

**NASA Constellation Overview Panel Questions**  
Career Technical Education (CTE) Event  
Sacramento, California  
January 15, 2008

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1. **At Aerojet do you support “Job shadowing” opportunities and limited term internships for high school and college students? (Questioned and Answered during panel session) (No name)**

At Aerojet, internship during the summer is very common practice. Many times, students will spend multiple summers learning skills in the workplace that enhance the success of their future job search and transition into the workplace. Many times these students “find a home” at Aerojet and go directly from graduation to their new job. The major advantage to industry for internships is that students after graduation have “real” workplace experience and bring more value to their job at the beginning – a much shorter learning curve.

2. **What is the advantage of the return module landing in the water and not land as the Russians did? (Questioned and Answered during panel session) (Ralph Jones; [ralph.jones@cvis.com](mailto:ralph.jones@cvis.com) )**

A land landing has more constraints than a water landing, specifically because obstacles and lateral winds make it more likely to tip the capsule, putting higher physiological loads on the crew. Mitigating these hazards can be done, at a cost of higher weight in the capsule which takes performance that could be applied to other parts of the vehicle.

The Russians are able to accomplish land landings because they can land on large, empty plains. A return from the moon is not so forgiving. On return from the moon you are committed to landing at a fixed time.

3. **Is there a model curriculum (similar to what “Project Lead the Way” developed for engineering courses) available or in development for space related careers and rocketry? ([lmccconville@sandi.net](mailto:lmccconville@sandi.net) )**

NASA and Project Lead The Way, Inc., share a commitment to education and to the nation by using innovative K-12 education outreach initiatives designed to develop the next generation of engineers. NASA believes that by increasing the number of students involved in NASA-related activities at the elementary and secondary education levels more students will be inspired and motivated to pursue higher levels of study in science, technology, engineering and mathematics, or STEM, courses.

To achieve this objective, NASA is engaging students, educators, families, and institutions. When students are inspired, they are motivated to learn more and assume more difficult challenges, such as those posed in the study of higher levels of mathematics and science. To continue challenging these students, educators must be provided with the tools, experiences, and opportunities to further their education and participate in unique NASA learning experiences to enhance their knowledge of STEM.

NASA programs will emphasize family involvement, which has been shown to enhance student achievement. Finally, NASA will support the role of educational institutions, which provide the framework to unite students, families, and educators for educational improvement.

NASA programs are in place to:

1. Increase the rigor of science, technology, engineering, and math experiences provided to K-12 students through workshops, summer internships, and classroom activities;
  2. Provide high quality professional development to teachers in science, math, engineering and technology through NASA programs;
  3. Develop technological avenues through the NASA web site that will allow families to have common experiences with learning about space exploration;
  4. Encourage inquiry teaching in K-12 classrooms;
  5. Improve the content and focus of grade level/science team meetings in NASA Explorer Schools; and
  6. Share the knowledge gained through the Educator Astronaut Program with teachers, students, and families
- 7. This eminent panel is 100% white (Bill Bruner noted 86% if you count him on panel) and 80% male (Bill Bruner noted 86% if you count him on panel). What are you doing in the project and in your work related to education to fully include under-represented groups (gender, race/ethnicity, disability, language, etc.) in this program and in STEM in general? (No Name)**

NASA's Office of Education strives to ensure that underrepresented and underserved students participate in NASA education and research programs to encourage more of these students to pursue STEM careers. NASA recognizes the role of teachers, faculty and families in the development of successful students.

The Office of Education focuses on enhancing the capabilities of Historically Black Colleges and Universities, Hispanic Serving Institutions, and Tribal Colleges and Universities to contribute to the research NASA's needs. The Office of Education works to encourage these institutions to collaborate with

K-12 teacher preparation programs to improve the quality and diversity of STEM teachers.

8. **Heard the words “International Space Station”. Saw the “U.S.” on the second rocket. How will NASA integrate the efforts and activities of other countries? In other words how will this not become another “Space Race” where we have fewer scientists than our “competitors” India and China? (No Name)**

Despite the achievements of our nation’s first fifty years in space, the history books a thousand years from now will note that the United States of America was not the first country to explore space. Those books will name a nation that no longer exists – the Union of Soviet Socialist Republics. History will show that the Soviet Union launched the first man-made object into space, *Sputnik*, in October 1957, and that they launched the first astronaut, Yuri Gagarin, in April 1961. However, in the span of only a few years, America went from being behind in the Space Race to putting twelve men on the surface of the Moon. We also went from a competition to the beginning of a partnership with the Soviet Union, and our collaboration continues to this day. Partnerships with other space faring nations have become a vital element of our nation’s space program. Over half of all NASA science missions, with over fifty spacecraft operating in space today, involve some form of international collaboration.

The President and Congress of the United States have chosen to incorporate the Solar System and its resources into the reach of our civilization. From the 2005 Authorization Act for NASA, “The Administrator shall establish a program to develop a sustained human presence on the Moon, including a robust precursor program, to promote exploration, science, commerce, and United States preeminence in space, and as a stepping-stone to future exploration of Mars and other destinations.”

The wording of the act requires NASA to promote the goal of “exploration”, but to do so *together with* economic, scientific, and leadership objectives, and in a way that encourages and allows further progress. Stated this way, the Act promotes U.S. leadership on the space frontier, but recognizes implicitly that leadership without a worthy purpose has no point. Thus, the goal is not solely to explore our Solar System, but to *use* accessible space for the benefit of all mankind. It is not a goal that can be accomplished in a decade, nor one that is restricted to a single destination for the purpose of planting a flag. The goal is to begin now to incorporate our Solar System into our way of life.

Space exploration is an enterprise for the ages. The United States is committed to space exploration, and wants other countries to join with us. As President Bush has said, “*we invite other nations to share the challenges*

*and opportunities of this new era of discovery. Exploration of the universe is a journey, not a race, and the United States has called on other nations to join us on this journey, in a spirit of cooperation and friendship.”*

NASA simply cannot carry out this ambitious goal of exploring the solar system alone. We will need international collaborators, commercial companies, venture capitalists, and other agencies of the United States government. For America to continue to be preeminent in the world economy, to be the world's leader in innovation, science, and technology, and to be a leader on the frontier of space exploration and aeronautics research, NASA will need the best ideas, hard work, and dedication from *all* those who would like to be involved with this most exciting enterprise of our time.

**9. Given the enormous cost of this Project, do you feel that we are in a position to afford this undertaking? As an economy and a Nation? (No Name)**

To explore space, we will need people, energy, and resources. There are some common misconceptions about how much the American taxpayer provides for NASA's budget. America's annual investment in NASA is less than one penny out of every federal dollar spent. NASA's current budget is 6/10ths of one percent of every federal dollar spent. When polled, the average American believes NASA's budget to be much higher than it actually is, 24% of the Federal budget, comparable to that of the Pentagon.

In fact, NASA's budget this year is \$17.3 billion, the Pentagon's operating budget (not including supplemental appropriations for our operations in Iraq and Afghanistan) is \$459 billion, and the overall federal budget is over \$2.5 trillion. From this small investment in NASA over many years, new engineering and scientific capabilities built originally for our nation's space program are now pervasive in our lives, critical to a range of activities that create and provide value.

NASA is bringing space capabilities to bear to improve people's lives and even to save lives, but it will take far more than NASA funding to open up the new, exciting opportunities we hope to continue finding when we explore and exploit the vantage point of space. NASA will be able to leverage the capabilities which the commercial sector builds and be able to harness the improved intellectual capabilities coming from our nation's universities and high school students. This is important. It matters greatly to our nation's future.

**10. During a visit to NASA at Edwards AFB, I found out that NASA was having problems replacing machinists and fabricators in the shop site. Have you solved this problem? Do you have any solutions? (John**

**Chocholare, high school machine shop teacher, Calif Industrial & Technology Teachers Association, john.chocholareusa.net, machine)**

At this time, NASA does not have any challenges related to finding and replacing machinists and fabricators at Edward AFB. Part of our solution is to continue to support programs internally and externally to support and train our technicians.

**11. How does the lack of high school tech programs impact NASA's space programs? Suppliers & Subcontractors? Engineers with no hands on experience? Other? (No Name)**

A highly educated and well-prepared workforce has been and continues to be critical to the success of NASA's mission. To help meet this demand, NASA will continue contributing to the development of the Nation's STEM workforce of the future through a diverse portfolio of education initiatives that target America's students at all levels, especially those in traditionally underserved and underrepresented communities. NASA is taking a leading role to inspire interest in science, technology, engineering, and mathematics, (STEM), through its unique mission, workforce, facilities, research, and innovations.

**13. How would an individual help progress or become a part of this program? (No Name)**

Explorers are wanted! However, NASA is more than astronauts. We are scientists, engineers, computer programmers, personnel specialists, accountants, writers, maintenance workers and many, many other kinds of people. At the NASAJobs Web site, you can review job listings, post a resume and even apply for a NASA job online at

<http://www.nasajobs.nasa.gov/>

At NASAJobs students can find opportunities for internships, cooperative programs and summer employment.

The question, "How can I become an astronaut?" is very common. The answer depends on where you are now and where you want to go. If you haven't finished high school yet, former astronaut Dr. Sally K. Ride has these suggestions:

*"The most important steps that I followed were studying math and science in school. I was always interested in physics and astronomy and chemistry, and I continued to study those subjects through high school and college on into graduate school. That's what prepared me for being an astronaut; it actually gave me the qualifications to be selected to be an astronaut. I think the advice that I would give to any kids who want to be astronauts is to make sure that they realize that NASA is looking for people with a whole*

*variety of backgrounds: they are looking for medical doctors, microbiologists, geologists, physicists, electrical engineers. So find something that you really like and then pursue it as far as you can and NASA is apt to be interested in that profession."*

If you have graduated from college or are in the military, you can apply to become an astronaut at:

<http://www.nasajobs.nasa.gov/astronauts/default.htm>

The Constellation Program industry partners also have job opportunities announced and administered through each participating company.

There are many ways to help support NASA. You can also write to your Congressional member. Additional resources are available through the following web sites:

<http://www.spacecoalition.com/>

[www.spaceadvocate.com](http://www.spaceadvocate.com)

**14. Please talk about the variety of jobs in the aerospace industry and long term career prospects? (No Name)**

There are technical engineering related positions in design, analysis, software, and test engineering (80%). In addition there are business related positions in finance, estimating, planning, contracts, and administrative specialties (20%).

Long term career prospects are excellent for new folks coming into the aerospace industry as a high percentage of the current workforce will be ready for retirement in the next few years.

**15. What is the ratio of technician to engineer needed to complete this project successfully? (No Name)**

During the design/ development phase of the Orion program, the ratio is about 5 engineers to 1 technician. During the production phase the ratio is about 2 engineers to 1 technician.

**16. Will there be a West Coast Launch Facility? Vandenberg? (No Name)**

NASA has no plans to use a west coast launch facility to launch the Ares rockets. NASA will use Launch Complex 39-B at the Kennedy Space Center in Florida to launch the Ares I rockets, which will carry astronauts into space inside Orion capsules. Launch Pad 39A will be the home of the Ares V rocket. The Ares V will not carry a crew, but is slated to loft a lunar lander and a fueled upper stage that will connect with an Orion capsule in Earth orbit.

**17. How can we get a copy of the Power Point and Video? (Carol Johnston, Sac. Co. Office of Ed.)**

Please contact Barbara Zelon at [barbara.e.zelon@nasa.gov](mailto:barbara.e.zelon@nasa.gov) for a copy of the specific materials shown at the conference.

NASA can provide you access to a number of videos. They are available through:

[http://www.nasa.gov/missions/Related\\_Multimedia\\_Collection\\_archive\\_1.html](http://www.nasa.gov/missions/Related_Multimedia_Collection_archive_1.html)  
and <http://sfa.nasa.gov/video.cfm>

Additional NASA educational materials are available for educators at Regional Teacher Resource Centers (RTRCs). Teachers may preview, copy, or receive NASA materials at these sites. The resource center in the Sacramento area is:

Resource Center  
Mail Stop T12-A  
**NASA Ames Research Center**  
Moffett Field, CA 94035-1000  
(415) 604-3574

**18. What becomes of all the Parts that get separated from the main unit? (No Name)**

The Solid Rocket Boosters (SRBs) are recovered and reused in the current mission architecture similar to the Space Shuttle Program. The rest of the Ares I and Ares V booster system are expended in earth orbit. The Lunar mission booster elements such as the Earth Departure Stage (EDS), that carry the Lander (Altair) to low earth orbit, are expended in earth orbit. The Lander (Altair) elements remain on the surface of the moon. The Lander ascent stage impacts the moon after returning crew to the Crew Exploration Vehicle (Orion).

**19. Aerojet – Are there any community colleges that supply Qualified Electrical/Electronics technicians – enough technical skill to be hired? In California? (No Name)**

There are a number of community colleges throughout California that offer 2 year certificates for Electronic Technicians. One of those, Los Rios in the Sacramento area, offers Associate Degrees and Certificates in Electronics Technology, Engineering, Engineering Design Technology and Engineering Technology. A web search should identify others with similar opportunities. Those students completing the Los Rios curriculum are definitely qualified for hire.

