

masters forum

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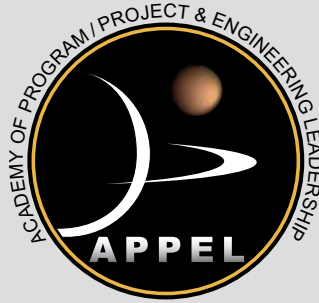
Passing the Torch 3



Presented April 19–22 by
**The NASA Academy of Program/Project
and Engineering Leadership**



The NASA Academy of Program/Project and Engineering Leadership's Knowledge Sharing initiative presents



Masters Forum 20: Passing the Torch 3

April 19–22, 2011

Crowne Plaza Melbourne | 2605 North Highway A1A, Melbourne, FL
Phone: 321-777-4100 | Fax: 321-773-6132 | www.cpmelbourne.com

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Welcome to **Masters Forum 20: Passing the Torch 3**, the final encore in this series—the result of overwhelming demand for this highly successful event. This Forum represents a continuing collaboration between the NASA Academy of Program/Project and Engineering Leadership (APPEL) and the Public Affairs Offices of NASA Headquarters and Kennedy Space Center, who have helped to make this a quality learning experience.

As we approach the final flight of the Space Shuttle, it is timely to reflect upon many important lessons learned from the formulation, development, operation, and utilization of the Space Shuttle, and its many contributions to science and human exploration—including the important role it played in the development of the International Space Station. Fortunately, many of the master practitioners who were involved in this program are here with us to share these stories with current and future practitioners within NASA. Additionally, we will examine key lessons from the Constellation program and also learn about innovative new space exploration architectures currently under development, as well as new space-transportation systems that will change the way we access space. We will also learn from the unique perspectives of our international partners as they reflect on our past collaborations and anticipate the future. We will hear about NASA's new system to capture and share knowledge, and we will gain an important understanding about young professionals in NASA's workforce.

Your participation in this Forum is evidence that your sponsoring organization considers you a master practitioner, or an emerging leader, so congratulations on being nominated to attend. This Forum is designed to permit you to engage, share, and learn from fellow practitioners through stories and lessons learned. It is anticipated that your active participation will help transfer knowledge, cultivate a community of reflective practitioners, and solidify cross-center relationships in support of NASA missions.

In addition to thought-provoking presentations and dynamic group discussions, the Forum offers you the chance to build relationships with peers from across the agency and to meet with key leaders in our community, providing networking opportunities that are perhaps one of the Forum's most valuable features.

While our Masters Forums continue to evolve to meet NASA's new challenges, one thing remains constant: our belief in the power of storytelling. Good stories engage us, illuminating subtle and contrasting points of view that otherwise would be lost to both novice and experienced practitioners. They provide a practical framework to deal with extraordinary change. Stories broaden our perspective by allowing us to see with the tellers' eyes. Through stories, we convey knowledge that helps us innovate, find new solutions to problems, and provide valuable insights for project management and engineering professionals. You will hear many stories while you are here. You may also share a few of your own. We look forward to hearing them, and we hope you continue to share your stories far into the future.

Sincerely,

Edward Hoffman, Academy Director,
and the Academy Knowledge Sharing Team



Agenda

Agenda

Crowne Plaza Melbourne • April 19–22, 2011

Monday, April 18, 2011

- Travel Day

Tuesday, April 19, 2011

8:00 a.m.–5:45 p.m.

- Kennedy Space Center Tour (8:00 a.m.–5:45 p.m.) (see details at end of agenda)
 - Assemble in Crowne Plaza Hotel lobby (8:00 a.m.)
 - Buses depart (8:30 a.m.)
 - Visit KSC Visitor Center (9:30 a.m.–12:30 p.m.)
 - Board buses for center tour (12:30 p.m.–4:30 p.m.)
 - Buses return to Crowne Plaza Hotel (5:45 p.m.)

Wednesday, April 20, 2011

7:00 a.m.–4:30 p.m.

- Breakfast (7:00 a.m.–8:00 a.m.)
- Welcome (8:00 a.m.–8:15 a.m.)
 - Bob Cabana, Director, Kennedy Space Center
- Opening Remarks and Forum Overview (8:15 a.m.–8:30 a.m.)
 - Ed Hoffman, Academy Director
- The Shuttle Program: Formulation, Development, and Operations (8:30 a.m.–9:45 a.m.)
 - Panel Chair and Introductory Remarks: Thomas (Tom) L. Moser, NASA (retired)
 - Program Formulation and Development: Thomas (Tom) L. Moser, NASA (retired)
 - Propulsion Systems Elements: Jody Singer, Marshall Space Flight Center
 - Q&A
- Break (9:45 a.m.–10:00 a.m.)
- The Shuttle Program: Formulation, Development, and Operations—Continued (10:00 a.m.–11:45 a.m.)
 - Panelist Introductions: Thomas (Tom) L. Moser, NASA (retired)
 - Launch Development and Operations: Russel (Russ) E. Rhodes, Kennedy Space Center
 - Shuttle Missions—Reflection and Perspectives of the Chief Engineer: Frank Buzzard, NASA (retired)
 - Mission and Flight Operations: John O'Neill, NASA (retired)
 - Q&A
- Lunch (Noon–1:00 p.m.)
- The Shuttle Mission: Enabling Science and Exploration (1:15 p.m.–3:00 p.m.)
 - Panel Chair and Introductory Remarks: Joe Rothenberg, Swedish Space Corp and Independent Consultant
 - HST Servicing Mission 1: Joe Rothenberg, Swedish Space Corp and Independent Consultant
 - Life Sciences: Scott M. Smith, Johnson Space Center
 - Space and Microgravity Sciences: Howard Ross, Glenn Research Center
 - Q&A
- Break (3:00 p.m.–3:45 p.m.)
- Knowledge Capture: Table Discussions and Reflections (3:45 p.m.–4:30 p.m.)
 - Ed Hoffman, Academy Director, and Forum Participants
- Dinner (5:00 p.m.–6:00 p.m.)
 - Open networking

Thursday, April 21, 2011

7:00 a.m.–5:30 p.m.

- Breakfast (7:00 a.m.–8:00 a.m.)
- Reconvene, Agenda Review, and Announcements (8:00 a.m.–8:15 a.m.)
 - Ed Hoffman, Academy Director

- Group Picture (8:15 a.m.–8:30 a.m.)
- The Space Shuttle/Space Station Connection (8:30 a.m.–10:15 a.m.)
 - *Panel Chair and Introductory Remarks: Tommy Holloway, NASA (retired)*
 - *Shuttle-Mir—A New Era of Collaboration: Ken Cameron, NASA (retired)*
 - *International Space Station—A New Beginning with New Challenges: Tommy Holloway, NASA (retired)*
 - *Extending the Promise—A Decade for Science and Exploration: Julie Robinson, Johnson Space Center*
 - *Q&A*
- Break (10:15 a.m.–10:30 a.m.)
- International Perspectives: Looking Back/Looking Ahead (10:30 a.m.–12:15 p.m.)
 - *Panel Chair and Introductory Remarks: Ed Hoffman, Academy Director*
 - *Rupert Gerzer, German Aerospace Center (DLR)*
 - *Shinobu Doi, Japan Aerospace Exploration Agency (JAXA)*
 - *Q&A*
- Lunch (12:15 p.m.–1:15 p.m.)
- Lessons Learned from Constellation (1:15 p.m.–2:30 p.m.)
 - *Panel Chair and Introductory Remarks: Phil Sumrall, Marshall Space Flight Center*
 - *Ares Launch Systems Development: Phil Sumrall, Marshall Space Flight Center*
 - *Orion CTV Development: Cleon Lacefield, Lockheed Martin*
 - *Q&A*
- Break (2:30 p.m.–2:45 p.m.)
- Capturing and Disseminating Knowledge (2:45 p.m.–4:05 p.m.)
 - *Panel Chair and Introductory Remarks: Roger Forsgren, NASA Academy of Program/Project and Engineering Leadership*
 - *The NASA LLIS Program/Process: Michael Bell, Kennedy Space Center*
 - *Learning from Case Studies: Ed Rogers, Goddard Space Flight Center*
 - *Mining the Academy Archives: Matthew Kobut, NASA Academy of Program/Project and Engineering Leadership*
 - *Q&A*
- Break (4:05 p.m.–4:20 p.m.)
- Knowledge Capture: Table Discussions and Reflections (4:20 p.m.–5:00 p.m.)
 - *Ed Hoffman, Academy Director, and Forum Participants*
- Table Group Reports (5:00 p.m.–5:30 p.m.)
 - *Ed Hoffman, Academy Director, and Table Group Leads*
- Dinner (6:00 p.m.–7:00 p.m.)
 - *Open networking*

Friday, April 22, 2011

7:00 a.m.–2:00 p.m.

- Breakfast (7:00 a.m.–8:00 a.m.)
- Reconvene, Agenda Review, and Announcements (8:00 a.m.–8:15 a.m.)
 - *Ed Hoffman, Academy Director*
- NASA Young Professionals Panel (8:15 a.m.–9:45 a.m.)
 - *Panel Chair and Introductory Remarks: Heather Rarick, NASA Academy of Program/Project and Engineering Leadership and Johnson Space Center*
 - *NASA/Aviation Week Young Professionals Study: Carole Hedden, Aviation Week*
 - *Understanding the Young Professional's Challenges*
 - Nick Skytland, NASA Headquarters
 - Philip Harris, Johnson Space Center
 - Anne Caraccio, Kennedy Space Center
 - Danielle Wood, Massachusetts Institute of Technology PhD Candidate

Agenda—*Continued*

- *NASA Forward: Justin Kugler, Johnson Space Center*
- *Academy Young Professionals Program: Haley Stephenson, NASA Academy of Program/Project and Engineering Leadership*
- *Q&A*
- Break (9:45 a.m.–10:30 a.m.)
- The Way Forward: New Pathways for Human Spaceflight (10:30 a.m.–12:30 p.m.)
 - *Panel Chair and Introductory Remarks: John Olson, NASA Headquarters*
 - *HEFT Architecture Study Results: John Olson, NASA Headquarters*
 - *SLS/HLLV: Garry Lyles, Marshall Space Flight Center*
 - *Commercial Crew Program: Maria Collura, Kennedy Space Center*
 - *Q&A*
- Break (12:30 p.m.–1:15 p.m.)
 - *Pick up boxed lunch*
- Forum Evaluation Surveys (1:15 p.m.–2:00 p.m.)
 - *Ed Hoffman, Academy Director, and Forum Participants*
- Forum Concludes (2:00 p.m.)
- Overnight stay is optional for guests

Saturday, April 23, 2011

- Return home travel day

KSC Center Tour Details:

Important Notes

- Guests must be attired in long pants (no Capri pants) and closed, low-heeled shoes; no tank tops
- Guests must be at least 12 years old (tour only)
- No sharp objects, backpacks, or coolers permitted
- Approved tours restricted to floor level only
- Eating is not encouraged on the buses; however, bottled water or soft drinks are permitted

Official KSC Tour Sponsor:

Stephen Angelillo, Managing Director, APPEL Training Center, Kennedy Space Center

Office: 321-867-4736 | Cell: 321-289-8299

Tour Date: April 19, 2011

Group Name: Masters Forum: Passing the Torch 3 (MFPT-3)

Number of Participants: Approximately 54 for KSC Visitor Center Complex and KSC center tour (including international participants)

Domestic Required Participant Information: Name, Date of Birth, Place of Birth, U.S. Citizen, Company, Company Title

International Required Participant Information: Name, Date of Birth, Place of Birth, Nationality, Company, Company Title, Passport Number, Passport Expiration Date

Transportation to/from hotel:

8:00 a.m. Assemble in Crowne Plaza Hotel lobby
 8:30 a.m. Buses depart Crowne Plaza Hotel
 4:45 p.m. Buses depart Kennedy Space Center
 5:45 p.m. Buses arrive at Crowne Plaza Hotel

Tour Itinerary and timeline:

9:30 a.m. Visit KSC Visitor Center Complex (Complimentary admittance)
Note: Lunch not provided—own your own at KSC Visitor Center Complex

- Shuttle Launch Experience
- Hubble 3-D
- Space Station 3-D
- Star Trek LIVE
- Rocket Garden
- Early Space Exploration Museum

12:30 p.m. Board bus at KSC Visitor Center Lot #1 and depart for KSC center tour (*Tour bus leaves promptly*)

1:00 p.m. Arrive and tour VAB transfer aisle

1:30 p.m. Board buses and depart for Orbiter Processing Facility (OPF)

1:45 p.m. Arrive and tour OPF
Guests must be at least 12 years old to go inside facility

2:45 p.m. Depart OPF for drive by Pad A, inside gate via Perimeter Road
Optional photo op in grassy area outside gate Launch Complex

3:15 p.m. Depart Pad A for Apollo Saturn V Complex

3:30 p.m. Arrive and tour Apollo Saturn V Complex

- On display Saturn V—Largest rocket ever made
- Apollo Launch and Lunar theatre
- Apollo Treasures Gallery
- Saturn V Firing Room

4:30 p.m. Board buses for return to KSC Visitor Center Complex

4:45 p.m. Board buses to return to hotel

5:45 p.m. Arrive at hotel
Note: Dinner not provided—own your own



Presentations

The Shuttle Program: Formulation, Development, and Operations

Wednesday • 20 April 2011



Thomas (Tom) L. Moser, NASA (retired), Panel Chair

Program Formulation and Development: Thomas (Tom) L. Moser, NASA (retired)

Propulsion Systems Elements: Jody Singer, Marshall Space Flight Center

Launch Development and Operations: Russel (Russ) E. Rhodes, Kennedy Space Center

Shuttle Missions—Reflection and Perspectives of the Chief Engineer: Frank Buzzard, NASA (retired)

Mission and Flight Operations: John O'Neill, NASA (retired)

As NASA approaches the final flight of the Space Shuttle, it is timely to reflect upon the many important lessons learned from the formulation, development, and operation of the Space Shuttle program. The Space Shuttle represented a dramatic departure from the launch and space vehicles of the preceding

Apollo era, with a new focus on routine access to low-Earth orbit, utilizing a high degree of reusability—and higher flight rates—to attempt to meet its many challenging goals. There is much to be learned from this pioneering effort and, fortunately, many of the master program/project manager practitioners who were involved in the shuttle program are still available to share these stories and lessons learned with current and future practitioners within NASA. This panel will examine the transition from the Apollo era to the shuttle program, the early conceptualization and definition of the shuttle, the development of its many challenging new systems and subsystems, the changing political environment, and its flight and mission operations over the past thirty years since its first flight: STS-1, on April 12, 1981. The panelists have experience in each of these phases of the program, including extensive involvement in Apollo through the development of the Space Shuttle itself, and its subsequent launch, flight, and mission operations, which they will share from their unique perspectives.

About the Presenters

Thomas (Tom) L. Moser began his aerospace career at RCA Missile and Surface Radar Division as a mechanical design engineer. Joining NASA at the Manned Spacecraft Center (Johnson Space Center) in 1963, he held various positions, including Apollo subsystem manager for the Command Module and Launch Escape System Structure; orbiter subsystem manager for the structure and thermal protection systems (tiles); Orbiter deputy project manager; and director of engineering. At NASA Headquarters, he served as the deputy associate administrator (AA) for the Office of Spaceflight and deputy AA and program director for the International Space Station program. After retiring from NASA in 1989, he served as vice president for business development at Fairchild Space and as vice president of space systems at ANSER. In 1998, he served as director of the Texas Aerospace Commission under Governor George W. Bush. He continued the pursuit of commercial space programs as the vice president at Constellations Services International. Mr. Moser now serves as a consultant to the aerospace industry. He has been recognized for his contributions to the aerospace industry by being selected as an American Institute of Aeronautics and Astronautics Fellow, American Astronomical Society Fellow, International Academy of Astronautics member, and distinguished graduate of the University of Texas College of Engineering.



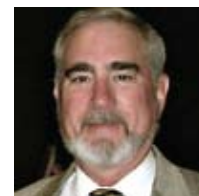
Jody Singer is currently serving in a dual role as the deputy project manager for the Shuttle Propulsion Office (SPO) and as the deputy manager for the Ares Project Office at Marshall Space Flight Center. She has been serving as the deputy manager for the Ares Project Office since March 2010. Ms. Singer was appointed as the deputy manager of the SPO in October 2007, where she is responsible for the manufacture, assembly, and flight readiness of the primary Space Shuttle propulsion elements: the main engines, external tank, solid rocket boosters, and motors. During her twenty-five-year career with NASA, she has held numerous leadership roles in the SPO, most recently as manager of the Reusable Solid Rocket Booster Project Office from December 2002 until assuming her current position. Ms. Singer received a BS in industrial engineering from the University of Alabama in 1983 and was appointed to SES in 2002. She has received numerous awards during her NASA career, including the Presidential Rank Award for Meritorious Executives—the highest honor for career federal employees—in October 2007. She also received the Space Flight Awareness Leadership Award, the NASA Outstanding Leadership Medal, and the Exceptional Service Medal. She was a Space Flight Awareness Launch Honoree in 1991.



Russel (Russ) E. Rhodes is a native of the state of Indiana, where he earned a BS in aeronautical engineering from Indiana Institute of Technology in 1958, and has been a senior member of the American Institute of Aeronautics and Astronautics for more than fifty-five years. Mr. Rhodes has been employed for more than fifty years at Kennedy Space Center. He has been engaged in the design, development, testing, and operation of ballistic missiles and space transportation systems and has specialized experience in space vehicle propellant loading, cryogenic, hydraulics, high-pressure gases, and other propulsion systems. He has served as a systems engineer and in engineering management roles with the Pershing, Redstone, Jupiter, Saturn I/IB, Saturn V/Apollo, Skylab, and Space Shuttle programs and is presently engaged in the Constellation program. He has served on mishap evaluation teams both on and off center, and as the Kennedy representative to many NASA-sponsored working groups and advisory committees. Presently Mr. Rhodes is a charter member of the Space Propulsion Synergy Team and a member of the Steering Committee. Mr. Rhodes has published several technical papers on advanced space propulsion and space transportation systems, focused on lowering the cost of space transportation systems and providing affordable access to space.



Frank Buzzard spent a distinguished thirty-year career with NASA at the Johnson Space Center, retiring in 2003 after leading the Columbia Investigation Task Force. He then served as Barrios Technology program manager for the International Space Station (ISS) mission integration contract until 2005. During his NASA career, Mr. Buzzard served as chief engineer of the Space Shuttle, chief engineer of the ISS, and ISS program director/senior system integration manager at NASA Headquarters. He received numerous NASA awards, including the Distinguished Service and two Exceptional Service medals. Mr. Buzzard served as a U.S. Army helicopter pilot for five years, followed by a BS in aerospace engineering with special honors from the University of Colorado in 1974 as the top engineering graduate. He served at General Dynamics, San Diego, as an Atlas Centaur and Titan Centaur trajectory designer before coming to Johnson in 1976. He received an MS in physical science from the University of Houston in 1981. Mr. Buzzard is retired and lives in Bryan-College Station and has an aerospace consulting business, Space Engineering Consulting, Inc.



John W. O'Neill is currently engaged as an aerospace operations and management consultant working with companies in the Johnson Space Center area supporting the center and other organizations in the area. At the time of his retirement in 1998, he held the position of director of Space Operations. He had responsibility for agencywide space-operations support and related facilities and systems. He previously held the position of director of Mission Operations at Johnson and was involved in all areas of the directorate's responsibilities for preflight planning, crew and flight controller training, and real-time flight control of NASA human spaceflights and for the support facilities. Prior to that assignment, he held various positions in the operations organizations. His thirty-four years with NASA spanned programs from Gemini to the International Space Station and included flight planning, payload operations, and the evolution of the facilities and systems used in training and mission support. Prior to NASA, he was a project engineer with Sandia National Lab and a fighter pilot in the U.S. Air Force.



HOW COULD YOU FACILITATE THE TRANSFER OR REUSE OF THESE LESSONS FOR OTHER INDIVIDUALS, YOUR PROJECTS, YOUR CENTER, ETC.?

ADDITIONAL THOUGHTS AND REFLECTIONS:

SECTION

The Shuttle Mission: Enabling Science and Exploration

Wednesday • 20 April 2011



Joe Rothenberg, Swedish Space Corp and Independent Consultant, Panel Chair

HST Servicing Mission 1: Joe Rothenberg, Swedish Space Corp and Independent Consultant

Life Sciences: Scott M. Smith, Johnson Space Center

Space and Microgravity Sciences: Howard Ross, Glenn Research Center

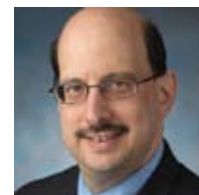
The Space Shuttle system was initially conceived to operate in partnership with an orbiting space station. Under extreme budget pressures in 1972, NASA was authorized to proceed with the development of the Space Shuttle alone, without the planned space station platform, thus requiring the development of capabilities well beyond its primary space-launch-vehicle role. Hence, the Space Shuttle system design evolved to serve as a reusable “spacecraft,” or limited-duration orbiting space platform, to conduct diverse missions for the scientific and exploration communities and return to Earth to be reoutfitted to meet other mission requirements. This panel will examine some of the unique contributions the Space Shuttle has made in space sciences, including the remarkable Hubble Space Telescope servicing missions that helped establish and maintain Hubble as one of NASA’s premier scientific observatories; in extensive space-life-sciences research, crucial to future human exploration; in unique microgravity sciences projects, including biotechnology, combustion and fire safety, fluid physics, materials science, and fundamental physics; and in Spacelab and other space sciences flight projects experiments. Collectively, these results represent significant advancements in scientific understanding, providing critical insights regarding human health, specific process and technology performance, in-space experiment operations, and technology transfer (spinoffs). The panelists, each having served in key leadership positions that led to these successes, will share their unique experiences in their respective areas.

About the Presenters

Joe Rothenberg's career spans forty-six years, twenty-seven years in the aerospace industry and eighteen years with NASA. He is currently a senior vice president for international development for the Swedish Space Corporation and an independent consultant with an international client base. He served as a member of the board of directors and president of Universal Space Network Inc. from 2002 to 2009. Mr. Rothenberg retired from NASA in 2001 as the associate administrator for Space Flight, having been responsible for the Space Shuttle, International Space Station, and all NASA space operations and space communications programs. From 1995 until 1998, he served as director of the Goddard Space Flight Center. Mr. Rothenberg joined Goddard in 1983 as the Hubble Space Telescope operations manager. In 1990, he was named to lead the Hubble project and is widely recognized for the success of its first servicing mission that corrected the telescope's flawed optics. He began his aerospace career with Grumman Aerospace in 1964 and has received numerous awards, including the Presidential Distinguished Executive Rank Award, the NASA Distinguished Service Medal, the National Aeronautics Association Collier Trophy, and the American Institute of Aeronautics and Astronautics Goddard Astronautics Award. In 1997 he was inducted into the Aviation Week and Space Technology Hall of Fame.



Scott M. Smith leads the Nutritional Biochemistry Laboratory at Johnson Space Center. The primary goal of this group is to determine the nutritional requirements for extended-duration spaceflight. He is the principal investigator for two ongoing spaceflight experiments on the International Space Station and several ground-based research projects. These research efforts include investigations of the role of nutrition in counteracting the negative effects of spaceflight on the human body. Dr. Smith serves on the Editorial Board of the Journal of Nutrition. He is a member of the American Society for Nutrition, the American Physiological Society, and the International Academy of Astronautics. He received a BS in biology and a PhD in nutrition, both from Penn State. After a postdoctoral fellowship in North Dakota, he moved to Houston in 1992 to work at Johnson.



Howard Ross is currently the chief technologist at Glenn Research Center, as well as the director of the Office of Technology Partnerships and Planning. Prior to these responsibilities, he was an associate center director for Planning and Evaluation, specializing in workforce planning and strategic analysis. At the same time, he served as acting director of external programs for education, community relations, and legislative affairs. Prior to these center-based roles, Dr. Ross worked at NASA Headquarters, in a staff office to the NASA Administrator, leading agencywide special studies and analyses. He also served at Headquarters as deputy associate administrator in the Office of Biological and Physical Research and helped select many spaceflight experiments that flew on the Space Shuttle and International Space Station. This assignment was based on his service as a principal investigator and project scientist on many microgravity experiments. He is the editor and co-author of an invited book by Academic Press entitled *Fire in Free Fall—Microgravity Combustion*. Dr. Ross began his career at the U.S. Department of Energy and the National Bureau of Standards (now the National Institute of Standards and Technology), serving as an energy conservation and environmental researcher and manager.



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ADDITIONAL THOUGHTS AND REFLECTIONS:

SECTION



Tommy Holloway, NASA (retired), Panel Chair

Shuttle-Mir—A New Era of Collaboration: Ken Cameron, NASA (retired)

International Space Station—A New Beginning with New Challenges: Tommy Holloway, NASA (retired)

Extending the Promise—A Decade for Science and Exploration: Julie Robinson, Johnson Space Center

Undoubtedly the greatest technical and engineering achievement of the Space Shuttle is the assembly and development of the International Space Station (ISS)—whose entire design, elements, and systems were designed for launch, assembly, and servicing by the shuttle. Indeed, following first element launch—the Russian-launched FGB module that established the initial foundation for station—the Shuttle manifest has been dominated by ISS requirements, so the shuttle and its mission were also dependent upon ISS. The ISS program has evolved dramatically since its initiation in 1984, having undergone several major redesigns—most notably the creation of what became the ISS after the Vest Committee Review in the early 1990s, which affected the overall program structure and management approach as well as necessitated the need for increased payload performance to meet the requirement of moving the station to an orbital inclination accessible to our new Russian partners. Perhaps most remarkable is the fact that ISS is the creation of eighteen international partners whose hardware and systems often “met” for the first time in orbit. As we approach “assembly complete,” we are now entering a decade of ISS utilization, which will afford the scientific and human exploration communities an opportunity to fully exploit the promise of this remarkable achievement, and to establish the foundation for exploration beyond the boundaries on low-Earth orbit. In this regard, the ISS is a model for future human exploration missions, which undoubtedly will be dependent upon international collaboration on a global scale. Our panelists will examine the lessons learned from the development of ISS, review our evolving international partnership, and peer into the future to anticipate the great promise of ISS.

About the Presenters

Tommy W. Holloway retired in 2002 as manager of the International Space Station (ISS) program for Johnson Space Center. He was named ISS manager in April 1999 after serving as manager of the Space Shuttle Program (SSP) for nearly four years. He began his career with NASA in 1963, planning activities for Gemini and Apollo flights. Mr. Holloway was a flight director in Mission Control for early Space Shuttle flights and became chief of that office in 1985. In 1989, he was named assistant director for the SSP for the Mission Operations Directorate. He served as deputy manager for program integration with the SSP and director of the Phase 1 program of Shuttle-Mir dockings before being named SSP manager in August 1995. He served on the National Research Counsel Committee on the assessment of options for extending the life of the Hubble Space Telescope (2004–2005). Mr. Holloway received his BS in mechanical engineering from the University of Arkansas and has earned numerous honors and awards, including Presidential Meritorious and Distinguished Ranks, the Robert R. Gilruth Award, and the Rotary National Space Trophy.



Ken Cameron became a NASA astronaut in June 1985. His technical assignments included work on tethered satellite payload, flight-software testing in the Shuttle Avionics Integration Laboratory (SAIL), launch-support activities at Kennedy Space Center, and spacecraft communicator in Mission Control. His management assignments include section chief for astronaut software testing in SAIL, astronaut launch-support activities, and operations assistant to the Hubble Repair Mission director. In 1994, Mr. Cameron served as the first NASA director of operations in Star City, Moscow, where he worked with the Cosmonaut Training Center staff to set up a support system for astronaut operations and training in Star City, and received Russian training in Soyuz and Mir spacecraft systems, and flight training in Russian L-39 aircraft. A veteran of three spaceflights, he has logged more than 561 hours in space.



Mr. Cameron left NASA in August 1996 to join Hughes Training, Inc., a subsidiary of General Motors Corporation, as executive director of Houston operations. He was later transferred to Saab Automobile in Sweden as vehicle line executive for the Saab 9-3 automobile. Upon return to the United States, he worked at the General Motors Technical Center. Following the loss of Space Shuttle Columbia and her crew, Mr. Cameron returned to the space program, taking a founding position in the NASA Engineering and Safety Center (NESC) as a principal engineer, based at Langley Research Center. In June 2005 he was selected as deputy director for safety of NESC, and in June 2007 he was relocated to the NESC office at Johnson Space Center. Mr. Cameron retired from NASA in December of 2008 to join Northrop Grumman Corporation as the director of Houston operations for Northrop Grumman Aerospace Systems. He is currently VP Risk and Reliability Solutions division manager at SAIC.

Julie Robinson is the program scientist for the International Space Station (ISS) at Johnson Space Center. She serves as the chief scientist for the ISS program, representing all ISS research disciplines and providing information and recommendations both inside and outside the agency. She chairs the ISS Program Science Forum, made up of the senior ISS scientists for each of the primary space agencies comprising the space station international partnership, and represents NASA at the multinational agency ISS User Operations Panel. As ISS program scientist, Dr. Robinson has overseen the transition of the laboratory from the assembly period, with just a few dozen active investigations, to full utilization, with hundreds of active investigations. She has an interdisciplinary background in the physical and biological sciences. Her professional experience has included research activities in a variety of fields, including virology, analytical chemistry, genetics, statistics, field biology, and remote sensing. She has authored more than fifty scientific publications.



HOW COULD YOU FACILITATE THE TRANSFER OR REUSE OF THESE LESSONS FOR OTHER INDIVIDUALS, YOUR PROJECTS, YOUR CENTER, ETC.?

ADDITIONAL THOUGHTS AND REFLECTIONS:

SECTION

International Perspectives: Looking Back/Looking Ahead

Thursday • 21 April 2011



Ed Hoffman, Academy Director, Panel Chair

Rupert Gerzer, German Aerospace Center (DLR)

Shinobu Doi, Japan Aerospace Exploration Agency (JAXA)

Throughout most of NASA's history, international collaboration has played an important role in both its science and human spaceflight programs. This collaboration has become the new norm in space, as more than sixty international space agencies increasingly work together in a broad range of space-related activities. Nearly two-thirds of NASA's space science missions now involve international collaboration on many levels, while human spaceflight—with its current focus on International Space Station and future exploration missions—is now fully international in scope. The Space Shuttle program helped facilitate this evolution with the involvement of a number of international flight projects, with

the participation of astronauts from many nations that flew on its missions, and with the use of our international partners' unique capabilities, such as the Space Shuttle's Canadian robotic arm and the German Space Agency's (DLR) Space Lab. The International Space Station has, from its very beginning, been a truly international endeavor, involving the work of eighteen space-faring nations that participated in its development. In this regard, the station is a model for future human exploration missions, which undoubtedly will be dependent upon global international collaboration. Our international panelists will examine the lessons learned from these collaborations and anticipate how we might benefit from these lessons, from their unique international perspectives, in our evolving partnerships.

About the Presenters

Edward Hoffman is responsible for the development of program and project leaders and teams within NASA, including the development of a comprehensive program and project management training curriculum, consulting services for project management teams, lessons learned, knowledge capture, and research and special studies on program and project management. He works both within NASA and externally with leaders of industry, academia, other government agencies, and international partners to enhance capabilities in program and project management. Dr. Hoffman holds a Doctorate as well as Master of Arts and Master of Science degrees from Columbia University in the area of social and organizational psychology. He received a Bachelor of Science in psychology from Brooklyn College in 1981. He frequently presents at conferences and associations and has published numerous articles and two books on program and project management: *Project Management Success Stories: Lessons of Project Leaders* (Wiley, 2000) and *Shared Voyage: Learning and Unlearning from Remarkable Projects* (NASA History Division, 2005).



Rupert Gerzer has been head of the DLR Institute of Aerospace Medicine as well as professor and director at the Institute of Aerospace Medicine at Aachen University since 1992. Previously, he was president of the German Society of Aerospace Medicine from 1999 to 2001. He is trustee to the International Academy of Astronautics and is co-editor of *Acta Astronautica*. He served as editor-in-chief for this journal from 2008 to 2010. Dr. Gerzer is a member of the advisory board on research under microgravity conditions to the German Aerospace Center and a member of the Swedish National Space Board. He is also head of the University Council at the University of Applied Sciences Bonn-Rhine-Sieg. He is a medical doctor with training in Heidelberg; Nashville, Tenn.; and Munich; and he has participated as a scientist and in his current position in numerous space experiments aboard the Space Shuttle, the Mir Station, and the International Space Station. He received the Life Sciences Award of the International Academy of Astronautics in 2003.



Shinobu Doi joined the Japan Aerospace Exploration Agency (JAXA, formerly NASDA) in 1994. Over fifteen years, he worked on the development and integration of space robotics, berthing mechanisms, and the airlock on the Japanese Experiment Module (JEM) of the International Space Station. He is now responsible for integrating and managing the mission and sustaining engineering for JEM, especially external systems. He also acts as a flight director of the JEM to support flight operations.



HOW COULD YOU FACILITATE THE TRANSFER OR REUSE OF THESE LESSONS FOR OTHER INDIVIDUALS, YOUR PROJECTS, YOUR CENTER, ETC.?

ADDITIONAL THOUGHTS AND REFLECTIONS:

SECTION



Phil Sumrall, Marshall Space Flight Center, Panel Chair

Ares Launch Systems Development: Phil Sumrall, Marshall Space Flight Center

Orion CTV Development: Cleon Lacefield, Lockheed Martin

Established in response to NASA's former Vision for Space Exploration and its early emphasis on lunar exploration, the Constellation program had several major program elements, including the Ares I launch and Ares V heavy-lift launch vehicles, the Orion crew exploration vehicle (CEV), and the Altair lunar landing system. The Ares launch systems development, managed by Marshall Space Flight Center, was led as an in-house project; whereas the Johnson Space Center–led Orion CEV development was awarded to Lockheed Martin.

Considerable progress was made in the development of these capabilities—the first major space transportation systems development undertaken by NASA since the Space Shuttle program—and many of the lessons that have been learned as a result of these projects will be examined during this session.

Lessons Learned in Building the Ares Projects

Established in 2005, the Ares projects at Marshall made steady progress in designing, building, and testing the Ares I-X launch system, ultimately leading to a flight test. The program committed to rebuilding crucial capabilities from the Apollo era that made the first human flights to the moon possible while incorporating the latest in computer technology and changes in management philosophy. One example of an Apollo-era practice was to assign NASA overall authority over vehicle-integration activities, giving civil-service engineers hands-on experience in developing rocket hardware. This knowledge and experience helped make the agency a “smart buyer” of products and services. More modern practices were used to improve efficiency, cost effectiveness, and gain institutional knowledge, including knowledge management/capture to gain better insight into design and decision making; earned value management, for which Ares won a NASA award for its practice and implementation; designing for operability; and Lean Six Sigma applications to identify and eliminate wasted time and effort. While it is important to learn technical lessons regarding how to fly and control unique rockets such as the Ares I-X flight test vehicle, the Ares management team also learned important lessons about how to manage and sustain large, long-term projects.

The Development and Evolution of the Orion CEV

Orion, or the Constellation program's CEV, evolved from its initial concept as primarily an Earth-to-orbit crew-transfer and cargo-delivery vehicle to a more capable, highly flexible, high-technology, deep-space vehicle for enabling human spaceflight missions beyond low-Earth orbit. These changes, coupled with unavoidable budget cuts, delayed the original development schedule for the program. NASA's governance model was one of using ten healthy centers and employing a robust, one-time test program for all missions. In today's world, requirements growth/capability expansion, low-risk/high-safety design trade-offs, and replanning due to budget constraints, and further design refinements—coupled with the chosen governance model—resulted in both positive and negative effects on the program. This session will examine some of these issues and share how the CEV program is using these lessons going forward.

About the Presenters

Phil Sumrall joined the Marshall Space Flight Center in 1962 as a member of the Von Braun team that developed the Saturn family of launch vehicles used in the Apollo program. Later he worked on Saturn improvement studies and other advanced concepts, including launch vehicles, the Hubble Space Telescope, the Skylab space station, and the Space Shuttle concept definition. In 1992, he was named chief of the Advanced Transportation Branch in NASA Headquarters, where he oversaw a \$25 million budget of concept studies and advanced development projects. He became the principal technical advisor in 1994 to the NASA Reusable Launch Vehicle (RLV) program manager. During this assignment, he worked on the DC-XA, X-33, X-34, and X-37 experimental vehicles. He returned to Marshall in late 2001 where he managed the Advanced Concepts Office. He was selected as a member of the Exploration Systems Architecture Study (ESAS) team appointed by former NASA Administrator Mike Griffin during the spring of 2005. When the Ares Projects Office was formed at Marshall in September 2005, he became the advanced planning manager. In this capacity, he is involved in planning for the Ares V cargo launch vehicle. During his NASA career, Mr. Sumrall has received numerous honors and awards. He received two NASA Exceptional Service Medals, one in 1997 for his work on the RLV program and another in 2006 for his service as a member of the ESAS team.



T. Cleon Lacefield is currently the vice president and program manager for the Orion Crew Exploration Vehicle (CEV) program at Lockheed Martin Space Systems. He has more than thirty-four years of aerospace experience in design, development, and operations of flight hardware programs. In addition, Mr. Lacefield served as a NASA flight director in Mission Control at Johnson Space Center. He directed the activities of Space Shuttle flights, managing 200-person flight-control teams during ascent, orbit, and entry space operations on eleven shuttle missions. He received NASA Exceptional Service Medal and Eagle Manned Space Flight awards for conducting a Space Shuttle abort-to-orbit after an early main engine redline shutdown. He also served as chairman of the Ascent and Entry Flight Techniques Panel for Space Shuttle flights and as a propulsion and guidance and control flight controller on nine NASA space missions. Mr. Lacefield served in the U.S. Navy as an A-7 pilot. During his naval career he earned the Distinguished Naval Graduate Award and is now a disabled veteran.



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ADDITIONAL THOUGHTS AND REFLECTIONS:

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Roger Forsgren, NASA Academy of Program/Project and Engineering Leadership, Panel Chair

The NASA LLIS Program/Process: Michael Bell, Kennedy Space Center

Learning from Case Studies: Ed Rogers, Goddard Space Flight Center

Mining the Academy Archives: Matthew Kohut, NASA Academy of Program/Project and Engineering Leadership

NASA has established a formal process to collect, document, and share lessons learned through the Lessons Learned Information System (LLIS), which was developed as a new tool to improve project performance and promote technical excellence through the development of case studies and documentation of best practices, and to share this knowledge throughout the agency. The

LLIS is intended to capture experiences from successful tests or missions, as well as from mishaps or failures, to provide excellent knowledge-based sources for learning. This session will discuss this process and also describe the methodology for developing case studies, with a focus on how to use them effectively as learning tools for knowledge sharing and project implementation. The session will also provide an overview of how to mine NASA's various archives and databases for highly relevant case studies, lessons learned, and best practices that are available to assist the program/project management and engineering communities in learning from, and applying, this knowledge in their projects.

About the Presenters

Roger C. Forsgren is the deputy director of the NASA Academy of Program/Project and Engineering Leadership. He is responsible for the contractual and financial management of the entire Academy program. Along with managing all associated contractual, procurement, and budgetary issues, he oversees the daily operations of the Academy and has also been recently responsible for designing and developing new engineering course offerings that focus on foundational learning of NASA-specific engineering and space sciences; creative thinking and innovative engineering methodologies; and leveraging of invaluable knowledge from historical NASA lessons learned. Mr. Forsgren began his career at Lewis Research Center (now Glenn Research Center) in 1983 as an apprentice mechanic. After attending evening classes and gaining years of experience, he was promoted to a project manager role. Success in this position led to a move to NASA Headquarters in 2005 to become the deputy director of the Academy. Mr. Forsgren holds a Bachelor of Arts and Sciences from Georgetown University, and a bachelor's degree in mechanical engineering and a master's degree in manufacturing engineering, both from Cleveland State University. His contributions have been recognized by the agency, having received NASA's Manned Flight Awareness Award, one of the highest service honors awarded by NASA, and the Silver Snoopy Award, a special honor bestowed by NASA's Astronaut Corps on men and women who provide key support for the Space Shuttle and human spaceflight missions.



Michael Bell is the program manager for NASA's lessons learned program and serves as the lessons learned center data manager for the Kennedy Space Center. In this position he promotes the collection and sharing of lessons learned and the use of the Lessons Learned Information System as a tool to improve project performance and promote technical excellence. As Kennedy's benchmarking manager, he served as the focal point for external organizations interested in comparing their process performance with processes at Kennedy and facilitated center benchmarking teams. In the role of business management system manager, he coordinated the system of processes and policies needed to meet the center's strategic objectives. Other NASA responsibilities have included management analyst for workforce budget formulation, facility maintenance contract surveillance, and alternative dispute-resolution mediator.



Edward W. Rogers is currently the chief knowledge officer at Goddard Space Flight Center. He joined NASA in May 2003 as the center's chief knowledge architect, working first in the Safety and Mission Assurance Directorate and then in the Office of Mission Success. He became the chief knowledge officer for the center in 2006. His programs and initiatives have been embraced not only at Goddard but also within the agency. He introduced the popular yet simple Pause and Learn (PaL) process, developed a highly effective case study methodology, designed (and runs) the Goddard Road to Mission Success workshop series, and promotes knowledge sharing and collaboration across the center. Dr. Rogers received a BS in agronomy from Ohio State University, a master's in international business from the University of South Carolina, and a PhD from Cornell's School of Industrial and Labor Relations. The son of a physicist, he grew up in Saudi Arabia and attended boarding school in India, and in the 1980s he and his wife performed five years of international relief work in Southern Lebanon. He continues to write and speak about how organizations can foster transparent learning to leverage collective intelligence. Some of his publications include *Near Miss Bias in Decision Making*, "The role of perceptions of reciprocity in achieving cooperative knowledge behavior in high tech firms" in the *Journal of High-Technology Management Research*, *A Ten-Year Review of the Vision for Transforming the Defense Acquisition System*, and *Measuring Organizational Communication Health at NASA's Marshall Space Flight Center*.



Matthew Kohut leads the communications team for the NASA Academy of Program/Project and Engineering Leadership. He serves as the editor of the ASK the Academy e-newsletter and oversees the development of the Academy's case studies. He has twenty years' experience writing about scientific, technical, and quantitative subjects for both general and expert audiences, including engagements with the Department of Energy, the Environmental Protection Agency, Harvard University, and the German Marshall Fund of the United States.



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ADDITIONAL THOUGHTS AND REFLECTIONS:

SECTION

NASA Young Professionals Panel

Friday • 22 April 2011



Heather Rarick, NASA Academy of Program/Project and Engineering Leadership and Johnson Space Center, Panel Chair

NASA/Aviation Week Young Professionals Study: *Carole Hedden*, *Aviation Week*

Understanding the Young Professional's Challenges: **Nick Skytland**, NASA Headquarters; **Philip Harris**, Johnson Space Center; **Anne Caraccio**, Kennedy Space Center; and **Danielle Wood**, Massachusetts Institute of Technology PhD Candidate

NASA Forward: **Justin Kugler**, Johnson Space Center

Academy Young Professional Program: **Haley Stephenson**, NASA Academy of Program/Project and Engineering Leadership

Developing NASA's workforce of young professionals so they can effectively execute the challenging programs that lay ahead is one of the most important issues we face as an agency. As many of NASA's senior master practitioners are approaching retirement, it is essential to understand the needs, interests, motivations, and unique capabilities of the young-professional community, and to use this understanding to provide opportunities for their development and help them prepare to meet the new challenges they will face in the increasingly technically complex, and internationally diverse, programs of the future.

This session will examine these challenges from the perspectives of the broader aerospace community, through a recently completed aerospace technical-workforce-development study conducted in partnership with Aviation Week, and from the perspectives of a panel of young professionals. The session will also provide an overview of how the community is coming together through grassroots volunteer organizations like NASA Forward, as well as the steps the Academy is taking to meet the need for young-professional development.

Since 2006, Heather L. Rarick has been a flight director for the International Space Station (ISS). She has served as lead for ISS Expedition 17 (April–October 2008) and the Space Shuttle/ISS mission of STS-128/17A (September 2009). Ms. Rarick is currently on a one-year assignment at NASA Headquarters, Office of Chief Engineer. She began her career as an ascent-flight design engineer for the Space Shuttle. She also supported Mission Control as a targeting operator for shuttle launch and ascents and later served as a supervisor and a project manager for the chief information officer. In 1999, she returned to Mission Control to work as the operations lead (Moscow) and Russian interface officer (RIO). Two years later, she accepted a similar role at NASA, taking on the technical lead for RIOs. In 2004, she chaired the Russian Joint Operations Panel, which addresses U.S./Russian operational issues. Ms. Rarick has been awarded NASA's Silver Snoopy, 1997, and NASA Outstanding Leadership Medals (2008 and 2009). She is also a Penn State Alumni Fellow (2008).



Carole Rickard Hedden is *Aviation Week's* special projects editor and president of The Write Stuff. She leads *Aviation Week's* annual Workforce Study research and editorial product, and *Aviation Week's* Program Management/Leadership initiative. In addition, she is the lead for *Aviation Week's* executive roundtables and summit, and editorial director for military conferences. The *Aviation Week* Workforce Study (begun in 1997) has evolved into the industry's authoritative source on the state of the aerospace and defense workforce combined with data on current workforce demographics, trends, and compensation. In 2009, in partnership with NASA and Aerospace Industries Assoc., young professionals and university engineering student components were added to the study. Ms. Hedden previously worked for twenty years in the news media and as a corporate communications leader for Austin Peay State University, Honeywell Defense Avionics, and Corning Incorporated. She began working with *Aviation Week* in 1996, providing financial analysis and then project leadership skills.

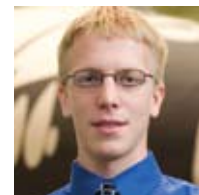


Nicholas Skytland is director of NASA's Open Government Initiative. Combining elements of space exploration, science, technology, visual art, and storytelling, he is well known for many of his presentations promoting NASA, the human space program, participatory exploration, and the Open Government initiative. He has worked at NASA for ten years, previously as a project manager in NASA's Human Research Program. He has also worked in the Strategic Partnerships Office encouraging new partnerships and collaboration with industry, academia, and other governments. Mr. Skytland started his career at NASA training astronauts for spaceflight missions in NASA's Neutral Buoyancy Laboratory. In 2004, he worked for the X PRIZE Foundation and was instrumental in the planning of the first privately funded, manned space launch of SpaceShipOne in the Mojave Desert. He has also worked in the space tourism industry at Zero G Corporation. Mr. Skytland also runs his own new media consulting company and has worked on a number of interesting projects, including co-founding SpaceAlumni.com—the first online network connecting leaders in the space industry. He holds a bachelor's degree from Valparaiso University in mechanical engineering, a master's degree from the International Space University in space studies, and an MBA from the University of Texas McCombs School of Business.



About the Presenters

Philip D. Harris is a flight planner and international operations engineer at Johnson Space Center. As part of his responsibilities, he works with NASA's domestic and international partners in developing planning and operations products for the International Space Station (ISS) program. Other current work assignments include ISSLive!, a project designed to extend ISS planning and telemetry data to the public. Mr. Harris joined NASA in 2007 as a cooperative education student at the Dryden Flight Research Center, where he developed business products for the Western Aeronautical Test Range. He transferred to Johnson in August 2007 and worked in the information technology, astronaut training, ISS onboard data systems, and international operations groups throughout his cooperative education terms. He graduated from the University of Denver in August 2010 and joined NASA full time in September 2010.



Anne Caraccio is a chemical engineer for the Materials Science Division of the Engineering Directorate at Kennedy Space Center. She received her BS and MS in chemical engineering from Manhattan College and graduated in December 2010. She came onboard with NASA in February 2011 after successfully completing three semesters in the NASA Co-op Program. During her co-op tours, Ms. Caraccio worked on developing self-healing systems in the Kennedy Polymer Science and Technology Laboratory with a team of highly skilled engineers and scientists. She is currently participating in the Accelerated Training Program for her first six months, and her work will include the development, fabrication, and analysis of high-performance fiber-composite capabilities. Fresh out of college, she is ecstatic to become a part of such an honored organization and looks forward to the exciting new missions and challenges that NASA will encounter in the years to come.



Danielle Wood is a doctoral candidate at the Massachusetts Institute of Technology (MIT), where she studies aerospace engineering, technology policy, and international development. She studies within MIT's Engineering Systems Division, a multidisciplinary academic community that combines engineering, management, and social science to address complex, socio-technical issues in society. Her technical focus is on the systems engineering and architectural approaches for satellite programs in Africa and Asia. Ms. Wood has pursued diverse experiences with NASA as an intern, guest researcher, graduate fellow, contractor, and student ambassador. She is currently interning at Goddard Space Flight Center in the Innovative Partnerships Program and at NASA Headquarters in the Office of the Chief Technologist. She received her Bachelor of Science in aerospace engineering in 2005, a Master of Science in aerospace engineering in 2008, and a Master of Science in technology policy in 2008—all from MIT. She is also a graduate fellow of the Department of Defense and the National Science Foundation.



Justin Kugler is a utilization relationship manager for the International Space Station (ISS) National Laboratory Office at Johnson Space Center and is responsible for facilitating partnerships with industry and academia that take advantage of the unique environment onboard ISS. He also coordinates the National Lab Office social media accounts and has served on center- and agencywide initiatives to expand innovation, inclusion, and openness. Mr. Kugler is a founding member of NASA Forward, a grassroots networking group dedicated to breaking down barriers between disciplines, organizations, and generations. He has previously worked as a systems engineer in the Constellation Training Facility and as a weapons analyst for the Central Intelligence Agency. He got his start in the aerospace industry as a summer intern over three tours at Johnson, twice in Mission Operations and once in the Advanced Space Propulsion Laboratory.



Haley Stephenson serves as the staff writer for ASK the Academy. She also writes case studies and white papers and is a contributing editor to ASK Magazine. Before joining the team in June 2009, she earned a master's in science writing from Johns Hopkins University in Baltimore, Maryland. Her graduate work focused on the fields of biological and computational vision. During this time she also interned for ScienceNOW, the online daily news source for Science Magazine, where she wrote about dinosaurs, bubble gum and cognition, erasing memories in mice, global warming, and butterfly larvae. Ms. Stephenson received a BA in neuroscience from Wellesley College in 2007, where she was also a four-year varsity soccer player. After college, she worked as a clinical research coordinator for intensive care studies at the University of California San Francisco–Fresno medical residency program and as a lab assistant in a fish neuroendocrinology lab at California State University–Fresno. Her mission in life is to stay curious.



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ADDITIONAL THOUGHTS AND REFLECTIONS:

SECTION

The Way Forward: New Pathways for Human Spaceflight

Friday • 22 April 2011



John Olson, NASA Headquarters, Panel Chair

HEFT Architecture Study Results: John Olson, NASA Headquarters

SLS/HLLV: Garry Lyles, Marshall Space Flight Center

Commercial Crew Program: Maria Collura, Kennedy Space Center

This session will provide an overview of a number of new initiatives that will ultimately change the way NASA will conduct future exploration missions. Topics to be discussed will include new approaches to space transportation systems that will change the way we provide access to space, an overview of the recently completed study results of space-exploration-system architecture, and a review of a current space-transportation-system study that is defining a next-generation transportation system that will enable exploration beyond low-Earth orbit. The session will also provide an overview of the Administration's plan to help mature the commercial launch industry for Earth-to-orbit missions following the end of the Space Shuttle era, and to exploit this emerging capability for International Space Station resupply and crew rotations in the coming decade.

About the Presenters

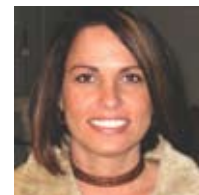
John M. Olson is the director of the Directorate Integration Office in the Exploration Systems Mission Directorate at NASA Headquarters in Washington, D.C. He is responsible for a broad range of exploration integration activities, architectures, processes, plans, and studies that span from international, commercial, interagency, and technology partnerships to synergy between science and exploration. Dr. Olson leads the human spaceflight architecture trades and analyses, strategic architecture and concept of operations development, the exploration information-technology portfolio, risk and knowledge management, technology protection, independent cost estimation, and concept of operations refinement, including extreme-environment analogs, configuration management policy, and integration of level-one exploration architecture requirements. He is also the focal point for Science Mission Directorate and Space Operations Mission Directorate interfaces, joint mission integration, special projects, and innovative acquisition.



Garry Lyles brings thirty-five years' experience in design analysis, system engineering, and program management to his position as associate director for technical management in the Engineering Directorate of the Marshall Space Flight Center. His previous experience includes chief engineer at the project (Space Shuttle main engine) and program (Exploration Systems Mission Directorate) levels. He has formulated and managed multiple programs, including the Advanced Space Transportation program and the Next Generation Launch Technology program. He gained his system design experience during Space Shuttle development and during service as NASA lead engineer and resident manager at two prime contractor facilities. He has managed large organizations within the Marshall Engineering Directorate as well as small, highly effective program management teams. He led a national team for the Constellation program to solve thrust oscillation in the Ares I/Orion vehicle. Most recently he has led the engineering team responsible for planning the heavy-lift Space Launch System program. Mr. Lyles's awards include the Rank of Meritorious Executive, NASA Exceptional Service Medal, and NASA Exceptional Engineering Achievement Medal. He holds a BS in mechanical engineering from the University of Alabama.



Maria A. Collura serves as the acting deputy director in the Space Transportation Planning Office at Kennedy Space Center, where she is responsible for assisting in the development of a national capability to provide NASA crew transportation to and from the International Space Station and enable the commercial industry to provide human access to low-Earth orbit. She began her career with NASA at Kennedy in 1991 as an orbiter payload electrical systems engineer in the Shuttle Processing Directorate under the Space Shuttle Program, then transferred to the Dryden Flight Research Center in 1996 to work as a lead systems engineer on several flight test projects. She later became the deputy project manager for the subcontractor members of the Earth Research and Sensor Technology project. In 2001, Ms. Collura was offered an agency-delegated position for Range Safety at Kennedy. From 2004 to 2009, she served in increasing capacities within the Safety and Mission Assurance Directorate, culminating in her role as SMA chief of the Constellation Space Transportation Planning Office. She earned her Bachelor of Science in electrical engineering in 1990 from the University of Central Florida.



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ADDITIONAL THOUGHTS AND REFLECTIONS:

SECTION



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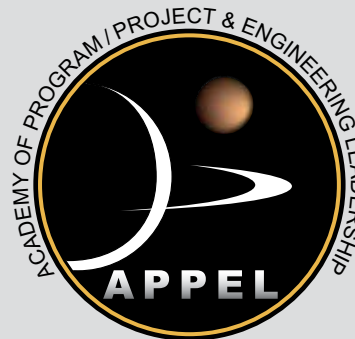
Additional Resources

Leadership**Teamwork****Knowledge****Process**

Four skill sets essential to mission success in NASA's project-based environment

Under the Office of the Chief Engineer, the Academy of Program/Project and Engineering Leadership (APPEL) provides leadership, advice, direction, and support for the development and learning of the NASA program/project management and engineering community.

The Academy provides an array of courses, taught by leading industry and NASA practitioners and designed especially for NASA civil servants; facilitates cross-discipline and cross-center knowledge sharing, best practices, and lessons learned through forums, conferences, case studies, the award-winning *ASK Magazine*, and the *ASK the Academy* e-newsletter; and offers team support and individual mentoring by NASA retirees.



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Providing leadership training, advice, direction, and support for the development and learning of the NASA program/project and engineering communities

Academy Sharing Knowledge

ask magazine

NASA's *ASK Magazine* gives program and project managers, engineers, and scientists a way to share expertise and lessons learned with fellow practitioners. This is only one way ASK helps share knowledge as part of NASA's Academy of Program/Project and Engineering Leadership.

Stories recounting the real-life experiences of practitioners communicate important practical wisdom and best practices that readers can apply to their own projects and environments. By telling their stories, managers, scientists, and engineers share valuable experience-based knowledge and foster a community of reflective practitioners. The stories that appear in *ASK* are written by professionals just like you, primarily from NASA, but also from other government agencies, academia, industry, and international partners.

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ask the Academy

ASK the Academy is an e-newsletter from the Office of the Chief Engineer that provides a means for regular communication with NASA's technical workforce about best practices, lessons learned, and new developments at the Agency and throughout the world. Since NASA is a decentralized organization in which experts within various technical disciplines have few opportunities to learn about each other's work, *ASK the Academy* serves as a way to build connections and share knowledge across the agency.

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CONTINUE THE JOURNEY ONLINE

NASA Aeronautics and Space Database <http://www.sti.nasa.gov>

The Aeronautics and Space Database provides access to research reports, articles, and books from NASA and other agencies on aeronautics, astronautics, chemistry and materials, engineering, geosciences, life sciences, mathematical and computer sciences, physics, social sciences and space sciences published from 1915 to the present. Full text is available for many NASA documents.

SATERN <https://satern.nasa.gov/elms/learner/login.jsp>

SATERN is NASA's comprehensive on-line database tool that allows NASA civil servants to sign up for APPEL courses and other career enhancing course opportunities; track their personal career history; and map out a career development plan. All NASA civil servants are provided with a username and password that allows them to use SATERN to track their career paths, projects and educational activities as well as register for courses and access relevant course materials.

NASA Astrophysics Data System <http://adswww.harvard.edu>

The Astrophysics Data System (ADS) is a NASA-funded project which maintains four bibliographic databases containing more than 3.7 million records. Scanned articles are available for about 140 journals, bulletins, conference series, books and historical publications.

INCOSE: International Council on Systems Engineering <http://www.incose.org/>

The International Council on Systems Engineering (INCOSE) aims to advance the state of the art and practice of systems engineering in industry, academia, and government by promoting interdisciplinary, scalable approaches to produce technologically-appropriate solutions that meet societal needs.

As a nonprofit, membership-based organization, INCOSE disseminates knowledge, facilitates international collaboration, promotes the establishment of competitive standards for systems engineering, and encourages governmental and industry support for research and educational programs that advance the field and practice of systems engineering.

The Project Management Institute <http://www.pmi.org>

The Project Management Institute (PMI) advocates the project management profession by setting professional standards, conducting research, and providing access to information and resources as well as opportunities for networking and community involvement. A leading membership organization for the project management professional, PMI has been working closely with NASA's Academy for Program/Project and Engineering Leadership to align the Agency's project management indicators with the industry standard and to encourage and facilitate project management certification for NASA civil servants.

NASA Engineering Network <http://oce.nasa.gov> (link to NEN is in the right column)

(Internal, NASA Only) Join collaborative communities, find engineering resources, find lessons learned, and search across engineering repositories. The NASA Engineering Network was created as a knowledge network to promote learning and sharing among NASA's engineers. Through engineering communities of practice, NASA Lessons Learned, agencywide search, expertise locator, and training, NASA's engineers are connected to engineering resources that help them effectively and efficiently solve problems and design solutions.

NASA Lessons Learned Information System

Knowledge is not found with only one person, one project team, or one organization. Sometimes, another project team, or person, knows something that can **help your project** or your task. How do you find “it” or the person who knows “it?” How does knowledge get from one place to another? A face-to-face meeting, e-mail, or telephone are methods traditionally used. The **NASA Lessons Learned Program** enables employees to **share and find knowledge** as easily and as broadly as possible. This system facilitates self-paced and **collaborative learning**. Knowledge sharing at NASA is critical to its success. The NASA Lessons Learned Program assists the agency's project teams in learning from one another's **on-the-job experiences** and recommendations for managing and mitigating project risk. Lessons are available by searching the NASA Engineering Network. <http://llis.nasa.gov/>





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