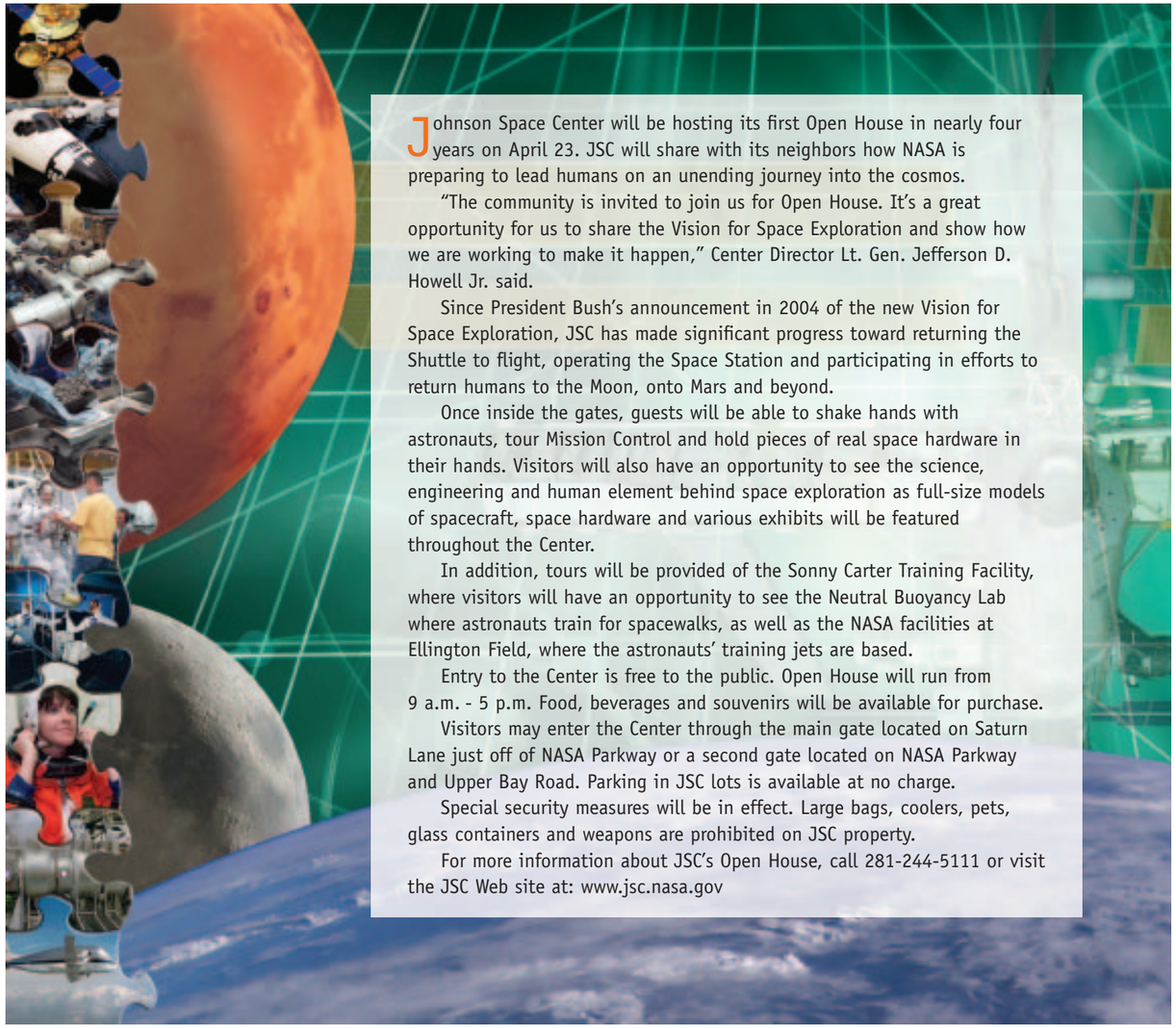

Johnson Space Center will be hosting its first Open House in nearly four years on April 23. JSC will share with its neighbors how NASA is preparing to lead humans on an unending journey into the cosmos.

"The community is invited to join us for Open House. It's a great opportunity for us to share the Vision for Space Exploration and show how we are working to make it happen," Center Director Lt. Gen. Jefferson D. Howell Jr. said.

Since President Bush's announcement in 2004 of the new Vision for Space Exploration, JSC has made significant progress toward returning the Shuttle to flight, operating the Space Station and participating in efforts to return humans to the Moon, onto Mars and beyond.

Once inside the gates, guests will be able to shake hands with astronauts, tour Mission Control and hold pieces of real space hardware in their hands. Visitors will also have an opportunity to see the science, engineering and human element behind space exploration as full-size models of spacecraft, space hardware and various exhibits will be featured throughout the Center.

In addition, tours will be provided of the Sonny Carter Training Facility, where visitors will have an opportunity to see the Neutral Buoyancy Lab where astronauts train for spacewalks, as well as the NASA facilities at Ellington Field, where the astronauts' training jets are based.

Entry to the Center is free to the public. Open House will run from 9 a.m. - 5 p.m. Food, beverages and souvenirs will be available for purchase.

Visitors may enter the Center through the main gate located on Saturn Lane just off of NASA Parkway or a second gate located on NASA Parkway and Upper Bay Road. Parking in JSC lots is available at no charge.

Special security measures will be in effect. Large bags, coolers, pets, glass containers and weapons are prohibited on JSC property.

For more information about JSC's Open House, call 281-244-5111 or visit the JSC Web site at: www.jsc.nasa.gov

Space Center Roundup

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Lyndon B. Johnson Space Center
Volume 44 • Number 3

NASA/Markowitz STS114-S-002

Returning the Shuttle to flight

The crew of STS-114 takes a break from training to pose for its crew photo. In front are astronauts Eileen M. Collins (right), commander; Wendy B. Lawrence, mission specialist; and James M. Kelly, pilot. In back are astronauts Stephen K. Robinson (left), Andrew S. W. Thomas, Charles J. Camarda, and Soichi Noguchi, all mission specialists. Noguchi represents the Japan Aerospace Exploration Agency.

Read about how the crew is preparing for its upcoming mission on pages 8-11.

March
2005
Houston, Texas

Beak sends...

A MESSAGE FROM CENTER DIRECTOR LT. GEN. JEFFERSON D. HOWELL JR.

Return to space

Have you ever been in a plane crash? I have. In 1985 I was the copilot in a Marine UH1N (Huey) when our tail rotor gear box, along with the rotor, ripped off the tail boom and fell into the Pacific Ocean between Lanai and Maui, Hawaii. Yes, it was a very serious, scary situation. I found out later that the probability of surviving that type of mishap is not promising. However, I was so busy assisting the pilot and preparing for the impact that I really didn't have time to be frightened during the episode itself.

It wasn't until the next day and the week following this adventure that the realization of my potential demise settled into my psyche. I had only suffered some minor cuts and bruises, but I experienced moments of abject fear as I relived the event in my mind. I had several sleepless nights, and an overwhelming feeling of dread became a continuous emotion as I considered the prospect of flying the Huey again.

I really didn't have to fly the UH1N. I was an F-4 Phantom pilot and with three of these squadrons in my air group I had plenty of opportunity to fly the aircraft that I loved above all else. However, I also felt compelled to fly the four other aircraft assigned to squadrons in my group, the Huey being one of them. I was the group commander and I thought that the commander, to be a true leader, should fly with all of his squadrons.

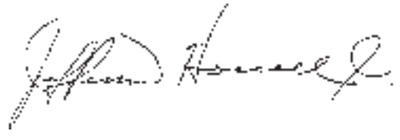
Thus was my dilemma: to cope with my fear and fly again or to hang it up and find another vocation. It's pretty obvious what I decided to do. I asked to fly the Huey as soon as I got my 'up-chit' back from the flight surgeon. I cannot appropriately describe the lump in my gut and how heavy my feet felt as I walked out to the aircraft for that next hop. I got through it OK, but to this day any time I crawl into a Huey for a flight I'm always listening for that "BANG" I heard in 1985. I will never get over that event.

I believe that what happened to me 20 years ago applies in many ways to the JSC team today. We were all wounded by the *Columbia* tragedy. I doubt if there is anyone who was here on Feb. 1, 2003 who doesn't feel at least partly responsible for what happened on that day. As we approach Return to Flight, all of us have a profound concern that we have not done everything we can to prevent another catastrophe like *Columbia* to occur again. That is only natural and appropriate.

However, we must face the reality that we cannot eliminate all the risks inherent in human spaceflight. If we try to eliminate all doubt and all risk, the Shuttle will never fly again. What we must do is use the knowledge that we have gained since STS-1, and have faith in the fixes we have made in accordance with the *Columbia* Accident Investigation Board and as reviewed and approved by the Stafford-Covey Team. We must weigh the risks as presented by our analysis and with the satisfaction that we have done the best that we can within reason – launch STS-114.

You can't get ahead in life unless you are willing to face your fears head-on and conquer them. You can't be in human spaceflight if you give up when you have a setback, no matter how tragic. Let's give it our best and go for it!

IT'S GREAT TO BE ALIVE AND IN HOUSTON!



Cheers!

Winemakers toast space technology

by Amiko Nevills

WINE LOVERS KNOW that an occasional glass can be good for the heart. What they may not know, however, is that their heart-healthy glass of wine may have been produced using pulse-quickening, space-age technology from NASA.

NASA technology is helping vineyards get the most out of their land and produce the best, most consistent wines possible. Winemakers are reaping benefits from tools like digital remote sensing, geographic imaging systems (GIS) and spectrometry.

Leveling the field

Soil type, geography, climate and other farming conditions play a major role in the overall quality of wine. Winemakers know that a single vineyard can produce a wide range of wine flavors due to subtle differences in these physical conditions. Such variety in one environment can be a concern, causing growers to cultivate each section of a vineyard differently.

"Grapes ripen at different times," said Ron Rosemeier, CEO and president of Brimrose, a small Maryland-based business. "Within the same vineyard, some rows of grapes are optimal for picking and some are not."

Vineyard managers turned to digital remote sensing and GIS to help visualize the different characteristics within a sectioned crop area. NASA connected winemakers with the commercial remote sensing industry for a project called Viticultural Integration of NASA Technologies for Assessment of the Grapevine Environment (VINTAGE), which encourages the use of these technologies in the wine industry.

VESTRA Resources, Inc., a California-based GIS consulting firm, used NASA research in the normalized difference vegetation index (NDVI) to develop a mapping tool known as the Vineyard Block Uniformity Map.

"The research performed under the VINTAGE project confirmed that NDVI could be applied to vineyards to improve the quality and value of grape harvests," said Paul Glendening, VESTRA GIS analyst. "Using this knowledge, we were able to provide a very useful tool for improving grape quality, resulting in better prices for the grower."

Some wine companies now use an infrared image-mapping tool to design better grids for sectioning their vineyards. The updated grids ensure maximum crop quality and wine consistency.

Shedding new light on an old technique

Spectrometry, the analysis of wavelengths of light and electromagnetic radiation, is essential to NASA research. A spectrometer, essentially a special camera, collects and separates the colors of light given off by an object to help scientists observe different materials. Spectrometer analysis can help NASA scientists identify the composition of other cosmic bodies, study molecules in the atmosphere and determine whether soil was created from lava flows or from meteorites.

A miniaturized version of a spectrometer developed for space found use on Earth in a portable, battery-operated device called the Luminar 5030. This tool, marketed by Brimrose, allows wineries to analyze grapes for optimum harvests and consistent wines.

"Winegrowers still rely more on an art to determine the right time to pick grapes," Rosemeier said. "Before, they would taste a grape, squeeze it and hold it up to the sun to estimate the levels of brix (sugar), pH and acidity."

Using a spectrometer to examine grapes can save time and money for wineries, and spares them the inaccuracy of taste tests and the inconvenience of extensive lab tests.

Currently, Brimrose is working with NASA's Jet Propulsion Laboratory to increase the durability and performance of the Luminar 5030 while reducing its weight and power consumption.

Thanks to NASA technology, the centuries-old art of winemaking is getting an infusion of science and, with it, some high-tech ways to bring consistent, high-quality wines to the table.

"It is one of NASA's key objectives to take our investments in research and development and use them to provide value for the nation," Jack James, assistant director of JSC's Technology Transfer and Commercialization Office said. "This is a great example of that partnership."

To infinity and beyond

NASA's robotic and human lunar exploration strategy gets under way at JSC

by Linda Singleton

The lunar landings of the Apollo missions are often considered the most significant technical achievement of humankind since the beginning of recorded history.

As former Apollo Astronaut Frank Borman stated, "Exploration is the essence of the human spirit." Humans are born with the spirit to explore. Anyone who observes a 2 year old can see it. It is the yearning within us to discover the unknowns of our surroundings. It is also what drives all of us at NASA to push the envelope of technology to go back to the Moon, on to Mars and out into the cosmos.

The Vision for Space Exploration has set a bold new course of discovery for humankind. Along the pathway to the Moon and Mars, we will discover and develop new electronic devices, faster communication systems, lighter life-support gear and innovative transportation improvements – all of which will eventually become new consumer products that make our Earth-bound lives more comfortable and convenient.

JSC recently hosted the NASA Robotic and Human Lunar Exploration Strategic Roadmap Committee meeting at Space Center Houston where a committee of university professors, decorated military officers and NASA representatives set out to pave the cosmic pathways to the Moon, Mars and beyond. This committee provides advice and recommendations to NASA on undertaking robotic and human exploration of the Moon to further science and to enable sustained human and robotic exploration of Mars and other destinations. The group is co-chaired by JSC Center Director Lt. Gen. Jefferson D. Howell Jr., USMC (Ret.); Associate Administrator for Exploration Systems Rear Adm. Craig E. Steidle, USN (Ret.); former astronaut and Associate Administrator of the Space Operations Mission Directorate William F. Readdy; and former astronaut Lt. Gen. Thomas P. Stafford, USAF (Ret.).

NASA/Markowitz JSC2005E01517

NASA/Stafford JSC2004-00543

NASA /Markowitz JSC2004E51722

David Leestma (top) manages the JSC Exploration Programs Office with Deputy Manager Barry Boswell (center) and Technical Integration Manager Susan Graham (bottom).

NASA/Stafford JSC2005E02469

JSC Center Director Lt. Gen. Jefferson D. Howell Jr. co-chairs the NASA Robotic and Human Lunar Exploration Strategic Roadmap Committee with Associate Administrator of the Space Operations Mission Directorate William F. Readdy, former Astronaut Tom Stafford and Rear Admiral Craig E. Steidle (Ret.) Associate Administrator for Exploration Systems Mission Directorate.

The committee collaborated to define its goals and objectives and addressed the myriad integration challenges the Agency will face in the next few years as the lunar and Martian initiatives get under way. Marc Allen, assistant associate administrator for Strategy and Policy for NASA's Science Mission Directorate, noted the tremendous undertaking that lies ahead as they set out to reprogram the long-term direction of an entire federal agency in only six months.

Scientific research and educational opportunities were also topics of importance at this meeting. The group addressed the immense scope of the scientific research and development that will be necessary to make the Vision for Space Exploration possible.

Steidle explained that the committee must recognize these future missions as scientifically based exploration. He added that human health and safety, robotic integration and communication systems will be mission-critical achievements necessary to sustain the Vision on a long-term basis.

Other committee members echoed Steidle's definition of scientific-based exploration, adding that education will also be critical to success in the future. The 30-year vision to the Moon and Mars will require the talents of two generations of scientists and engineers. The committee members agreed that NASA-supported educational programs for grades kindergarten through graduate school would be necessary to fulfill the Vision.

Committee members also discussed a variety of potential resources within the Moon that will warrant further research and discovery. For example, ice could be a major resource for oxygen production on the Moon, making the polar regions very strategic landing sites for future astronauts. In addition, these regions are permanently illuminated by the Sun and could provide a potential resource for harvesting solar power.

University of Hawaii planetary scientist G. Jeffrey (Jeff) Taylor, Ph.D., explained the importance of the robotic and human missions to the Moon in the scope of the Vision for Space Exploration. "Establishing a landing site and permanent base on the Moon will be instrumental in allowing human and robotic sorties to other lunar sites," Taylor said. The professor further explained that robotic precursor missions would be critical in teaching future astronauts how to move and handle regolith (lunar soil) in order to build any sort of infrastructure or human habitats on the Moon.

Other committee members explained that establishing a permanent base on the Moon will be a critical step in getting us to Mars and other planetary bodies. The lunar test bed will enable the Agency to bootstrap key capabilities and maintain a permanent presence on the Moon to allow for continuous exploration throughout the solar system. A strategically selected landing and base site will also enable astronauts to take full advantage of the Moon's in-situ resources.

"I would like to emphasize how important it is that we take a near-complete package to the Moon for testing before we go on to Mars," Howell said. "Just as the military ran drills and combat simulations in the deserts of Arizona before deploying to Iraq, we too must test all the necessary capabilities in Earth or low Earth orbit first before going off to a foreign planet."

We Are Not Alone

International participation and cooperation will also be critical in achieving the Vision for Space Exploration. NASA's Exploration Systems Mission Directorate participates in three international strategic working groups: the International Microgravity Strategic Planning Group, the International Space Life Sciences Working Group and the Multilateral Commercialization Group. These groups are comprised of representatives from NASA and the International Partner Agencies.

The International Space Life Sciences Working Group (http://www.exploration.nasa.gov/about/islswg.html) identifies mutual interests and programmatic compatibilities of the various agencies; enhances communication and unity among and between the participating space life sciences communities around the world; and enables a more complete coordination of the international development and utilization of spaceflight and special ground research facilities.

The Multilateral Commercialization Group (http://ipp.nasa.gov/) was established by the Multilateral Coordination Board to provide a multilateral forum where the International Partners can consult and coordinate on policies and procedures related to Space Station commercial development. The group acts as the focal point of coordination among the partnership on commercial projects to foster the greater commercial development of the Space Station.

The International Microgravity Strategic Planning Group (http://www.space.gc.ca/asc/eng/sciences/committees-imspg.asp) coordinates the development and use of research apparatus among microgravity research programs in areas of common interest to maximize the productivity of microgravity research internationally.

About the Exploration Systems Mission Directorate

Immediately after the President unveiled the Vision for Space Exploration in January 2004, NASA began to transform in order to achieve this Vision by establishing four specialized directorates: Exploration Systems Mission Directorate, Space Operations Mission Directorate, Science Mission Directorate and Aeronautics Research Mission Directorate.

NASA/Stafford JSC2005E02460

Brenda Ward, JSC's project lead for Exploration Systems Research and Technology, listens intently to briefings on lunar mission strategies as ISS Expedition 6 Science Officer Don Pettit takes notes.

Key Exploration Milestones

2008: Initial flight test of CEV
2008: Launch first lunar robotic orbiter
2009-2010: Robotic mission to lunar surface
2011: First uncrewed CEV flight
2014: First crewed CEV flight
2015–2020: First human mission to the Moon

NASA/Stafford JSC2005E02457

More than 100 NASA employees, contractors and space enthusiasts attended the NASA Robotic and Human Lunar Exploration Strategic Roadmap Committee public meeting held recently at Space Center Houston.

Exploration Systems' focus is to work in tandem with NASA's three other directorates in order to advance the Vision for Space Exploration. The directorate's objectives are to:

- Implement a sustained and affordable human and robotic program
- Extend human presence across the solar system and beyond
- Develop supporting innovative technologies, knowledge and infrastructures
- Promote international and commercial participation in exploration

The JSC Exploration Programs Office was established in March 2004 to serve as a liaison office between JSC and HQ's Exploration System, which is dedicated to creating a constellation of systems of new capabilities, supporting technologies, and foundational research that enables sustained and affordable human and robotic exploration.

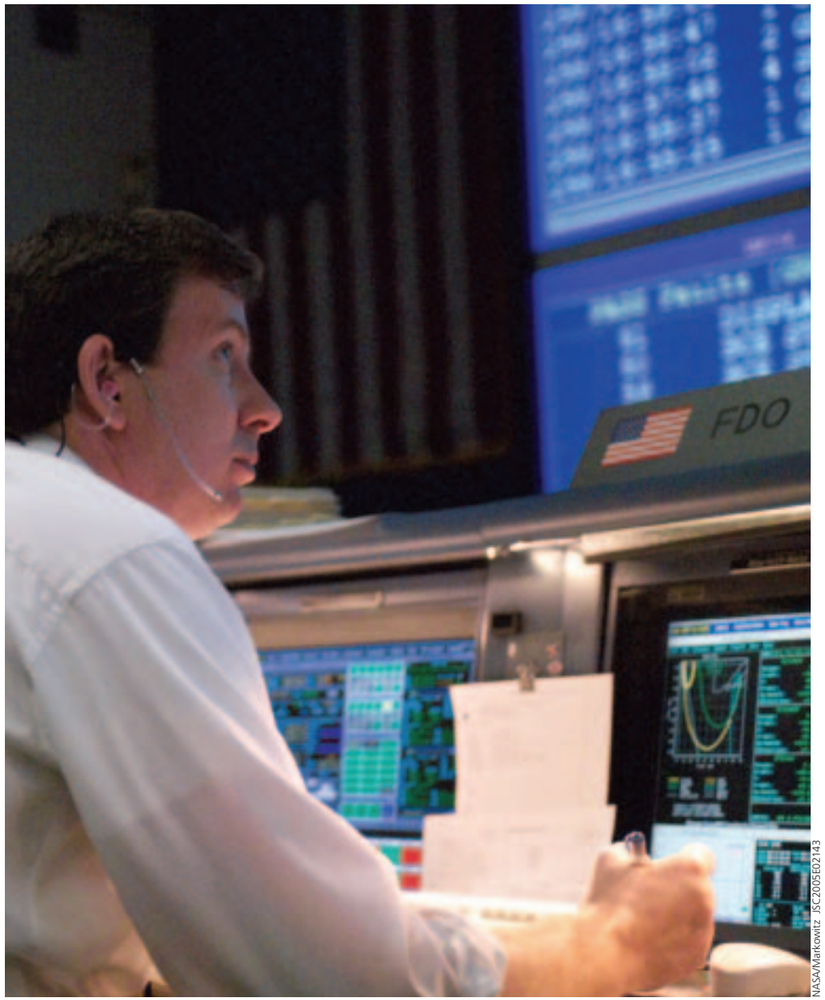
Most recently, all NASA centers have been heavily involved in a series of Broad Agency Announcements, Intramural Calls for Proposals and Extramural Calls for Proposals. Collectively, thousands of proposals were submitted to NASA Headquarters for projects ranging from human and robotics systems integration to innovative interplanetary propulsion systems to long-term health and safety protocol for the astronauts. These projects will support the areas of Advanced Space Technology, Technology Maturation, Innovative Partnerships Programs, Prometheus Nuclear Systems and Technology and the Centennial Challenges.

To learn more about the JSC Exploration Programs Office and the Exploration Systems Mission Directorate, visit **www.expoweb.jsc.nasa.gov**

Return to Flight team completes first marathon simulation

The long haul

by Kendra Phipps



NASA/Markowitz JSC2005E02143

Lead Flight Dynamics Officer, William H. Tracy, takes part in a mission simulation run.

Ever have *one of those days*?

Return to Flight Space Shuttle Commander Eileen Collins is having one. Her STS-114 crew is battling an electrical short in a crucial laser – one that helps inspect Space Shuttle *Discovery* for damage and aids in docking to the International Space Station – and struggling to restart a malfunctioning fan in Soichi Noguchi's spacesuit. The suit may be a no-go for tomorrow's spacewalk, and now Mission Control is calling with updated coordinates to be programmed into the Shuttle's robotic arm.

The good news is that the crewmembers, along with dozens of flight controllers and other experts, are calmly working through these issues like the pros that they are.

The even better news is that it's all part of an elaborate simulation – the real mission is still weeks away.

"The long sim is great practice for us," Collins said. "We've been training on these tasks for a year and a half, but this allows us to put it all together."

This "long sim" is a rigorous 36-hour dress rehearsal of the mission's second and third days, which includes orbiter inspection activities and Space Station rendezvous and docking.

A simulation this complex takes weeks of planning.

The STS-114 crewmembers have been training together since October 2003. These seven – Commander Collins, Pilot James Kelly and Mission Specialists Charles Camarda, Wendy Lawrence, Noguchi, Stephen Robinson and Andrew Thomas – have worked as a cohesive unit for countless hours. They have rehearsed intricate spacewalks, studied possible tile repair techniques and gone over mission checklists in Shuttle simulations. However, this long sim is their most intense challenge yet.

A multi-stage dress rehearsal

This rehearsal plays out on many stages. The crew itself splits its time between the Shuttle Mission Simulator and the Space Station Training Facility.

Across the Center, the Shuttle and Space Station Flight Control Rooms are also buzzing, along with the Simulation Control Room and numerous "back rooms" of supporting cast members. Extra eyes and ears scrutinize every step of the simulation, looking for any room for improvement.

Mission simulations that involve the control teams in this way, called integrated sims, are as much about the Earth-bound teams as the crew.

Long sims are useful for practicing "the standard communication, coordination and teamwork objectives between the crew and the flight control teams," said Simulation Supervisor Darrel McGregor with United Space Alliance (USA). McGregor is the wizard behind the curtain who makes this simulation happen.

Paul Hill, lead flight director for STS-114, agreed.

"It's important to wring this out as much as possible in the integrated environment to make sure we're ready for whatever comes our way," Hill said.

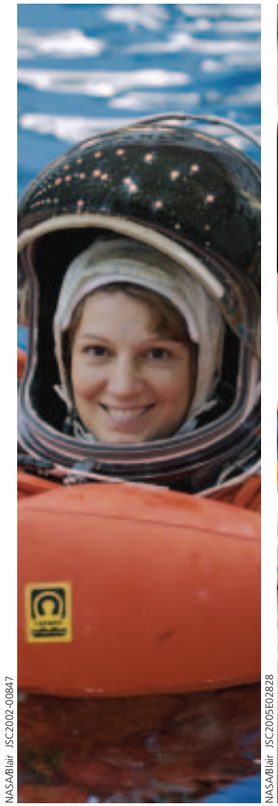
During this sim, Shuttle flight controllers work for the entire 36 hours in Mission Control. They rotate teams around the clock, making any necessary schedule adjustments at each shift change. As for the crew, the astronauts spend virtually every waking hour for two days in the Shuttle simulator.

NASA/Markowitz JSC2005E02133

STS-114 Lead Flight Director Paul Hill participates in the simulation.

The first 24 hours rehearse the first two days of the mission, much of that time involving a new, highly detailed inspection of the Reinforced Carbon-Carbon on the Shuttle wings' leading edges and nose. The crew practices using a new boom with laser sensors at its end that extends the reach of the Shuttle's robotic arm to scan those surfaces.

The crew of STS-114 prepares for Return to Flight.


NASA/Blair JSC2002-00847

Eileen M. Collins


NASA/Blair JSC2005E02828

Stephen K. Robinson


NASA/Stafford JSC2004E41129

Charles J. Camarda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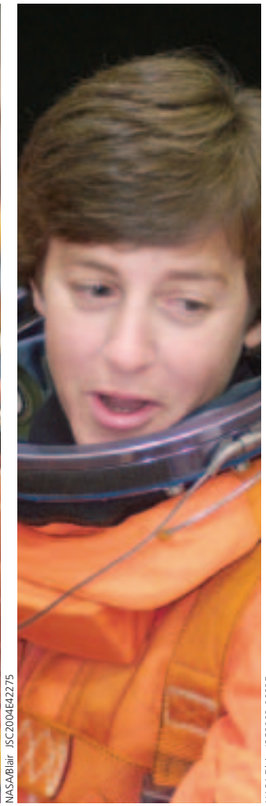
James M. Kelly


NASA/Blair JSC2004E42275

Wendy B. Lawrence


NASA/Blair JSC2002-00825

Soichi Noguchi


NASA/Stafford JSC2004E41401

Andrew S. W. Thomas

The Space Station flight controllers then join the simulation during its last 12 hours for the rendezvous and docking activities. They rehearse a new nose-over-tail "flip" the Shuttle will perform as it approaches the Station to allow photographic inspection of its underside heat protection tiles. They also practice a new robotic "handoff" of the boom extension from the Shuttle's robotic arm to the Station's robotic arm.

Choreographing the chaos

A simulation this complex takes weeks of planning. McGregor and his simulation planning team worked with Shuttle and Space Station trainers to come up with timelines and objectives, which are then culled down into a final script.

While everyone's ultimate goal is a flawless mission, the best way to get there is not through a flawless simulation. McGregor and his team deliberately write dozens of malfunctions and mishaps into the sim script. These are not randomly selected errors, either.

"The instructors for each discipline provide ideas on which failures would be best to meet the desired objectives," McGregor said.

During the sim itself, the malfunctions are thrown into the mix by simulation instructors down the hall from the crew. With a few keystrokes or mouse clicks, the crew has a new challenge. Usually, many more problems are added during a sim than would actually happen on a mission; this keeps the entire team – astronauts, engineers and flight controllers – on its toes.

As for the instructors, their current task – throwing wrenches into a simulation – may seem sinister, but it is a critical part of spaceflight training and it tests how well they've done a larger part of their jobs. They spend most of their days working with crewmembers one-on-one and teaching them how to use the very systems that they are now deliberately breaking.

"I think this is one of the greatest jobs in the world: knowing that you have a hand in training a crew in real procedures that they'll use in the mission," said USA's Chris Edwards, Data Processing Systems and Navigation instructor. His USA colleague, Michael Grabois, agreed.

"I'm on the front lines of a Shuttle mission," said Grabois, Space Shuttle Systems instructor. "Training is the next best thing to flying."

One down, two to go

The crew presses forward through the glitches being sent their way. When the 36 grueling hours are up, they will review their lessons learned from the simulation and get right back to training again.

Most Shuttle crews would only have to get through one long sim or none at all. But for this mission, several of the marathon training sessions are being used to get the crew and ground teams in top shape: another 36-hour sim is coming up, followed by a 48-hour session.

The number of long sims for STS-114 is partly due to the complexity of the mission, and partly to the fact that the Shuttle fleet has been grounded for nearly two years. Sims such as this one help everyone get focused.

"We're definitely approaching the peak of training," Hill said. "The sims are becoming more difficult, with more problems to solve."

Prior to this, Collins said her longest simulation for a Shuttle mission lasted about 10 hours. But she said she can already appreciate the benefits of the extended rehearsals.

"This gets us in the correct mindset," she said. "It gets us in the mode of flying again."

Expedition 10 and 11 science:

Focus on exploration

by David Baumann
Office of the International Space Station Program Scientist

One of the key elements of the new Vision for Space Exploration calls for NASA to complete the assembly of the International Space Station. Along with this element is the charge for us to "Refocus research to exploration factors affecting astronaut health." Even as NASA's physical and biological research programs are working to align to this goal, current Expedition 10 research and the research planned for Expedition 11 are already focusing on the science needed for exploration.

Expedition 10

These five investigations, currently being conducted by the Expedition 10 crew, will help us better understand how humans adapt to long-duration spaceflight.

Advanced Diagnostic Ultrasound in Microgravity (ADUM)

In the ADUM investigation, crewmembers use ultrasound in innovative ways to expand its diagnostic capabilities. Astronauts conduct exams on orbit while the images are relayed and interpreted by an expert on the ground. These strategies will be needed for crews traveling beyond low Earth orbit for periodic health exams or for unforeseen medical situations. New uses for ultrasound technology have already been applied in Earth-bound hospitals, and ADUM's ultrasound relay techniques have potential in the world of telemedicine.

Effect of Prolonged Spaceflight on Human Skeletal Muscle (Biopsy)

The Biopsy experiment measures the changes in skeletal muscle due to spaceflight by taking pre- and postflight calf muscle biopsies, exercise evaluations and MRIs. This investigation will allow researchers to determine if muscle loss due to spaceflight reaches a steady state, or if novel countermeasures will be necessary for crews on longer-duration missions.

Behavioral Issues Associated with Isolation and Confinement (Journals)

The Journals study investigates the effects of isolation and confinement during long missions by analyzing astronauts' private journals. The goal of this investigation is to aid in designing future equipment and procedures to better maintain human performance in space.

Chromosomal Aberrations in Blood Lymphocytes of Astronauts (Chromosome)

The Chromosome investigation is assessing the genetic changes crewmembers undergo due to exposure to cosmic radiation. This will allow mission designers to better understand the health risks astronauts will face on long-duration missions and to design appropriate countermeasures.

Mitigate Locomotor Dysfunction after Long Duration Spaceflight (Mobility)

The Mobility experiment utilizes pre- and postflight movement and treadmill tests to help design an inflight training regimen that may help reduce post-landing dizziness and balance problems.

The Vision for Space Exploration also states that NASA should "develop life support and other capabilities required to support more distant, more capable and/or longer duration human…exploration of Mars and other destinations." These three current investigations are aiding NASA in meeting that goal.

Dust and Aerosol Measurement Feasibility Test (DAFT)

DAFT is a test of a modified off-the-shelf technology that counts ultra-fine particles in a microgravity environment. This hardware could lead to improved fire detection in future exploration spacecrafts.

Synchronized Position, Hold, Engage, Re-Orient, Experimental Satellites (SPHERES)

SPHERES consists of three bowling-ball-sized, free-flying satellites that will test a number of algorithms by self-aligning themselves in various formations inside the Space Station. Each mini-satellite is self-contained with power, propulsion, computers and navigation equipment. This will help future designers engineer the next generation of rendezvous and docking technology for constellation and array spacecraft configurations.

NASA ISS010E11054

Increment 10 Science Officer, Leroy Chiao, scans the knee of Flight Engineer, Salizhan Sharipov, as part of the Advanced Diagnostic Ultrasound in Microgravity investigation.

Materials on International Space Station Experiment (MISSE)

Future spacecraft and lunar or Mars habitats will rely on the selection of appropriate materials. MISSE is an investigation that exposes 400 candidate materials to the space environment. This payload is attached externally to the Space Station by a spacewalking crewmember. Once returned to Earth, researchers will be able to view the effects that two years in the space environment have had on these materials.

Expedition 11

Along with the continuation of some of the investigations performed on Expedition 10, other exploration-related research projects will be added for Expedition 11.

Foot/Ground Reaction Forces during Spaceflight (Foot)

The Foot experiment evaluates the loads and stresses on leg joints in spaceflight as compared to typical daily activity on Earth. This study will provide insight to the loss of bone, minerals and muscle function in the lower extremities. In turn, this should lead to development of better countermeasures to prevent muscle and bone loss in the legs.

The Investigation of Brain Functional Effects of Microgravity and Cosmic Radiation (ALTEA)

An international investigation, ALTEA will provide new information regarding the possible effects of heavy ion impacts on crewmembers' brain functions. Radiation is one of the largest risks facing Mars-bound astronauts journeying outside the Earth's magnetic shield for long periods of time. This investigation will help to quantify part of this risk and determine the requirements for future radiation shielding.

Continuing its mission of being a world-class laboratory, the Space Station is now proving itself as a necessary test bed for the research and technology that will allow NASA to take the next steps in exploration of the solar system.

Space Center Houston invaded by

Swamp things

by Kimberly Harle

NASA/Blair JSC2005E04050

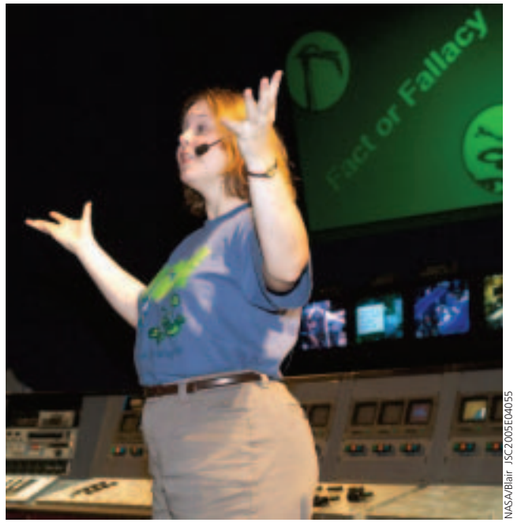
A group of students is entranced as they explore the wetlands of Louisiana from an auditorium during the JASON conference held at Space Center Houston.

Space Center Houston's Blastoff Theater was recently invaded by tree frogs, oysters, shrimp boats, swamps and kids. Students from schools all over Texas crowded into Space Center Houston to participate in the annual JASON Expedition.

"I like it so much better than books; I learned so much," fourth-grader Megan Hamil said after the event.

JASON is a nonprofit educational organization that teams up with students, teachers, corporations, educational institutions and government in order to cultivate kids' desire to learn. JASON supplies teachers with curriculum materials to supplement their classrooms throughout the year.

Each year, millions of kids across the nation get the opportunity to participate in a live broadcast JASON Expedition where they get to explore the curriculum in a field setting.



NASA/Blair JSC2005E04055

Sherri Jurls, Education Specialist with Tessada & Associates, Inc., on the JIMMS contract, leads students on a trip through Louisiana marshland trivia during the JASON conference held at Space Center Houston.

NASA/Blair JSC2005E04047

During the JASON Project, the Space Center Houston theater is quickly transformed into a marshland.

During the hour-long program, kids nationwide were transported from their seats into the wetlands of Louisiana to examine oysters, feel the fur of animals in the area, learn how to track animals and much more.

At Space Center Houston, the students were not apathetically watching a video. The kids were participating with exciting experiments and jumping out of their seats to compete with other children across the nation to answer various trivia questions. They even got to see their very own questions answered by scientists. Aside from students and teachers, parents enjoyed JASON as well.

"We had to see part of it twice and we still loved it!" parent April Shecterly said.

Looking across the room, there was not a glazed-over eye in the entire theater.

"It was awesome!" said Jacob Spivey, a fourth grader at Rustic Oak Elementary in Pearland, Texas. If half of the excitement and participation in that room transfers into the classroom, it is no wonder that teachers are raving about the program.

"It's something fun and different. The kids love it and can tie in the information. They get so excited and absorb so much," said Jennifer Wade from DeZavala Elementary.

What began in 1989, when JASON took thousands of kids on an adventure through the Mediterranean Sea, has now grown to a program reaching more than 33,000 teachers and 1.7 million students from around the world.

JASON continues to grow and reach kids of all ages and backgrounds, trying to inspire students across the spectrum – elementary, high school, gifted and at-risk classes alike. This year there were numerous kids who had never participated, including one group from the charter school Raul Yzaguire School for Success.

Since the creation of JASON, kids have traveled on adventures studying some of the coldest regions on Earth, the Arctic and Antarctic, to one of the hottest regions – the center of an active volcano in Hawaii.

Over the years, JASON has been working with NASA scientists closely to try to make science interesting, applicable and easy to grasp. This year the students will get an even more educational and out-of-this-world experience since JASON incorporated the International Space Station's EarthKAM into the program. The students will now be able to study the wetlands in a new capacity – from space.

JASON's program not only inspires kids to discover and explore Earth but also beyond. Next year, the students will get to go on the ultimate adventure. They get the chance to explore where no human has gone before: Mars. It may be a preview for one lucky member of this generation who just might be the first person to set foot on Mars in the future.