project academies by Human Systems International, a division of the Project Management Institute. Finally, the International Association for Continuing Education and Training (IACET) presented APPEL with its 2015 Exemplar Award for significant contributions to the field of continuing education and training.

The CKO continued to engage NASA's knowledge community and expand knowledge services across the agency. Throughout the year, they remained focused on ensuring that knowledge capture and lessons learned were accessible and integrated into current projects and programs. In addition, CKO advanced critical knowledge capture, lessons learned sharing, and leveraging best practices from other federal agencies, industry, and academia. Together, APPEL and CKO continue to develop partnerships with international space agencies and to work with young professionals, making sure that NASA moves forward with a skilled workforce that leverages the agency's vast store of knowledge.

NASA Administrator Charlie Bolden, NASA Associate Administrator for the Human Exploration and Operations Directorate William Gerstenmaier, and others react as Orion splashes down after its inaugural flight, Exploration Flight Test 1 (EFT-1).

Photo Credit: NASA/Bill Ingalls

The APPEL Team convened for a face-to-face meeting in February 2015.

Photo Credit: NASA APPEL/Erin Bonilla

Core Business

In FY 2015, the Academy and CKO achieved the following in their core areas of activity:

Training & Career Development

- Trained a total of 3,055 participants in 133 courses delivered across all NASA centers.
- Expanded both the online APPEL Catalog and the interactive PM&SE Competency Model to increase their value to practitioners.
- Provided extensive support to the agency Federal Acquisition Certification for Program/Project Managers (FAC-P/PM) program.
    - Assisted the centers with their recertification of program/project managers.
    - Maintained an in-depth online resource, housed on the APPEL website, to provide program details and better identify center points of contact.
    - Continued to assess and update as needed all agency program-level and individual-level certification materials as well as the centralized, web-based FAC-P/PM document repository that all center points of contact can use as a resource in administering their programs.
- Completed the required updates to adhere to changes to the Project Management Institute (PMI®) Continuing Certification Requirements (CCR), enabling the Academy to maintain compliance as a Registered Education Provider (R.E.P.). This included 29 course content reviews for applicability to the PMI Project Management Body of Knowledge (PMBOK® 5th Edition standard) and re-apportioning the associated Professional Development Units (PDUs) into three new categories (Technical Project Management, Leadership, and Strategic and Business Management). The 29 courses were added to the PMI CCR PDU reporting website, while the relevant course pages in the APPEL Catalog were updated with the new PDU structure and PMI Course IDs. Key stakeholders were notified by APPEL about the changes and a new web page was added to the APPEL Catalog detailing how the changes affect NASA practitioners.
- APPEL ensured plurality in the calculation and award of external credits earned as a result of successfully completing courses. This includes International Association for Continuing Education and Training (IACET) Continuing Education Units (CEUs) for all APPEL courses, PMI PDUs for 29 APPEL courses, and FAC-P/PM Continuous Learning Points (CLPs) for 51 APPEL courses.

Hands-On Development

- Continued to offer comprehensive development opportunities for early-career engineers who participated in the Glenn Research Center Rocket University program or the HOPE (Hands-On Project Experience) Training Opportunity.
- Leveraged APPEL resources, including social media platforms, to support the launch of the HOPE Radiation Dosimetry Experiment (RaD-X).

Knowledge Sharing

- In November of 2014, participated in a Virtual Project Management (PM) Challenge to share information about how the Academy facilitates professional development through its world-class curriculum, development programs, and strategic communications.
- In May of 2015, assumed leadership of the NASA Virtual PM Challenge to promote best practices and lessons learned across the agency.
- Facilitated two Knowledge 2020 events, at Kennedy Space Center in fall of 2014 and Johnson Space Center in spring of 2015.
- Hosted six Masters with Masters programs as well as additional knowledge sharing events that engaged NASA centers, international partners, and industry leaders.

Communications

- Published more than 70 project management- and engineering-related *APPEL News* articles designed to advance understanding of NASA's programs and projects for the technical workforce as well as universities and other institutions.
- Redesigned the monthly digital publication *APPEL News Digest*, which reaches more than 75,000 subscribers worldwide.
- Expanded coverage of key agency events, such as Exploration Flight 1 (EFT-1), through APPEL's social media channels.

On December 2, 2014, APPEL Director Roger Forsgren, Curriculum Manager Donna Wilson, and APPEL Deputy Director Stephen Angelillo took part in a Virtual Project Management Challenge about how the Academy helps NASA's technical workforce achieve their professional development goals.

Photo Credit: NASA

Developing Strategic Capabilities in Advance of Need

NASA Strategic Plan Overarching Goals	APPEL & CKO Acvitivities in FY 2015
Investing in next-generation technologies and approaches to spur innovation	➤ Enhanced the interactive APPEL Catalog by adding new information, including additional videos, updated schedule and registration information, and expanded supplemental resources ➤ Expanded the utility of the interactive Project Management & Systems Engineering Competency Model with updates designed to identify practitioners' proficiency gaps in terms of NASA PM and SE competencies ➤ Continued to build the APPEL audience through extensive engagement via social media across multiple platforms
Inspiring students to be our future scientists, engineers, explorers, and educators through interactions with NASA's people, missions, research, and facilities	➤ Captured and disseminated project and mission stories through the Academy's tonline publications ➤ APPEL News stories, APPEL News Digest, and APPEL case studies were accessed by universities and other program-management organizations around the globe
Expanding partnerships with international, intergovernmental, academic, industrial, and entrepreneurial communities	➤ Shared best practices, benchmarked, or collaborated with a wide range of organizations, including the German Aerospace Center (DLR), Department of Homeland Security, and Internal Revenue Service (IRS) ➤ Partnered with international space agencies across diverse projects, including the International Project Management course
Committing to environmental stewardship through Earth observation and science, and the development and use of green technologies and capabilities in NASA missions and facilities	➤ Maintained an extensive array of online tools and resources, including the APPEL Catalog and the PM&SE Competency Model ➤ Expanded the Academy's online case study database ➤ Implemented online surveys to engage with key stakeholders ➤ Delivered course materials electronically for 50.4% of APPEL courses
Securing the public trust through transparency and accountability in our programmatic and financial management, procurement, and reporting practices	➤ Maintained multiple digital dashboards to track key performance indicators and strengthen accountability ➤ Updated event management software to better capture customer feedback, process course surveys, award courses, and distribute course materials

Innovations and Cost Management

For FY 2015, APPEL and CKO met the challenge of proactively and efficiently managing budgets to deliver high-quality training and development offerings as well as knowledge management events. These innovations spanned new courses, novel initiatives, customer engagement efforts, and knowledge sharing activities.

- Debuted four new courses for NASA's technical workforce:
  - *Agile Project Management*, *Cost Estimation for Project Managers*, and *Project Management for non-Technical Managers* enhance understanding of project management at the agency and advance a variety of project management-related skills.
  - *Presentation Skills for Technical Professionals* helps participants develop an advanced set of skills that are broadly applicable in contexts ranging from team meetings to senior leader briefings to professional conferences.
- Significantly revised and expanded the Supplemental Resources section for each course in the APPEL Catalog to maximize the learning experience before and after attending an APPEL course.
- Enhanced the utility of the interactive PM&SE Competency Model by highlighting the essential knowledge, skills, and expected proficiencies associated with each competency, enabling practitioners at every technical career level to assess their current proficiency level against an agency-wide standard.
- Throughout FY15, worked with stakeholders and subject matter experts to create a new PM&SE Career Development Framework to be implemented at the start of FY16. The Development Framework is designed to support practitioners, supervisors, and managers by helping determine which courses and activities will enhance competencies in current positions and support future development aspirations. It complements the APPEL Catalog and PM&SE Competency Model, and is designed to be used in conjunction with such development tools as mentoring and manager/supervisor discussions.
- Laid the foundation for a new registration model to be introduced in FY16. APPEL course registration now follows the same four-semester calendar model used by many universities. This new process shortens the registration period from 12 months to 3 months, streamlining the experience for everyone.
- Enhanced the APPEL and CKO websites to increase utility and ease of use, and redesigned the APPEL course website, part of the Academy's event management program, for enhanced navigation and practitioner usability.
- Promoted lessons learned and best practices across the agency by assuming leadership of the NASA Virtual Project Management Challenge, an ongoing online dialogue series focused on critical aspects of project management.
- Participated in an APPEL-focused Virtual Project Management Challenge to drive awareness of the Academy's trainings and services as well as the support available to NASA's project management and systems engineering communities.
- Hosted two Knowledge 2020 conferences to share lessons learned and best practices for knowledge capture and management across industries and federal agencies.
- Introduced CKO-specific social media channels to engage with the knowledge-management community across NASA and at other institutions around the world.

- Developed *OCO-2: A Second Chance to Fly*, a case study examining the ways in which the Orbiting Carbon Observatory 2 (OCO-2) team applied lessons learned when they received the rare opportunity to rebuild and refly following a mission-ending anomaly during the original OCO launch in 2009.
- Introduced the *APPEL Training News*, a quarterly publication directed at APPEL center points of contact (POCs), which provides updates about APPEL initiatives and shares success stories concerning APPEL POCs, APPEL course participants, and NASA practitioners involved in APPEL-supported developmental programs such as Rocket University and HOPE (Hands-On Project Experience) Training Opportunity.
- Expanded communications efforts to regularly engage the APPEL Course Alumni community, sharing new about novel offerings and activities at the Academy.
- Continued to reinforce mobile learning content and support systems for the Academy website and event management systems to capture course feedback, award courses to centers, and distribute course materials.
- Introduced a tiered-scale cost model for APPEL courses designed to increase attendance while limiting center investment.

Participants found the content of new APPEL courses highly relevant.

"
I learned that there is the potential that an Agile approach can be employed for hardware technology development.
(I was very skeptical going into the course.)"

> ~ Participant, *Agile Project Management*

"
I needed to become more familiar with basic cost estimation principles, and I found this course presents all the needed information in a very clear and concise manner."

> ~ Participant, *Cost Estimation for Project Managers*

"
As a result of this course, I will create a more organized work plan that breaks the process into more defined subtasks that I feel will result in a more efficient process moving forward."

> ~ Participant, *Project Management for non-Technical Managers*

"
I often present complicated charts and graphs, and people don't always grasp what I'm trying to say. Because of what I learned in this course I have already structured my next status briefing in the Assertion-Evidence style."

> ~ Participant, *Presentation Skills for Technical Professionals*

Measuring Effectiveness

The Academy and CKO measured effectiveness in FY 2015 in four primary ways.

Accreditation

- APPEL is a Registered Education Provider with the Project Management Institute® (PMI). Successful completion of designated APPEL courses allows holders of the Project Management Professional (PMP®) credential to claim Professional Development Units (PDUs) toward the recertification of their credential.
- APPEL has also obtained permission from PMI such that the education requirement to sit for the PMP exam is waived for any current holder of the NASA Federal Acquisition Certification for Program/Project Managers (FAC-P/PM) credential. NASA is the only federal agency to be recognized by PMI in this manner.
- The Academy retains Authorized Provider status with the International Association for Continuing Education and Training (IACET) and is a past recipient of the IACET Exemplar Award for Internal Training.
- Most APPEL courses provide Continuous Learning Points (CLP) toward participant recertification of the FAC-P/PM credential.

Customer Feedback

- APPEL implements utilization metrics and user surveys to solicit customer feedback in order to enhance course offerings as well as training support. In addition to using enhanced course evaluation questionnaires, the Academy regularly solicits extensive customer feedback from participants, instructors, and APPEL center points of contact. Demand for courses and project team services also act as feedback mechanisms.
- New assignment data, supervisor interviews, and meetings with senior leaders at NASA centers and mission directorates provide input from key stakeholders.
- APPEL also responds to requests from senior leadership for studies, papers, articles, case studies, and lessons learned.

External Validation

APPEL performs benchmarking with organizations such as Disney, Federal Aviation Administration, National Science Foundation, Defense Acquisition University, Embraer, the German Aerospace Center (DLR), and Shell Oil Company.

Alignment with NASA Policies and External Requirements

- The Office of Management and Budget provides approval of project management certification process.
- APPEL performs activities supporting NASA's Corrective Action Plan to remove NASA Acquisition Management from the General Accountability Office's (GAO) High Risk List.
- APPEL activities respond to direction provided by the Aerospace Safety Advisory Panel.
- APPEL courses and offerings are aligned with NASA Procedural Requirement (NPR) 7120.5 and NPR 7123.1. Where appropriate, certain courses are also aligned with additional, relevant NPRs.
- APPEL courses and offerings are in accordance with briefings to NASA management councils and senior leaders.

The New Horizons mission made history as the first flyby of Pluto. Taken on July 13, 2015 by the New Horizons Long Range Reconnaissance Imager (LORRI), this image prominently features Pluto's "heart" feature, which is approximately 1,000 miles wide. Color was added from a separate image taken on the same day by the spacecraft's Ralph instrument.

Photo Credit: NASA/APL/SwRI

Achievement: Supporting Success Across the Agency

Achievement was a primary focus for APPEL and CKO in FY 2015. Both organizations continued to expand engagement with key stakeholders, connecting with diverse communities in meaningful ways to maximize their audiences' potential for achievement.

Academy Achievement

Global Leader

In early 2015, the Academy was recognized as the global leader in project management training. Human Systems International (HSI), a division of the Project Management Institute (PMI)®, named APPEL "the best academy in the world" in the provision, development, and improvement of project management learning and development. The Academy was evaluated and assessed against more than sixty project management academies from such respected companies and organizations as Rolls Royce, BAE Systems, Airbus, Shell Oil, Siemens, and Mercedes-Benz. APPEL earned the highest scores ever recorded since HSI began assessing PM training over twenty years ago.

APPEL Deputy Director Steve Angelillo accepts the Exemplar Award from IACET in Chicago, August 2015.

Photo Credit: NASA APPEL

Exemplar Award

In late FY 2015, APPEL received the Exemplar Award from the International Association for Continuing Education and Training (IACET). This recognition underscored the Academy's significant contributions to the field of continuing education and training in support of NASA's technical workforce.

In addition, when NASA was named the "best place to work in the federal government" among large agencies in a survey by the Partnership for Public Service, its training and development capability was ranked #1 as well. APPEL, one of many training opportunities available within the agency, is NASA's primary resource for project management and systems engineering training and development.

Celebrating Agency Achievements through Social Media

APPEL continued to expand its social media presence, engaging with stakeholders in the virtual community throughout the year. As a result of its ongoing interactions with diverse constituencies, the Academy experienced notable growth across key social media channels. (See "Metrics: Expanding Value Through Data Insights.")

The CKO established its social media presence, building an online community by using Twitter, Facebook, LinkedIn, and other platforms to highlight CKO activities and events.

Exploration Flight Test 1 (EFT-1)

The Academy leveraged its social media presence to elevate awareness about one of the most exciting NASA achievements of FY 2015: the maiden voyage of Orion. APPEL spent the week surrounding EFT-1 at Kennedy Space Center (KSC), attending news conferences and the Orion EFT-1 NASA Social event, interviewing Orion team members, and observing the launch. The team shared the experience with the APPEL audience through ongoing live tweets, Facebook posts, and other social media initiatives. One tweet, sent as part of a dynamic combination of Twitter comments and Facebook interactions, generated over 429,000 impressions: *#Orion will be "the first human-rated spacecraft that's gone beyond LEO in 40 years," said LM Orion PM Hawes*. APPEL later compiled a report on the event, highlighting the role of social media in expanding coverage and understanding of the historic event.

HOPE Radiation Dosimetry Experiment (RaD-X) launch

In addition to spotlighting NASA's high-profile accomplishments, APPEL celebrated the achievements of early-career professionals at the agency. On September 26, the HOPE RaD-X microsatellite took flight. Designed to obtain the first high-altitude dosimetric measurements of cosmic ray interaction in the upper atmosphere, HOPE RaD-X looked at how cosmic rays deposit in the upper atmosphere, with the goal of validating low-cost sensors for future missions and enhancing understanding of issues affecting the health and safety of commercial and military aircrews and space crews. In the weeks before launch, HOPE RaD-X established a Twitter account to spread the news about the project's status and mission. APPEL stepped in, expanding the scope of their social media presence by live-tweeting the launch and sharing it with the larger APPEL audience.

APPEL was invited to attend the launch of Orion's first flight, EFT-1, in December 2014. Key members of the Academy's Strategic Communications Team spent a week onsite at Kennedy Space Center and shared the experience with APPEL's audience through social media as well as APPEL News *articles and interviews. The Orion Exploration Flight Test-1 (EFT-1) Report, above, summarizes APPEL's activities.*

Highlighting Achievement Across the Agency

Virtual Project Management (PM) Challenge

In FY 2015, APPEL assumed leadership of the NASA Virtual PM Challenge. These inspiring and informative agency training events are delivered online to share project management insights and best practices with NASA practitioners, project managers in general, and members of the aerospace industry. Designed to examine current trends in program and project management, the goal of the Virtual PM Challenge is to expose audiences to diverse perspectives, providing a forum for knowledge sharing and the exchange of lessons learned.

The first NASA Virtual PM Challenge hosted in 2015 by APPEL was *Building Your Systems Mentality: Using Systems Engineering & Integration to Solve Project Challenges*. Over the course of the webcast, presenter Bohden Bejmuk and APPEL moderator Ramien Pierre discussed how a system-level perspective can enhance project management efforts. APPEL continues to produce the NASA Virtual PM Challenge every other month.

Prior to undertaking management of the NASA Virtual PM Challenge, APPEL participated in a Virtual PM Challenge that highlighted how the Academy supports the development of NASA's technical workforce. Over the course of the event, APPEL Director Roger Forsgren, APPEL Deputy Director Stephen Angelillo, and Curriculum Manager Donna Wilson discussed the ways in which APPEL helps ensure the agency's project management and systems engineering communities have the skills and knowledge they need to advance mission success at NASA.

APPEL News and *APPEL News Digest*

Over the course of the year, APPEL published over 70 project management- and engineering-related *APPEL News* articles designed to advance understanding of NASA's programs and projects for the technical workforce as well as universities and other institutions. *APPEL News* dedicated a series of articles to key agency milestones, such as the New Horizons flyby of Pluto and the growing support for CubeSats across the space community. Interviews with project managers, systems engineers, Academy instructors, and others highlighted lessons learned and career development insights for the APPEL audience.

APPEL continued to produce the *APPEL News Digest*, a monthly digital publication that engages stakeholders by spotlighting recent APPEL news, articles, videos, and social media interactions. *APPEL News Digest* serves as a means for sharing knowledge by providing a month's worth of content to APPEL audiences as well as to the greater project management and systems engineering communities and the general public. The Academy also established an archives collection of past *APPEL News Digest* issues for ongoing access to its wealth of information.

Unique Resources to Enable Achievement and Development

APPEL Catalog

In FY 2014, the Academy introduced the APPEL Catalog: an interactive compendium of the courses and programs offered by APPEL that engages practitioners with an array of resources designed to help them determine whether the course will meet their needs. In FY15, APPEL significantly enhanced the catalog with additional capabilities and resources. These included linking the online catalog to the PM&SE Competency Model, adding contact information for the Course Curriculum Manager and Training Support Specialist on each course page, and augmenting the Supplemental Resources section on each course page.

The Supplemental Resources section was revised and significantly expanded to increase learning opportunities for practitioners. The new resources enhance the training experience by providing easy access to learning materials that augment the course subject matter in different ways. Practitioners are encouraged to explore the resources—which can be accessed on demand—as a means of extending the learning experience both before and after attending a course. Before the course, practitioners can use the resources to frame their learning expectations and prepare themselves for the immersive classroom experience. After the course, practitioners can reinforce what they learned and deepen their understanding of the subject by reviewing relevant materials as needed. At any time, the resources serve as valuable tools for course participants. APPEL worked closely with stakeholders in the NASA Galaxie Library group, at Skillsoft, and elsewhere to develop and implement the resources available to practitioners.

PM&SE Competency Model

The PM&SE Competency Model is the first interactive resource to help practitioners identify the competencies required for success in their roles at NASA, linking training opportunities with those competencies. It was updated in FY15 to provide practitioners with a unique means of identifying their proficiency gaps in terms of NASA's project management and systems engineering competencies. For each competency, the model describes the associated knowledge, skills, and expected proficiencies. These additional data are organized into four technical career levels in order to help NASA practitioners assess their current proficiency level against an agency-wide standard.

APPEL Website

The APPEL website was enhanced to ensure APPEL resources and tools are easy to access and each APPEL business line is appropriately supported.
- The website tabs were revised to enhance the utility of the site, making it more user friendly so that practitioners can easily locate the information and resources they require.
- A Frequently Ask Questions (FAQs) section was added to answer common questions concerning the Academy. The FAQs help practitioners learn more about how to determine which APPEL courses will benefit them most, how the curriculum is determined each year, important timelines and processes, and much more. The FAQs span a range of key topics, including APPEL courses, APPEL curriculum, accreditation, registration, course pre-work, course logistics, withdrawal, APPEL support, and specifics about the FAC-P/PM and hands-on development training.
- The Accreditations and Affiliations web page was reorganized and revised to ensure practitioners understand the Academy's relationships with professional organizations and associations as well as with NASA organizations that promote professional development.

The website continues to serve as the Academy's communication hub by offering information about APPEL courses, contacts, representatives, and processes as well as links to the APPEL Catalog, PM&SE Competency Model, *APPEL News*, APPEL case studies, and formal papers.

CKO Website

The CKO website was reorganized in FY15 to enhance usability and highlight novel resources.
- The Critical Knowledge (CK) Gateway, a unique, user-friendly guide to agency lessons learned, was added to the website. The CK Gateway is a portal connecting the NASA community to a vast array of NASA video-based lessons learned resources and serving as an index to broadly applicable lessons learned that enable mission success. The goal of the CK initiative is to stimulate critical thinking and assist users in formulating questions that need to be considered at various phases in a project life cycle.
- A new Lessons Learned Landing Page was introduced to provide access to all lessons-learned resources across NASA.
- The My Best Mistakes series was compiled in a single section of the website. The series is an array of stories told by project managers and knowledge practitioners in the NASA community. Each story tells how the author learned a lasting lesson from a mistake.
- NASA Knowledge Map: The Knowledge Map was updated throughout the year to ensure users have access to the rich variety of knowledge available at NASA.

The CKO site continues to serve as a communications resource and knowledge repository where the CKO audience can find information about current events, such as Masters with Masters discussions, as well as material that promotes knowledge sharing, including NASA Knowledge Community Forums.

Assessing Achievement through Ongoing Evaluation

In FY 2015, APPEL's Training & Support division assessed customer satisfaction through an ongoing series of electronic surveys designed to determine practitioner, instructor, and APPEL center point of contact satisfaction with the support offered by APPEL. Based on feedback from the FY 2015 survey, APPEL maintained a Satisfaction Improvement Plan that allows the Academy to continually improve course support processes to ensure participants have a positive experience with APPEL. Improvements included enhanced navigation on APPEL's event management system, which hosts the APPEL course website; the addition of practitioner calls to engage with participants before each course; and streamlined Course Information Emails to make it easier for practitioners to obtain course information. Improvements were instituted in real time as soon as feedback was received. The overall customer satisfaction rating for FY 2015 was 4.8 out of 5.0, which exceeded the Academy's goal of 4.2.

On a scale from 1 to 5 (5 being the highest), key stakeholders were asked to rate their satisfaction with APPEL training and support.

The overall customer satisfaction rating in FY 2015 was 4.8.

" *APPEL continues to excel at providing high quality education in a crisply administered fashion...great job!"*

~ Participant, *Advanced Project Management & Advanced Systems Engineering*

Training: Building Individual Capability at NASA

The Academy's training curriculum enables NASA's technical workforce to develop NASA-specific expertise and capability in project management and systems engineering. It supplements both academic and professional work experience, drawing extensively on best practices and the knowledge of NASA subject matter experts to ensure it addresses the needs of the agency's practitioners.

Courses are developed following established instructional design processes, which includes rigorous annual audits and revisions. Both participant and NASA subject matter expert feedback is incorporated. The courses are offered using a variety of delivery methods, including live classroom, virtual classroom, and self-paced online offerings. They are highly interactive and include case study analyses, group discussion, individual exercises, and simulations.

The Academy's PM&SE Competency Model provides the basis for all course objectives. The model, which aligns with NASA standards, policies, and requirements, consists of 18 project management competency areas, 17 systems engineering competency areas, and 14 competency areas common to both project management and systems engineering. New updates to the interactive model make it easier for practitioners to identify both the *competencies* and *proficiencies* required for success in their roles at NASA.

The curriculum consists of a wide range of courses:
- **The Academy's core courses** cover both foundational and advanced topics. They 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.
- **The Academy's 54 in-depth courses** supplement the core curriculum and span a critical range of disciplines: project management, systems engineering, engineering, communication and leadership, earned value management, and mission and safety.

For FY 2015, APPEL offered 133 courses, including two delivered virtually:
- 14 core
- 119 in-depth
- 2 virtual

Center Course & Program Support

For FY 2015, APPEL funded 87% of center training requests. APPEL's core audience of program/project managers, systems engineers, and discipline engineers represented 63.9% of total FY15 course attendees.

APPEL Course Participants
Span All Levels of Experience at NASA

6%
16-20 YEARS

2%
Undetermined

30%
20+ YEARS

15%
11-15 YEARS

26%
0-5 YEARS

21%
6-10 YEARS
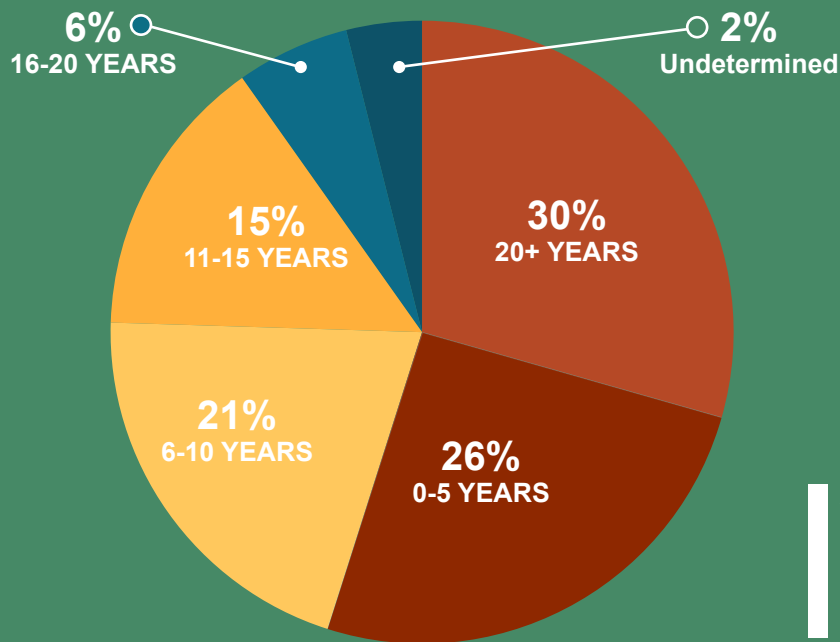
APPEL courses meet the development needs of practitioners at all stages of career growth, from early career (0-5 years) to highly experienced (20+ years).

Center Course Requests by Category
for FY 2015

1%
Engineering

25%
Systems
Engineering

44%
Project
Management

30%
Communications
& Leadership
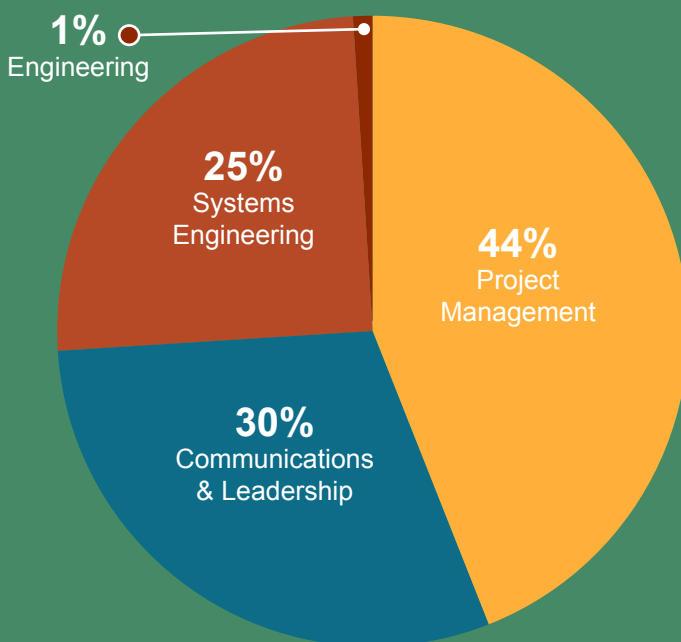
APPEL delivered 133 courses across NASA centers in FY15.

In addition, the Academy continued to integrate with center development programs, offering courses as well as support critical to the training provided by centers.

APPEL Courses Support Center-Level Development Programs	
→ **ARC**	• Ames Project Excellence Program (APEX)
→ **GRC**	• Rocket University • Space Mission Excellence Program (SMEP)
→ **GSFC**	• Systems Engineering Education Development (SEED) • Flight Projects Development Program (FPDP)
→ **HQ**	• Presidential Management Fellows • Project HOPE
→ **KSC**	• KSC Foundations of Leadership • Systems Engineering Advanced Leadership Program (SEAL)
→ **LaRC**	• Project Ingenuity and Management Excellence (PRIME)
→ **MSFC**	• Marshall Systems Engineering Leadership Development Program (MSELDP) • Program, Planning and Control Leadership Development Program

APPEL is a key center development resource, with courses supporting a range of center-level programs.

Innovative Offerings

In order to address new and emerging needs, the Academy continued to innovate and build upon its in-depth course offerings. In FY 2015, four new courses were introduced:

- Agile Project Management (APPEL-AGILE)
- Cost Estimation for Project Managers (APPEL-COST)
- Presentation Skills for Technical Professionals (APPEL-PSTP)
- Project Management for non-Technical Managers (APPEL-PMnTM)

The Academy collaborated with practitioner communities as well as subject matter experts to ensure the accuracy and relevance of APPEL courses. Courses were reviewed, audited, and revised, as needed, to reflect input and to meet the diverse needs of NASA's technical workforce. In FY 2015, APPEL worked closely with stakeholders to revise *Foundations of Aerospace at NASA (APPEL-FOU)*. The course was shortened from five days to three, a time frame that allows APPEL to deliver critical training and information while limiting the time practitioners spend away from their work responsibilities. Course content was revised to place a greater emphasis on aeronautics and aerospace instruction and pre-work was added to enhance the learning experience.

Academy Center for Excellence

The Academy Center for Excellence (ACE), APPEL's state-of-the-art learning facility at Kennedy Space Center (KSC), hosted 149 events for a total of 2,726 participants during FY 2015. A number of different groups used the facility, including the KSC Mobile Launcher Platform (MLP) Renovation Project Team, Rocket University, the KSC Office of Diversity, the Verification and Validation Sub-Team, the KSC Creo Users Group, the KSC Interns Space Apps Challenge, the KSC Human Element Program, and the NASA FIRST Program.

The ACE facility serves as the Academy's primary location for delivering its core courses, and is continually utilized and visited by NASA groups as well as NASA industry and international partners. (See "International Collaboration: Partnering to Learn and Grow.")

On a scale from 1 to 5 (5 being the highest), participants were asked to rate the effectiveness of APPEL core and in-depth courses.

The average rating for all core courses in FY 2015 was 4.4.

The average rating for all in-depth courses in FY 2015 was 4.4.

Developmental Programs: Facilitating Hands-On Learning

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 technology, 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.

Rocket University

Rocket University ("Rocket U" or "RU") is a NASA training and development effort designed to give early-career employees hands-on project experience throughout the full life cycle of a flight project. The program seeks to develop the next-generation workforce as they transition into higher-profile projects. Since 2012, the Academy has partnered with NASA's Rocket U programs through consulting and course offerings as part of its commitment to hands-on training and development for the NASA workforce.

In 2015, Rocket U team members from Glenn Research Center (GRC) worked on the Autonomously Navigated paraGliding Experimental Lander (ANGEL). They attended many APPEL courses, including Lifecycle, Processes, & Systems Engineering, Requirements Development and Management, and Project Planning Analysis and Control. In addition, Rocket U offered non-APPEL courses that advanced engineering development for team members, including Fabrication Overview, Structural Dynamics, Communications Telemetry, Instrumentation and Selection, and Cryogenic Propulsion Systems.

On September 4, 2015, the GRC RU team launched the ANGEL experiment from Fort Sumner, NM, to demonstrate the controlled descent of a high altitude balloon payload to a predetermined landing site. The payload ascended into the upper atmosphere to 120,000 feet before disconnecting from the balloon. It was then guided to the desired landing site by a paragliding parachute. ANGEL demonstrated how the Airborne Systems, Inc. Guided Precision Aerial Delivery System (GPADS) can benefit planetary science balloon missions through a risk-reduction flight test for high altitude balloon operations, allowing for faster and cheaper recovery as well as softer landing.

> *Since I'm one of the youngest engineers in my branch, this program gave me opportunities to take on lead roles in program management early on in my career."*
>
> ~ Deb Goodenow, Diagnostics and Electromagnetics Branch

> *Participants gained a technical knowledge and experience on a cross-functional project team in a low-risk, low-cost environment. This includes opportunities to improve their skills in communications and networking in and outside of the center."*
>
> ~ Rochelle Gallagher, Glenn RU Program Manager, Human Capital Development Division

GRC RU graduates, left to right: Steven Korn, Douglas Astler, Jeremiah McNatt, Amanda Stevenson, Therese Griebel (advisor), Deb Goodenow, Dr. Howard Ross (advisor), Jeffery Chin, and Anthony Roberts. Not pictured: Justin Niehaus and Fransua Thomas.

Photo Credit: Bridget Caswell
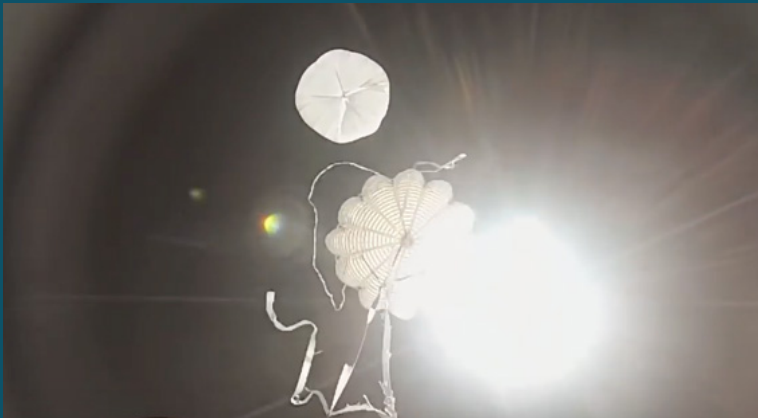
The ANGEL drogue parachute deploys during flight.

Photo Credit: NASA

ANGEL's Ram-Air Canopy in flight.

Photo Credit: NASA

HOPE Training Opportunity

Project HOPE (Hands-On Project Experience) is a cooperative workforce development program sponsored by the Science Mission Directorate and supported by the Academy. The HOPE Training Opportunity provides teams of early-entry NASA employees with a chance to propose, design, develop, build, and launch a suborbital flight project over the course of 18 months. The purpose of the program is to enable practitioners in their early careers to gain the knowledge and skills necessary to manage NASA's future flight projects.

In 2015, a team of 13 young engineers from Langley Research Center (LaRC) worked on the Radiation Dosimetry Experiment (RaD-X). RaD-X was designed to obtain the first high-altitude dosimetric measurements of cosmic ray interaction in the upper atmosphere in order to validate low-cost sensors for future missions and provide data to improve the health and safety of all future commercial and military aircrews that transit the poles. Working on the mission provided trainees with hands-on training in all major phases of mission design and execution, complemented by mentoring and coaching as well as both formal and informal learning experiences. The result was a customized, flexible, and integrated training approach that prepared the RaD-X team for mission success. Over the course of the project, they worked toward a goal of developing qualified science and technology personnel to support science missions.

On September 25, 2015, the RaD-X High Altitude Science Balloon launched from Fort Sumner, NM. The project remained in flight for 24 hours as it collected data, measuring cosmic rays at two regions in the stratosphere. The first region was above 110,000 feet, which is at the edge of space. The second was between 70,000 and 89,000 feet, where the experiment remained overnight. The data will be fed into the Nowcast of Atmospheric Ionizing Radiation for Aviation Safety (NAIRAS) model to provide

" *It's been an amazing experience—we've taken RaD-X from concept to launch-ready in just 18 months."*

~ Denisse Aranda, Integration and Test lead for HOPE RaD-X

" *Speaking for myself, I learn best by doing and seeing, and there is no better way than for me to try to execute using tools and techniques learned through a direct experience."*

~ Amanda Cutright, Chief Engineer for HOPE RaD-X

In the Fort Sumner hanger, NASA Astrophysics Division Director Paul Hertz addresses the RaD-X team before the balloon launch.

Photo Credit: NASA APPEL/ Erin Bonilla

Preparing for the balloon launch of RaD-X.

Photo Credit: NASA/JPL-Caltech

CKO: Knowledge Services Advancing Organizational Learning

In FY 2015, the CKO continued to promote knowledge management and services throughout NASA by engaging and advocating for the CKO knowledge community and its activities within the agency and by further developing numerous initiatives advancing critical knowledge capture, lessons learned sharing, and leveraging leading practices of other federal agencies, industry, academia, and international space agencies.

These activities involve knowledge sharing with NASA's unique requirements, solutions, and expertise shared across individuals, teams, projects, programs, mission directorates, and centers. NASA, as a highly technical agency, continues to rely on a systematic approach for capturing implicit and explicit knowledge and sharing it within its federated structure. The formal effort of the CKO endeavors to ensure that knowledge capture and lessons learned are leveraged by developing and using modern tools to make them highly visible and easily accessible. Other efforts include risk-informed prioritization of lessons and processes to determine which lessons have local or across-agency potential and to achieve distilling and incorporation of lessons and technical standards most critical to safety and mission success.

The CKO is also extensively involved in the International Astronautical Federation's International Program/Project Management Committee (IPMC) and Knowledge Management Technical Committee (KMTC), with APPEL's International Project Management Course, and with the IPMC's Young Professionals Workshop.

Critical Knowledge and Referee Process

NASA CKO has initiated the Critical Knowledge and Referee process to address risk-informed knowledge review of the knowledge that is most important and has broad applicability for safety and success from sources such as technical reports, mishaps findings, lessons-learned submissions, and other reviews and findings as appropriate. CKO has initiated critical knowledge interviews with senior leaders at NASA to best identity lessons learned, within four major categories, for programmatic and engineering missions, as well as other lessons to prevent skills and expertise from dissipating over time or being completely lost.

Masters with Masters

A video series that brings expert practitioners to share their knowledge, the Masters with Masters interviews capture insights, stories, lessons learned, leading practices, personal experiences, and the challenges of managing a team, project, or program. Facilitated by the CKO, these events are distributed and accessible through a variety of communication platforms, including the CKO website and social media and the Academy's YouTube channel.

Six Masters with Masters events took place in FY 2015:

- **John Sprague, Deputy, Technology & Innovation Division and End User Architect**, and Brian Thomas, **Data Scientist at NASA**, spoke on a variety of topics centered around Big Data, in this first of a series of interviews on that crucial subject.
- **Susan Motil, Deputy Chief of the European Service Module Integration Office for the Orion Program at Glenn Research Center (GRC),** and **Carol Ginty, Project Manager, Evolvable Cryogenics (eCryo) Project, Space Technology Project Office, GRC**, discussed project leadership and lessons learned.
- **Therese Gribel, Director of Aeronautics at GRC**, and **Dr. Aaron Weaver, Orion Program Integration Lead, GRC**, shared their experiences in mentoring and lessons learned from a formal mentoring program.
- **Charlie Bolden, NASA Administrator**, and **General Walter Natynczyk, President of the Canadian Space Agency**, shared the practices and successes of international collaboration and the critical role of relationships among space organizations.
- **Michael Barrett, Deputy Chief for the Space Technology Project Office**, and **Diane Malarik, Senior Project Manager of the Space Flight System Directorate**, spoke on a variety of topics, including how small details are managed in large projects and how to best handle risk and innovation.
- **Bart Singer, a Senior Systems Engineer, Langley Research Center (LaRC) Chief Engineer**, and **Jennifer Stevens, the Chief Knowledge Integrator for Marshall Space (MSFC)**, discussed their plans and efforts for distilling and infusing the most critical elements from their respective lessons-learned programs.

Michael Barrett, Deputy Chief for the Space Technology Project Office, and Diane Malarik, Senior Project Manager of the Space Flight System Directorate, spoke with NASA CKO Ed Hoffman (left) on a variety of topics, including making career choices, managing details in large projects, and how best to handle risk and innovation.

Photo Credit: NASA

Knowledge Services

The CKO advanced NASA as an organization committed to learning through building and promoting knowledge services within the agency and its various communities. In FY 2015, NASA CKO shared presentations and delivered addresses at over three dozen events, conferences, and symposiums. These events included the two CKO-facilitated face-to-face events, Knowledge 2020 conferences, at Kennedy Space Center (KSC) in fall of 2014 and at Johnson Space Center (JSC) in spring of 2015. Other events leveraged the CKO facilitation of knowledge services activities, such as a lessons learned event for Space Communication and Navigation's (SCaN) Space Network Ground Segment Sustainment (SGSS) project. NASA CKO also serves on the Project Management Institute (PMI)® Executive Council and American Productivity and Quality Council (APQC) Advanced Working Group on Knowledge Management. Benchmarking events dovetailed with CKO presentations and interviews; these included benchmarking events with Microsoft, Boeing, Merck, and Gates Foundation, and a dozen federal agencies, such as the United States Secret Service, Department of Transportation, General Services Agency, and Homeland Security.

Dan Ranta (far left), former Director of Knowledge Sharing, ConocoPhillips, and Jean-Claude Monney (center), Global Knowledge Management Lead, Microsoft Services, mingle with participants at the Welcome Reception of Knowledge 2020 2.0 at JSC in April 2015.

Photo Credit: NASA/Susan Snyder

Federal Knowledge Management Work Group

During 2015, NASA CKO chaired for its third year the Federal Knowledge Management Community. This community consists of over 200 members, each acting as knowledge management and services representatives within their 45 federal organizations. NASA HQ hosted two quarterly meetings this year and continues to plan and facilitate meetings with partner Department of Transportation.

Regular Community Meetings

In FY15, the NASA CKO community met remotely by conference call on a quarterly basis, and twice annually in a face-to-face directly after the two Knowledge 2020 Conferences. Quarterly meetings and monthly reports ensure that all activities in which the community engages are shared and leveraged across organizational boundaries. The meetings and report outs help to create opportunities for networking and exchanging best and leading practices for maturing the models of knowledge management and services at NASA. Such collaborative and varied knowledge-sharing projects at NASA include Jet Propulsion Lab's searchable key-worded video program, JPLTube, Human Exploration and Operations Mission Directorate's Knowledge-Based Risk Dashboard, JSC's Search initiatives, MSFC's Distilling and Reference Process for Lessons Learned, Goddard Space Flight Center (GSFC)'s Road to Mission Success program, and KSC's Gamification and Innovative Spaces projects.

Ed Rogers, Chief Knowledge Officer at GSFC, and Marisa Connell, a former Knowledge Management practitioner at NASA, share insights into how organizational structure affects organizational learning.

Photo Credit: NASA/Susan Snyder

International Collaboration: Partnering to Learn and Work

International collaboration in space exploration continues to grow in scope and complexity as NASA and its partners work together to pursue common objectives. During 2015, the Academy and CKO continued to collaborate with NASA's international partners through the International Astronautical Federation's International Program/Project Management Committee and Knowledge Management Technical Committee, through the Academy's International Project Management course, and through the conduct of an annual Young Professionals Workshop.

International Program/Project Management Committee and Knowledge Management Technical Committee

In 2015, NASA continued to participate actively in the International Program/Project Management Committee (IPMC) of the International Astronautical Federation (IAF). The IPMC meets twice annually and provides a forum to promote sharing of experiences and approaches to international project management and technical workforce training among the committee's 25 participating space agencies, companies, and professional organizations.

During the past year NASA also worked closely with the European Space Agency, Japanese Space Exploration Agency, German Aerospace Center and French National Center for Space Studies in the IAF's Knowledge Management Technical Committee (KMTC). The KMTC also meets twice annually in conjunction with the IPMC and focuses on sharing best practices in providing knowledge services to space organizations.

International Project Management Course

In February and July of 2015, APPEL conducted two highly successful International Project Management (IPM) courses held at the Academy Center for Excellence (ACE) at NASA's Kennedy Space Center (KSC). The course is designed to bring together NASA and international participants to develop international teaming skills and understand respective project management approaches and challenges. Fifty-five NASA project team members and 36 counterparts from twelve countries nominated by IPMC member organizations took part in the two courses. The one-week IPM sessions include modules discussing the programs and project management approaches of NASA, the European Space Agency (ESA), the Japanese Aerospace Exploration Agency (JAXA), the Centre National d'Etudes Spatiales (CNES), the German Aerospace Center (DLR), and the Canadian Space Agency (CSA), as well as a module on the perspectives of space industry participants supporting collaborative international projects. The IPM participants also receive training on negotiating successfully in a multicultural environment as well as differing cultural and ethical considerations.

October 2015 IPMC meeting.

Photo Credit: IAF

Young Professionals: Fostering a New Generation of Leaders

As a new generation of professionals is poised to enter the technical workforce, the Academy and CKO have continued to work toward bridging the gap between NASA veterans and early-career employees. In FY 2015, the Academy continued to engage with NASA's young professional community to better understand their professional development needs and provide them with the resources and support they need to grow.

Young Professionals Workshop

In October 2015, NASA and its International Program/Project Management Committee (IPMC) member counterparts organized the fourth in a series of Young Professionals Workshops to gather insights, perspectives, and suggestions on topics that can help develop the next generation of space program employees. Twenty-five early-career space professionals nominated by agencies, companies, and professional organizations in 15 countries attended the 2015 workshop, which was held in conjunction with the International Astronautical Congress (IAC) in Jerusalem, Israel. The participants—who deliberated through virtual exchanges in the months leading up to the Workshop—focused on three topics: the value of mentoring programs, decision factors for entering and remaining in the space workforce, and rapid engagement/accelerated learning. A report summarizing the discussions, observations, and proposals of the workshop participants is available on the IAF and CKO websites.

APPEL News *Interviews and Articles*

In FY2015, the Academy's *APPEL News* published a range of articles that benefited NASA's young professional community. Articles on engineering- and project management-related activities across the agency highlighted the work being done at all NASA centers. Interviews with successful project managers and systems engineers, both at NASA and in the broader aerospace community, offered insight and advice to early-career professionals. Finally, pieces on the activities of those engaged with the international young professional community promoted idea dissemination across borders.

NASA Young Professionals Page

APPEL continued to sponsor the NASA Young Professionals web page: the first comprehensive source for connecting early-career employees with their peers across the agency. The Young Professionals webpage serves as a resource for all of the details about how to connect with each group by email, interact with them through social media, or visit their website to find out more about what they're doing. The page provides a means for NASA young professionals to share knowledge by connecting with colleagues.

Social Media Support

In the fall of 2015, APPEL used its broad social media reach to support the HOPE Radiation Dosimetry Experiment (RaD-X) team: a group of early-career NASA employees participating in a cooperative workforce development program sponsored by the Academy and the Science Mission Directorate. In the weeks before launch, HOPE RaD-X established a Twitter account to spread the news about the project's status and mission. On launch day, APPEL stepped in, expanding the scope of their social media presence by live-tweeting the launch and sharing it with the larger APPEL audience.

The Rapid Engagement and Accelerated Learning discussion group finalizing their report for the 2015 IPMC Young Professionals Workshop.

Photo Credit: IAF

Kevin Daugherty (left), HOPE RaD-X Project Manager, with Amber Agee-Dehart (center), Founder of the Cubes in Space program, and Frank Peri (right), Deputy Director, Engineering Directorate at NASA Langley Research Center.

Photo Credit: NASA APPEL/ Erin Bonilla

Metrics: Leveraging Data Insights to Enhance Value

To maximize its online and social media impact and interest, in FY15 the Academy continued to invest in communications services and strategies to deliver critical updates, content, stories, and reports to its stakeholders. Using a "connect and learn" approach, the Academy communicated to a wide audience to connect practitioners to the people, resources, and knowledge they need in order to learn, grow, and develop as managers and engineers. By leveraging tools such as Google Analytics, the Academy determined how visitors use the APPEL website and online resources, who accessed the website, and where they were located regionally. The wealth of data and flexibility in analysis of statistics provided by the program enabled the Academy to fine-tune its online and social media activities in FY 2015 in order to build its audience and expand its value to stakeholders.

APPEL Website Metrics

Throughout FY 2015, user traffic increased on the APPEL website.

The total number of page views for the website from October 2014 through September 2015 was 181,402. The monthly page view average was 15,117 compared with 12,401* for FY14. The high traffic on the APPEL website was attributable to the relevance of its contents as well as ongoing improvements in the look, feel, and functionality of its webpages.

Traffic on the APPEL website grew as APPEL's communications reached users in all 50 states. The majority of website users were U.S.-based, with most located near NASA centers. Outside of the U.S., individuals in North America, Europe, and elsewhere— including those at international space agencies and learning institutions—also accessed the site.
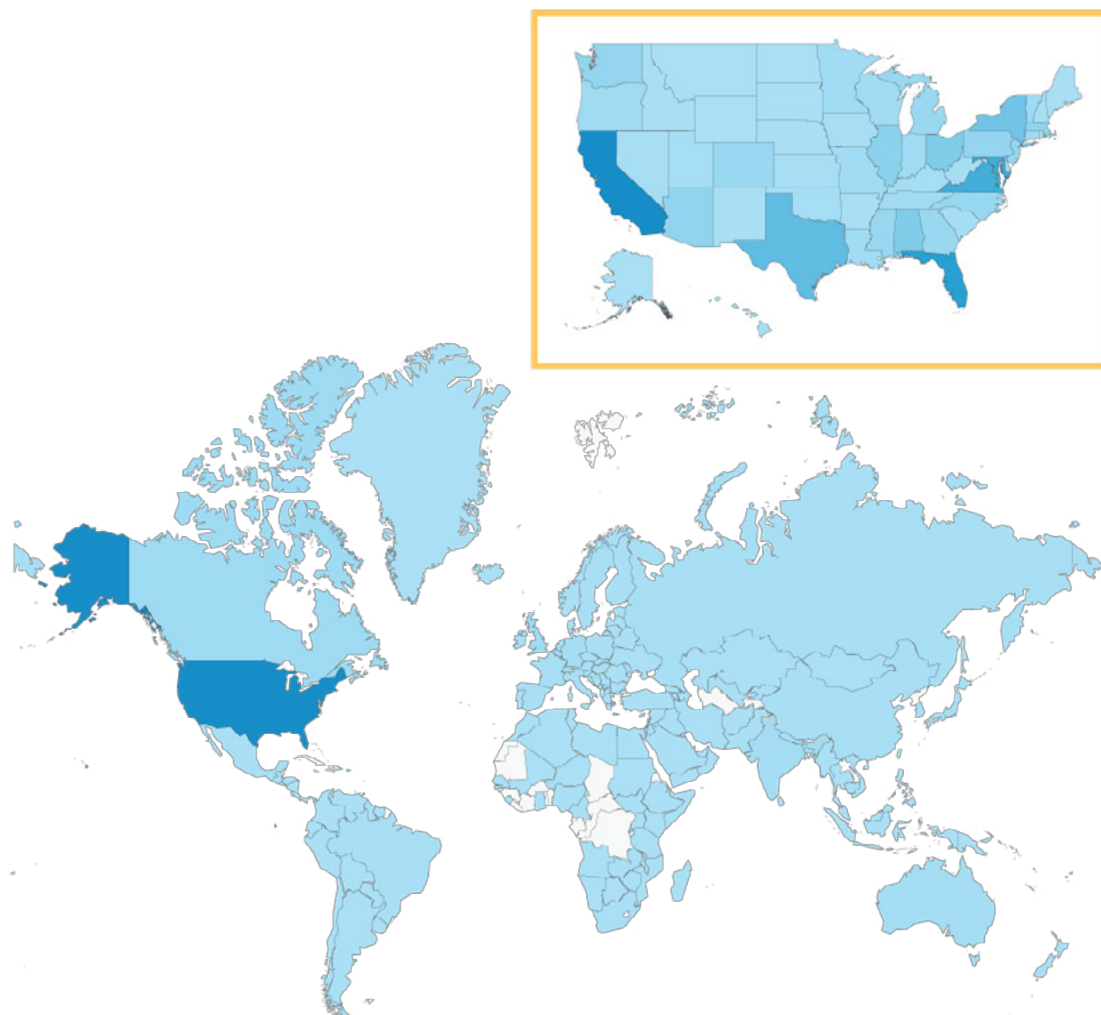
Top States/Regions in FY 2015	Top Countries in FY 2015
• California	• United States
• Florida	• Canada
• Maryland	• United Kingdom
• Virginia	• India
• Texas	• Australia

*Average of random six-month sample of data from FY14.

Over the year, the APPEL website attracted visitors from around the world. Blue areas on the map above indicate website users while darker colors correspond with more page views.

The interactive APPEL Catalog received more page views than any other APPEL resource, except for the website itself, with 10,692 views for the year. The monthly average was 891 views.

The interactive PM&SE Competency Model received nearly 3,000 views over the course of the year. Like the catalog, the Competency Model was extensively updated for FY 2015.

APPEL Social Media Metrics

The Academy utilizes a full range of digital channels to keep APPEL news and accomplishments in the forefront.

APPEL's *Twitter* account is a key platform for the Academy to share news about significant moments in NASA history, lessons learned on complex projects, and insights from live-streamed events that impact APPEL stakeholders, such as the Commercial Crew Program partner announcement.

APPEL's *Facebook* channel allows the Academy to maintain a longer conversation with stakeholders. Posts augmented by images and links to APPEL News stories elicit a strong response, a strategy that continues to be effective at increasing community engagement and awareness of APPEL.

APPEL's *Flickr* albums serve as a repository for visual storytelling. In addition to supplementing new stories with Flickr albums, the site allows the Academy to share lesser-known stories and images to increase page views.

The Academy uses *YouTube* to share video content with the NASA technical workforce and its stakeholders, including Masters with Masters events, career and professional development presentations, and lessons learned discussions.
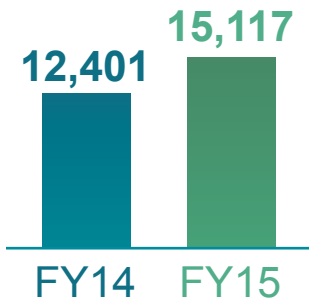
Through *iTunes U*, the Academy is able to share knowledge with NASA practitioners in an easy-to-use-and-download format. Resources include APPEL publications, curriculum material, and Academy archives.
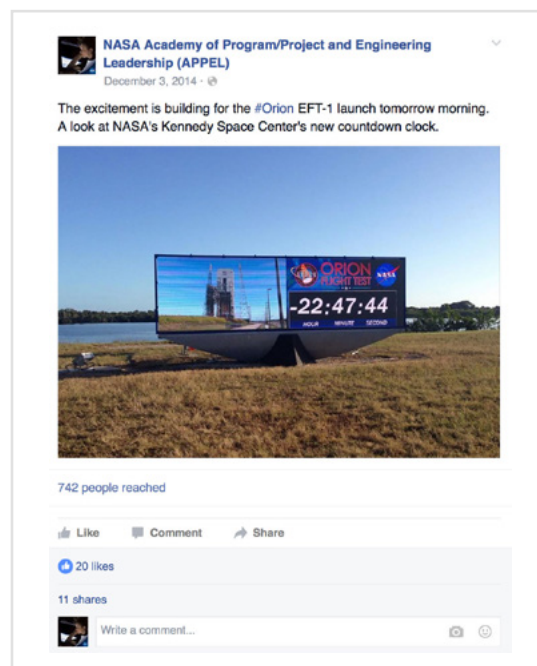
APPEL Metrics Snapshot

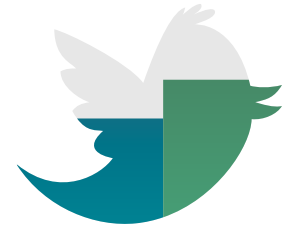## APPEL Website
Avg. Pageviews Per Month

12,401 FY14
15,117 FY15

YouTube
Views to Date

FY14 **106,026**
FY15 **127,609**

Twitter
Followers to Date

15,578 FY14
17,707 FY15

Facebook
FY Total Likes

15,578 FY14
17,707 FY15

Flickr
Views to Date

404,241 FY14
612,350 FY15

iTunes U
Views to Date

141,278 FY14
146,488 FY15

During FY15, APPEL utilized its social media platforms and website to engage audiences around the world.

Operational Metrics

Beyond its digital offerings, APPEL examined its level of customer satisfaction and quality control through surveys and monthly evaluations in order to enhance the Academy's interactions with key stakeholders.

Customer satisfaction surveys based on defined quality standards were sent to APPEL course participants and instructors as well as APPEL points of contact at each NASA center, with the goal of soliciting key stakeholder input to improve APPEL performance. The customer satisfaction analysis produced an overall satisfaction rating of 4.8 out of 5.0 for FY 2015. (See "Achievement: Supporting Success Across the Agency.") In addition, monthly quality control evaluations were conducted to evaluate consistency in delivery and practitioner satisfaction. These evaluations, which focused on 11 key performance indicators (KPIs), examined how APPEL Training & Support Specialists performed across three categories: Process, System, and Customer Service.

Together, the data enabled the Academy to measure both the satisfaction of stakeholders with APPEL support as well as the quality of the support provided. Furthermore, the direct feedback facilitated continuous process improvement. Based on responses, APPEL instituted changes designed to improve the course attendee experience, such as ensuring course information—including maps and directions—was easily accessible, increasing the level of interaction with practitioners, and streamlining course emails, in addition to addressing registration efficiencies by introducing a new quarterly registration model to be implemented in FY16.

Orion engineers Stu McClung (left) and Ed Strong (right) update the speed limit at Kennedy Space Center for Orion's first flight, Exploration Flight Test 1 (EFT-1). APPEL News interviewed McClung, Orion Crew Module Landing and Recovery System Functional Area Manager, following Orion's successful maiden voyage.

Photo Credit: NASA

Looking Ahead to 2016

FY 2016 will be an exciting time for NASA and the Academy. APPEL and CKO will continue their tradition of innovation in order to deliver high-quality and effective training, development opportunities, and tools for learning and knowledge sharing to the NASA technical workforce and the knowledge management community.

A number of new resources, programs, and audience-engagement events are planned for FY 2016, including:

- Introducing the new PM&SE Career Development Framework: a unique resource designed to support practitioners, supervisors, and managers by helping determine which courses and activities will enhance competencies in current positions and support future development aspirations. It complements the APPEL Catalog and PM&SE Competency Model, and is designed to be used in conjunction with such development tools as mentoring and manager/ supervisor discussions.
- Implementing a new quarterly registration model, similar to the four-semester calendar model used by many universities. This new process shortens the registration period from 12 months to 3 months, streamlining the experience for both practitioners and authorizers alike.
- Responding to stakeholder needs by introducing new project management-focused courses, including an Acquisition series for project managers and a Project Management 101 course for those new to the field.
- Continuing to lead the NASA Virtual Project Management Challenge, an ongoing online dialogue series focused on critical aspects of project management, to promote lessons learned and best practices across the agency.
- Supporting agency practitioners in navigating the new requirements for maintaining certification from the Project Management Institute (PMI®).
- Maintaining the practice of continuously reviewing APPEL courses with subject matter experts to ensure alignment with NASA policies and procedures as well as agency missions.
- Providing additional training opportunities through programs such as the Systems Engineering Leadership Development Program (SELDP), Rocket University, and Project HOPE.
- Enhancing engagement with Academy stakeholders through continued participation in live social media events.
- Building on the vision of a developing a NASA Knowledge Certification program that provides a year-long education program on tools and activities for knowledge capture and sharing at NASA.
- Increasing CKO presence at forums to share knowledge and best practices, enabling the knowledge community to leverage them in order to better infuse into projects and programs to reduce risk and enhance mission success.

- Enhancing skill development in knowledge management competencies by ensuring that the APPEL courses that address the skill or competency are identified and communicated.
- Developing CKO materials such as the Knowledge Journal, blogs, articles and white papers in order to deepen the online learning resources on critical knowledge.
- Continuing to participate in external benchmarking studies of Knowledge Management efforts throughout the world.
- Increasing APPEL presence at academic and industry conferences to share knowledge and best practices.
- Continuing to solicit review of the Academy's offerings by participating in external benchmarking studies of training institutions throughout the world.

The Academy and CKO remain committed to supporting the agency's mission and workforce in this challenging fiscal environment.

" *Man's mind, once stretched by a new idea, never regains its original dimensions."*

~ Oliver Wendell Holmes

ON THE BACK COVER

At the conclusion of EFT-1, the Orion spacecraft reentered Earth's atmosphere going roughly 20,000 miles per hour before splashing down in the Pacific as planned.

Photo Credit: NASA/ James Blair