

**National Aeronautics and Space Administration
Washington, DC**

NASA ADVISORY COUNCIL

October 18, 2007

**Point Plaza Suite and Conference Hotel
Newport News, VA**

MEETING MINUTES



**Paul A. Iademarco
Executive Director**



**Harrison H. Schmitt
Chair**

**NASA ADVISORY COUNCIL
Point Plaza Hotel
Newport News, VA
October 18, 2007**

**Meeting Report
TABLE OF CONTENTS**

Opening Remarks	2
Aeronautics Committee Report and Discussion	2
Space Operations Committee Report and Discussion	4
Audit and Finance Committee Report and Discussion	7
Human Capital Committee Report and Discussion	9
Science Committee Report and Discussion	10
Exploration Committee Report and Discussion	12
Discussion and Agreement on Recommendations	14

Appendix A	Agenda
Appendix B	Council Membership
Appendix C	Meeting Attendees
Appendix D	List of Presentation Material

*Meeting Report Prepared By:
Paula Burnett Frankel*

**NASA ADVISORY COUNCIL
Point Plaza Suite and Conference Hotel
Newport News, VA
October 18, 2007**

Opening Remarks

Senator Harrison H. Schmitt, Chair of the NASA Advisory Council (the Council) called the meeting to order at 8:00 a.m. and welcomed members and attendees to the Council's October quarterly meeting. The new Executive Director, Mr. Paul Iademarco, made a few administrative announcements. Sen. Schmitt thanked the Langley Research Center (LaRC) Director, Dr. Lesa Roe, and her staff for an excellent tour, use of the Center's conference facilities, and assistance with meeting support. He reminded everyone that the Council meeting is open to the public and held in accordance with the Federal Advisory Committee Act (FACA). He requested that the public attendees refrain from questions and comments unless acknowledged by the Chair. Minutes from the July 17, 2007, meeting are available in hard copy and on the web site.

Aeronautics Committee Report and Discussion

Mr. Neil Armstrong introduced the Aeronautics Committee report. He reviewed the areas of interest from the fact-finding meetings: support for NASA's space mission directorates by the Aeronautics Research Mission Directorate (ARMD); the Hypersonics Project; crashworthiness research with application to the Exploration Systems Missions Directorate (ESMD); the Subsonic Fixed Wing (SFW) Project; and Thermal Protection System (TPS).

The principal focus was support to ESMD from the Fundamental Aeronautics Program (FAP), the Aeronautics Test Program (ATP), and the Aeronautics Safety Program (ASP).

Gen. Lester Lyles noted that the Committee had some specific questions on how the ARMD relates to ESMD. Every one of the fundamental elements of ARMD touches on ESMD and Space Operations. Gen. Lyles discussed some specific activities in the Fundamental Aeronautics Program (FAP). The FAP comprises four elements: Hypersonics; Supersonics; SFW; and Subsonic Rotary Wing (SRW). Each of these addresses or has direct or indirect relevance to the needs of ESMD and Space Operations. Aeronautics is very important in the hypersonic area in terms of exo-atmospheric approach, hypersonic entry, supersonic descent, and subsonic landing. ARMD is conducting research in each of these areas. At the subsystem level, ARMD is addressing Entry, Descent, and Landing (EDL), and eventual ascent, technical challenges. One example of how the EDL challenge is important for Mars: the right descent capabilities in the tenuous Martian atmosphere are essential to go to the right places on the surface. Today's landing technology makes about fifty percent of the planet's surface (the higher altitudes) inaccessible. ARMD is working with the Mars Science Laboratory (MSL), a 2009 mission, to get an EDL system capable of getting to the higher altitudes.

Gen. Lyles briefly reviewed the current ARMD EDL investments. Dr. Tyson noted that the Moon's thin atmosphere has not prevented landing. Gen. Lyles referred to a taxonomy chart in Dr. Sullivan's presentation that would display the different landing options. There are many ways to land; the challenge is to get to the best approach for the Mars Program. Senator Schmitt pointed out that the problem with EDL for Mars is not that the atmosphere is not thick enough to help much in energy dissipation with heavy payloads but, on the other hand, is thick enough to cause heating problems.

Dr. John Sullivan discussed three of the specific investments: the Inflatable Reentry Vehicle Experiment (IRVE), the Program to Advance Inflatable Decelerators for Atmospheric Entry (PAIDAE), and the Mars EDL Instrumentation (MEDLI). He showed the Mars heritage since Viking. The real challenge is the large mass planned for MSL and future missions. One of the ways to address the challenge is via inflatable aerodynamic decelerators that increase the drag. One of the technologies owes its development to advances in high temperature, light weight materials. Dr. Sullivan showed the effect of a decelerator on heating rate. IRVE, an experiment to test this, was launched on a sounding rocket from Wallops. Unfortunately, there was wiring error in the launch vehicle that prevented separation of the assembly. The program is

considering whether to do another sounding rocket launch, or do a similar test on PAIDAE. MEDLI, an instrumentation suite in the MSL heatshield, will collect data on pressure temperatures and ablation rates as well as atmospheric density and winds during entry and descent. This would help with the design of future shields. Dr. Sullivan showed the EDL taxonomy for a human Mars mission. There is a significant weight penalty for a propulsive system, so the program is looking at aerocapture. In response to a question from Sen. Schmitt regarding testing, Dr. Sullivan indicated that pieces are testable via unmanned Mars flights and launches with re-entry to Earth. At the moment, the plan is for a couple of flight experiments from Wallops. He acknowledged that the atmosphere is different, which is a problem. Gen. Lyles added that the program recognizes the challenge. This is an area for the Committee's continued interest.

There have been a series of NASA Research Announcements (NRA's) for Mars entry. Topics include EDL trades, experimental validations, fluid dynamics, fluid-structures interaction, supersonic propulsion, and materials and structures. In response to a query from Sen. Schmitt, Dr. Sullivan noted that all of the projects involve graduate students. He noted that most of the entry vehicles of the larger size will require an active control system. Sen. Schmitt observed that portions of the flight regime are less than a minute, but still require a TPS. Even the vehicle ascending from the Mars surface must be aerodynamic. Gen. Lyles added that the NRA's for 2008 are going primarily to industry because the last round (2007) went to academia. ARMD is trying to take advantage of the academic environment, but did not delve into the academia/graduate student topic. It was noted that perhaps this could be coordinated with the Human Capital Committee. Dr. Sullivan summarized the support that ARMD is providing to ESMD. The ATP wind tunnels are supporting the Constellation Program. One of the issues is that the current ground facilities cannot cover the complete lunar or Mars return environments, and additional test capability is needed.

Mr. Armstrong presented the Committee recommendations. Briefings have persuaded the Aeronautics Committee that it is difficult to predict the flow field and boundary layer transition around entry vehicles at high hypersonic speeds both in Earth and Mars atmospheres. That results in uncertainties in lift to drag ratios, trim angle of attack, aerothermodynamic characteristics, and heat flux profiles. The Shuttle orbiter flies through a substantial part of these difficult flight regimes and has a limited number of flights remaining.

Recommendation 1: The Aeronautics Committee, in conjunction with the Space Operations Committee, recommended: **NASA should examine the feasibility of using the remaining orbiter flights to make in-flight determinations of flow field and boundary layer transitions that would be applicable to the general field of hypersonic aerodynamics.**

There are a lot of ways to determine the transition. The Aeronautics Committee believes that it is possible to have non-intrusive investigations. Dr. Donald Fraser noted that the more certainty one has about the atmosphere, the tighter the design and less contingency. Col. Eileen Collins agreed with the recommendation, but suggested that it actually read "NASA should use the remaining orbiter flights", not just examine the feasibility.

Dr. Neil Tyson also endorsed the recommendation. Based on his experience on orbital telescopes, he observed that it is easier to solve the problem after the fact through high performance computing. Mirrors are now segmented and made very thin to minimize heating, etc. As the telescope turns, the shape gets put into place in real time. Dr. Fraser noted that one of the challenges in Apollo was knowing about the characteristics of the atmosphere. There will always be uncertainties. One of the evolutions has been in the area of controls, and someone should look at applying monitoring and control techniques to the issue of uncertainties. Dr. Tom Jones noted that studying the orbiter's reentry could provide valuable data for Orion. As an example, he pointed out that they are planning for a lunar return, with a skip reentry and the second dive into the atmosphere comes at a slower speed. So, it's counter intuitive that an Earth orbiter reentry might apply to a lunar return, but a second dive into the atmosphere on the skip might be more like a shuttle hypersonic re-entry. This can get you apples to apples comparison for studying the orbiter's reentry that could be applicable to the Orion thermal protection system and get to the weight problems mentioned earlier. The Council accepted the amended recommendation and agreed to move forward with the

appropriate background and changes as discussed. |Dr. Eugene Covert noted that the addition of computers has added a degree of complexity; the entire system is now more complex.

Recommendation 2: The Aeronautics Committee, in conjunction with the Exploration Committee, recommended: **ARMD should develop/define a “critical path analysis” for the Aeronautics Multi-Disciplinary Analysis and Optimization (MDAO) needs of the ESMD mission. Ensure that the areas ARMD is addressing are on the critical path and that all aeronautics related items on the critical path are being addressed.** Gen. Lyles added that the Aeronautics Committee wants to ensure that the items ARMD is working are clearly on the critical path and have the right prioritization for funding. The ARMD reoriented its budget to focus on the needs of ESMD. There is a question whether some of the funding should have come from ESMD (Later, the Council was informed by the Director that the Langley Research Center is being reimbursed its direct cost for work for ESMD.), and the Aeronautics Committee will be looking at this as a secondary aspect. What is not being done is fundamental aeronautics. The Council agreed to move forward with this recommendation.

The third area of relevance of ARMD to ESMD is safety (ASP). Dr. Covert addressed the reaction of the Aeronautics Committee to a presentation by Dr. Karen Jackson on the crashworthiness of helicopters. Most of the helicopter accidents occur in the vertical flight mode, which is similar to a re-entry. Crashworthiness is an intentional design process that uses a systems approach to absorb energy to ensure the survivability of the occupants. The SRW research program has developed an Externally Deployable Composite Energy Absorber. When it is deployed, it has a honeycomb shape. Dr. Covert noted the advantages of this new concept. It will absorb a high amount of energy for its weight and has no timing issue. He showed the energy absorption curve. The Absorber was successfully tested at the Langley Landing and Impact Research Facility (LandIR). The program is on target and moving forward. The next test will be on a full-size helicopter. It would be prudent to test the Absorber on a sloping terrain. The SRW and Orion CEV project and resources at LandIR are collocated and the two programs have common technical objectives.

Gen. James Abrahamson asked about the comparison of the Adsorber to other systems. Dr. Covert indicated that the last time he looked, the Absorber was about twice as effective as the airbag system. However, the Aeronautics Committee did not get into cost comparisons. Sen. Schmitt asked if this was being considered as a parallel path in the Orion entry systems. Dr. Covert could not comment one way or the other, but Gen. Abrahamson noted that this is being examined along with other candidates. Sen. Schmitt stated that in the background discussion for the final recommendation on critical path items, the Council should ask NASA to look at specific things that should be included.

Mr. Armstrong reported on the presentation by Dr. Fay Collier on the Subsonic Fixed Wing (SFW) Project. Proposed new configurations of aircraft can significantly improve several areas: noise, emissions, and performance (fuel burn). He showed the numbers that could be achievable in each area with the conventional tube with wing (N+1 generation in the 2015 timeframe) and the unconventional hybrid wing body (N+2 generation in the 2020 timeframe). He compared the noise of the current airplane with the N+1 conventional airplane and the N+2 hybrid wing/body plane. He also showed the emissions and performance comparisons between N+1 and N+2 planes. In response to a question from Gen. Abrahamson, Mr. Armstrong noted that the swept forward wing has the same advantages as a swept-back wing. However, on the swept forward wing, the flow tends to be toward the fuselage, and the wings have less “twist.” It also allows the wing spar further back in the fuselage, which has advantages. Mr. Armstrong clarified that the measurement used by the FAA to determine the acceptability of noise is additive and has no physical meaning.

Mr. Armstrong briefly reviewed the Aeronautics Committee’s next steps, which included: getting a briefing from ARMD and looking into what non-ESMD fundamental aeronautics programs ARMD is not doing because it is addressing the fundamental aeronautics needs of the ESMD; and getting a briefing from the Chair of the new TPS Working Group at the next meeting to see if it meets the needs of the Committee (reference Council minutes for the February 7, 2008 meeting).

Space Operations Committee Report and Discussion

Dr. Tom Jones gave the report on the Space Operations Committee. The Committee met with a variety of NASA people and heard about the current status of the International Space Station (ISS) and Space Shuttle and the challenges leading into the Orion Program. It also heard about the Commercial Orbital Transportation Services (COTS) and the variety of cargo vehicles that will become available.

Col. Collins reported on the recent STS-120 Flight Readiness Review (FRR) on October 9-10. The Space Shuttle FRR process has undergone a number of changes since STS-114. The Shuttle review is now similar to the ISS review. A new FRR process has been put in place starting with the STS-120 mission. Dissenting opinions are encouraged and well-received in this environment. There has been an increase in the openness and the thoroughness compared with five years ago. The review is two days long, and issues take a lot longer to examine and resolve, but it is worth the extra time. Many of the organizations had a statement detailing dissenting opinions. Most of the presenters not only presented the readiness for STS-120, but also the rescue flight (STS-320). If a rescue flight were needed, there would be an additional FRR for that flight. In general, it remains to be seen whether the new process is of net benefit to the program. Col. Collins gave the Council a sample of some of the technical issues that were discussed: foam loss on the last flight; subsequent tile damage resulting from the foam loss; aerothermal evaluation during the mission to see if the Shuttle could safely re-enter; ExtraVehicular Activity (EVA) glove damage; TPS coating. The predictions on re-entry were very conservative. There was a plea to collect more aerothermal data, and this fits in with the recommendation brought to the Council by the Aeronautics Committee.

The Shuttle Program has many difficult issues, due to a variety of reasons from age of Shuttles to basic design. It is still a test spacecraft, despite the number of years it has been flying, and it still flies with significant amount of risk in all phases. If NASA had to lower the risk to zero, the Shuttle would not fly at all. Col. Collins stated that she respects the decisions that were made at the FRR. This mission is very complex and busy, and is a huge challenge to the flight crew and the ground crew. She reviewed some of the major parts of the flight: five spacewalks; installation of Node 2; crew rotation; and removal of the P-6 array and reattachment at another site.

There is a lot of work to be done over the thirteen remaining Shuttle flights. Col. Collins indicated that she was in agreement with recommendations of the Aeronautics Committee to collect more aerothermal data. If possible, a member of the Space Operations Committee should attend future FRR's. She noted that members of the Committee are also welcome to attend the Mission Management Team (MMT) meetings.

Dr. Tyson noted the new challenges arising. Through the 1960's, every NASA mission was an advance in space. When NASA returns to that regime, we will not have the opportunity for repeated analysis of the Shuttle missions. He posed the question: Can we realistically advance the space frontier with the appropriate safety margins? Col. Collins noted that many lessons learned are documented in the Columbia and Challenger reports. The Orion program will have opportunities for repeated flights. Dr. Tyson commented that in future FRR reviews; perhaps there should be a sliding risk scale. Col. Collins indicated that the risk matrix has a confidence number, and data needs to be gathered in order to assign a confidence level.

Sen. Schmitt observed that risk will never go to zero because hazards never go to zero. Gen. Abrahamson added that learning all the lessons we can from the Shuttle is essential. The Shuttle was designed for one hundred missions and a ten-year life and we are many flights and many decades after that. One of the mistakes we are avoiding in the Constellation initiative is that we are recognizing from the beginning that this is a system that will have a lifetime of many decades. The whole process of learning the lessons and getting them translated into the design the right way is very important. Sen. Schmitt noted that one of the philosophical points developing in the Constellation Program is that programs and facilities will have an indefinite life. He posed the question: How does the experience of other activities on Earth (e.g., power plants) come to bear on the future of spaceflight? We have to be thinking in terms of an indefinite life right from the beginning. In response to a question from Ms. DiGennaro, Col. Collins indicated that she didn't know of any components of the process that are available for real-time educational feed.

Dr. Jones discussed upcoming ISS events: completion of the US core segment with the installation of Node 2 on the next flight; expansion of the ISS to include European and Japanese modules beginning in December 2007; and the Canadian *Dextre* launch in February 2008. Over the next year, there will be intense operations to complete the ISS. With the addition of the partner labs, ISS will be about 71% complete. All of this is “under the radar” for the public and is unfolding with amazing achievement. The public needs to be made more aware of what is happening. The five EVA’s will be on NASA Select as well as the web site. Capt. Rick Hauck observed that it is up to the local cable stations whether they want to pick up the NASA feed. The public needs to be aware that these feeds are available if the cable providers can be persuaded to carry them. Dr. Covert agreed that finding a way to present the results of these activities is an excellent idea. It is important to get across to the public and particularly the young people that the excitement of the outcome is the result of deferred gratification and hard work prior to going into orbit. Sen. Schmitt added that one inherits in the spacecraft a motivational component that puts it far ahead of its design specifications. This was true in Apollo and is still true today.

The Space Operations Committee supported the recommendation of the Aeronautics Committee to collect data from the hypersonic flight regime. Shuttle program managers need validated entry heating and aero data. NASA should mount a rigorous data collection campaign to gather useful thermal protection and flight performance results from remaining flights. NASA should also conduct a general survey of how future exploration programs might benefit from focused Shuttle test objectives.

The Space Operations Committee presented the following recommendations:

Recommendation 1: Constellation planners should investigate techniques for stabilizing the lunar regolith on surfaces such as landing zones, outpost roads, work sites, etc. Early investment in such technologies will minimize the impact of dust on surface systems and prevent continuous disturbance of the local soils.

Sen. Schmitt agreed with the recommendation, but added that dust will be a fact of life and engineering designs will need to take that into account. In terms of operations, there trade studies are needed for comparison of various techniques.

Dr. Jones continued with discussion of the post-2010 ISS logistics shortfall. The Shuttle retirement will reduce supply deliveries to ISS just as assembly ends. Dr. Jones showed ISS cargo demand versus capability through 2015. Deliveries never quite satisfy the need, and there will be a growing shortfall. Hopefully, commercial services can fill the gap. In the current suite of vehicles, there is no downmass capability. Sen. Schmitt noted that ISS is not planning beyond 2016 because that is the limit imposed by OMB; however, the Council needs to think about the timeframes beyond what the Agency is permitted to address. After the Shuttle retires, the ISS will depend on commercial systems and/or international partner vehicles--Progress (Russia), the ATV (ESA), and the HTV (Japan). Beyond 2011, relief may be required from the Iran-Syria Nonproliferation Act (ISNA) limitations in order to begin talking to Russia about purchase of Progress vehicles.

Recommendation 2: In light of the looming ISS logistics shortfall (due to Shuttle retirement), the Constellation program should plan for a robust long term supply capability in support of the lunar outpost. Features of such a robust logistics capability might include the following: early use of In Situ Resource Utilization (ISRU) to reduce long-term supply requirements; ISS-derived regenerative life support systems; innovative life support systems, like a bio-regenerative system; and international partner and commercial logistics delivery capabilities.

Senator Schmitt directed a question to Gen Abrahamson, “Do you feel this recommendation is not being covered by the current Constellation planning?” Gen. Abrahamson indicated that the Exploration Committee has struggled to identify where it could contribute to things that are not being done or perhaps being externally controlled. He noted that the Exploration Committee feels this is a hole in the Constellation Program and that although work is happening; the long-term logistics planning for continuous support of an outpost is not complete. There is value in sending this recommendation forward, long-term planning on Constellation is essential. The problem on Shuttle is a real lesson. In response to Capt. Hauck,

Dr. Jones noted that Constellation is not looking into highly innovative systems, like a bio-regenerative system, primarily because of budget limitations. In response to another question, he indicated that the Planetary Protection Subcommittee (PPS) has concluded that introduction of life forms on the Moon is not an issue because of the hostile environment; however, it would be an issue with Mars. In response to a question from Dr. Brad Jolliff on what the Constellation Program could do, Dr. Jones stated that the Program should explore what Ariane could do in terms of cargo delivery. Dr. Collins noted that the recommendation from the Committee came out of the logistics shortfall issue on ISS. The Council accepted the recommendation on logistics capability.

Dr. Jones discussed the status of the Commercial Orbital Transportation Services (COTS). NASA is investing in future capability, not contracting for services until such capabilities have been demonstrated. There is some good news. According to fact-finding briefings received by the Committee, Space X is apparently on schedule, and there will be a Falcon 9 test launch in 2009. The company appears to be on solid financial footing. The Space Operations Committee is cautiously optimistic about post-2010 ISS capability. Dr. Jones showed a schematic of some of the products and briefly reviewed the milestones completed to date. Space X is moving forward on its planning milestones as well. Unfortunately, the second competitor, RPK, has stopped work due to lack of funds. They have not met their fund-raising targets beyond what NASA has provided. If RPK does not move forward, NASA funds would become available to spend for a follow-on competitor. In response to a comment, Adm. Ben Montoya commented that the NASA people are well aware of how important the business model is.

Recommendation 3: NASA should maintain opportunities to provide for a competitive environment and the best probability of success for this vital capability in Commercial Orbital Transportation Services.

NASA issued a Request for Information in August for industry advice on how to improve prospects for a successful commercial cargo delivery capability. The Space Operations Committee will hear more about this at the next meeting, including information about a potential new source for medium-size expendable launch vehicles. NASA is already integrating COTS prospective operations into ISS plans.

The Committee heard about the plans for Orion operations to ISS. Orion does have some limited capability for pressurized and (potentially) unpressurized cargo in addition to crew. The Low Impact Docking System (LIDS) ultimately will replace the Shuttle docking system. Sen. Schmitt noted that the launch abort system shell on Orion has been modified, and he needs to understand that a little better. At present, LIDS transport on the Orion apparently does not result any net mass impact.

Dr. Jones noted that he would work with the Chairman to ensure that the language of the recommendations was clear and accommodates the Council input.

Audit and Finance Committee Report and Discussion

Mr. Robert Hanisee reported on the Audit and Finance Committee activities. The Committee received an update on all of the active issues. It also had an opportunity to meet the new NASA Chief Financial Officer (CFO), Mr. Ron Spoehel.

The year end audit is underway. This time around, the Audit and Finance Committee asked for a full audit rather than just a non-opinion as in the recent past, and it appears that the auditors are going to do the full audit this year. However, the Committee is not optimistic that NASA will get an unqualified audit. The goal is to get an unqualified audit by next year. The Committee also took care of some of its deferred business, including a full review of the Integrated Enterprise Management Program (IEMP) and a review of Constellation financial management activities.

Mr. Stanislawski discussed the background of Mr. Spoehel. At the Committee meeting, Mr. Spoehel answered a lot of detailed technical questions that far exceeded those expected given his short tenure on the job, and the Committee was very impressed with him. He has had extensive experience in the private sector and comes with a variety of impressive credentials. He has "hit the ground running" and already has

a high-level grasp on NASA's vision, mission, and strategic imperatives. Mr. Spoehel is an important addition to the NASA team.

Mr. Howard Stanislawski provided an update on continuing issues. NASA received a "green" from Treasury on cash balances as of August 31, 2007. The out-of-balance amount (\$105,000) is well below material thresholds and is a very significant improvement. The issue appears to be essentially resolved. Mr. Hanisee briefly reviewed the background of the issue for the benefit of the new Council members.

The next issue, environmental liability, is ongoing. There is still no Independent Verification and Validation (IV&V) on the software from the vendor. In addition, there is a new issue: NASA needs to begin estimating cleanup costs when items are placed into service. This hasn't been done until this point, but now there is a focus on the issue and the cleanup estimate for new activities will be done in the future.

Mr. Hanisee reported on the continuing Property and Plant Equipment (PP&E) issue. A project has been underway over the past year to get the auditors and the Federal Accounting Standards Advisory Board (FASAB) to accept expensing of certain theme assets as R&D. Accordingly, for example, NASA has expensed the Dawn mission assets. The net of the reclassification write-offs is about \$20.5 billion at end of FY07. Most of the PP&E problem is with space exploration assets. Many of these assets are over 7 years old (the limit of NASA recordkeeping outside of "deep storage"). The auditors appear to be ready to accept the Shuttle assets as history and write off those assets. There are good records on ISS, and the Committee will suggest to the auditors that they pull the manifests and test a sample from those. If the outcome is favorable, the Agency may be able to get an unqualified audit report in 2008. Mr. Michael Montelongo indicated that the DOD faces many of the same issues. When he was there, there were substantial disagreements with the DOD Office of Inspector General (OIG). At the time, DOD was trying to bring in external auditors and some "common sense" approaches, and the OIG and General Accounting Office (GAO) resisted to that. In response to a question and comment from Gen. Abrahamson, Mr. Hanisee agreed that the write-off of assets doesn't really help the budget. There is no reason why agencies in the federal government should be on a cash accounting basis. The problem is that the equivalent of the Federal Agency Standards Board (FASB) in the government sector has its own bureaucracy. Mr. Hanisee stated that he has tried to get the NASA OIG to go along with giving NASA a "fresh start." NASA is doing a very good job of keeping track of new assets. However, the OIG has not yet agreed to the fresh start approach. Mr. Ted McPherson observed that a clean audit opinion is highly valuable. There is a solution that requires common sense and the federal agencies have to work at it and find something reasonable. Mr. Montelongo noted that there was a law in 1990 (the CFO Act) that set in motion the current drive for agencies to be more in line with the private sector. Sen. Schmitt opined that there is an inherent benefit for NASA.

Mr. Hanisee stated that there are two paths for NASA: (1) a fresh start; and (2) doing sampling from manifest data. The auditor, Ernst and Young (E&Y), has given a preliminary nod that it may be open to the second approach. The Audit and Finance Committee will continue to work this issue. One of the really difficult aspects is contractor purchased and held property. However, the Agency is getting more rigorous about NASA 533 Reports (Contractor Financial Management Reports) and property reporting. As a consequence, all new work on existing contracts, as well as new programs, are being tracked in a thorough manner.

Another issue that affects the ability of the CFO office to get work done is finding and retaining financial staff personnel. In September, the financial staff was 19 below the authorized level, agency-wide. There is a critical shortage of trained, capable financial accounting people in the country, especially in the Washington, DC area. The Committee has suggested moving part of the CFO staff to another location; however, the Committee didn't want to make a formal recommendation until it talked with the new CFO. The CFO's response was that they have about fifteen or more offers outstanding and would like the Committee to hold off on the recommendation until he saw how close they could come to closing the gap. The Committee will stay on top of this issue. If not resolved by the next meeting, a formal recommendation will be made.

Mr. Michael Montelongo discussed the NASA Shared Services Center (NSSC) initiative. This concept has been employed by many private sector firms. The Human Resources, Finance, and Contracting functions (transactional in nature) are centralized in one place to obtain economies of scale. The initial estimate of savings was about \$100 M. It is important that the transition be implemented carefully. The next set of transactions slated for movement to the SSC is Accounts Receivable, Accounts Payable, and SF-224 Reporting. A Task Force is looking at managing these kinds of activities from decentralized to centralized mode. In the process, they are imbedding an internal control framework into the transition. This transition must be done in a planned, methodical way. Because the physical center is located in the New Orleans area, Hurricane Katrina slowed down the transition plan. The Centers are finding that some labor at the Centers has to be retained for the time being in order to make sure the transactions are done correctly.

Grant accounting is another activity that needs attention. The grant money has been spent, but the paperwork hasn't been completed to ensure that the accounts are closed. Mr. Terry Bowie (formerly the Acting CFO) has a plan to manage the closeout of the old grants. Mr. Hanisee explained the current grant accounting system, where grants are collectively accounted by Institution. Under the new system, there will be grant-by-grant accounting. Mr. Hanisee emphasized that the transition needs to be very well managed. Sen. Schmitt observed that under the current protocols, there is opportunity for abuse. Mr. Montelongo agreed and stated that the new system is a welcome change.

Mr. Montelongo summarized what is being done at LaRC. The Center is fully committed to "One NASA" and SAP/IEMP (System Application Program/Integrated Enterprise Management Program) implementation and utilization. The people are doing the right things. NASA's challenge is to attract and recruit top financial talent. The Agency requires the best professionals for best results. Mr. Hanisee agreed that with one exception (which is improving), the Committee has found the same attitude and quality at all of the Centers.

The Audit and Finance Committee met with financial and program control people in the Constellation Program. Mr. McPherson noted that the Committee has seen how better decisions can be made when there is a better handle on costs. The work being done by the program control office is constantly moving. They look at the cost risks and spot reserves. One of the enhancements is a management system with insights that let reserves flow down to the projects. The IEMP is a NASA-wide initiative (started in 2000) to integrate the financial management and accounting, contract management, asset management, human capital management, and systems and processes. Most of the system is in place, but some pieces remain for implementation in 2008—e-travel, integrated asset management, the human capital information environment, and aircraft management. The value of having information and on-line access, blended into the risk management matrices, provides solid data for decision making. In response to a question from Sen. Schmitt related to over-run problems on past programs, Mr. McPherson indicated that every invoice will be thoroughly reviewed for accuracy before payment. Current issues include seventy-nine additional projects to be evaluated and prioritized and continuous improvement of the management information that is delivered to end users and decision makers. Mr. McPherson acknowledged that there has been substantial progress. There is a feeling among the Committee members that everything is finally coming together.

Mr. Hanisee stated that the Audit and Finance Committee will continue stay on top of new programs. It will monitor Constellation cost elements and attend some of the briefings for the Administrator. It will have a fact-finding session on unallocated balances. The Committee will continue to monitor the NSSC. He noted that it will probably not have the savings that were initially estimated. The Committee plans to have a session with Deputy Administrator Shana Dale. It will also meet with E&Y on the audit, with the OIG, to review progress. The Committee is dedicated to getting the Administrator an unqualified audit opinion. Mr. Bowie has done yeoman work and the Committee will be making some kind of recommendation to the Administrator that his efforts be recognized.

Gen. Lyles commented on Earned Value Management (EVM). EVM is a project management technique that seeks to measure forward progress in an objective manner. It has been around for awhile; however, until now, the Centers have not been uniform in their understanding of EVM, and there is a tremendous need for education and training. Also, EVM doesn't work unless the contractors cooperate. Mr. McPherson noted that one of the issues recognized by the Committee is training and education. There has

been a lot of change in the management process at NASA. Mr. Hanisee agreed to make a new agenda item: how EVM is being implemented across the Centers and programs. He acknowledged that there is a lag in some of the Centers. One of the things to be bridged is the adoption of EVM by the program people as well as the financial people.

The Audit and Finance Committee had no recommendations to report at this time.

Human Capital Committee Report and Discussion

Dr. Gerald Kulcinski reported for the Human Capital Committee. At its meeting, the Committee worked on a set of back issues. It discussed the interagency meeting on Oct 18th, the STS pre-launch educational activities, the aging NASA population, governmental reviews of NASA educational programs, and the proposed engineering conference in 2008. In addition, it presented a clarification of a previous recommendation.

The Interagency Aerospace Revitalization Task Force is meeting in Washington, DC, on October 18. It is concentrating on post-graduate student issues. NASA is one of the minor participants. The Committee will get feedback from Dr. Joyce Winterton at the next meeting. There is an invitation for a few “gifted and talented” students to meet with NASA officials at the pre-launch educational activities event at the STS-120 launch. There will be feedback on this format at the next meeting.

Dr. Kulcinski noted that the Committee does not have all the data in hand regarding the aging NASA population, but it made a few observations. He showed the “double hump” graph displayed at a previous Council meeting. The double hump is now gone and the average age is about 50, currently increasing one year every year. Dr. Milgram noted that if money were not an issue, the Agency would prefer to hire an older person with more experience. Sen. Schmitt commented that when Apollo started, many young people without experience were hired so that the average age, for example among flight controllers, was in the 20s. For Apollo, at least, the motivation, imagination and stamina of youth apparently more than compensated for experience. Dr. Kulcinski indicated that the Committee wants to get more information government-wide, to look if and how NASA is unique, and how this compares to industry. Sen. Schmitt said that the Agency is dealing with two constraints—one imposed by OMB and one imposed by Congress. This makes it almost impossible to hire anybody until someone retires. Dr. Milgram noted that there is a distinction between the overall NASA employment and the subset of scientist and engineers. For the latter group, the “peaks” are moving to the right, and there is an obvious cliff in availability of experienced personnel in the middle of implementation of the Constellation program. There will be more information at next meeting.

There have been two external reviews of NASA education programs: an OMB study just published (showing mixed results), and a National Research Council (NRC) Review that should be completed next month. In the OMB study, program results/accountability was only scored 33%. The Committee will request a meeting with someone from OMB to go over the findings. Also, there has been a change in the method of tabulating results, and NASA people feel that the paperwork has not caught up. The OMB measure is whether a program is meeting its long-term and annual performance goals. The NRC review was congressionally mandated. It is looking at the effectiveness of the program, and will include an assessment of the quality of results, an evaluation of funding priorities, an evaluation of collaborations, a review of best practices, alignment of pre-college goals, and the effectiveness of NASA’s goals in pushing students through the Science, Technology, Engineering, and Mathematics (STEM) pipeline. Results should be available by the next meeting. Gen. Lyles asked the Committee to consider taking a look at the difference between this NRC review and the America Competes Act. Mr. McPherson noted that what is in play is the ownership of the education initiatives and where the resources come from. Success in this arena will require key players and advocates for NASA. Dr. Kulcinski indicated that the Human Capital Committee is trying to instigate a detailed proposal for a high level conference in 2008 that would involve major stakeholders in understanding NASA’s future engineering needs. He invited input from Mr. McPherson and others on the Council. There will be more details at the next meeting.

The Human Capital Committee proposed to generalize its previous recommendation pertaining to scholarships for high achievement students. There are a number of non-governmental organizations that have been awarding scholarships to high achieving undergraduate and graduate students pursuing careers in

STEM areas critical to NASA. There is an opportunity for NASA to help expand these highly successful programs. The recommendation was revised to read:

Recommendation 1: NASA should consider the possibility of financially matching the efforts of successful non-profit organizations in order to help satisfy future NASA needs.

Sen. Schmitt noted that the previous recommendation had been approved, and unless there was objection, the Council would go forward with the modified recommendation.

Ms. DiGennaro suggested that for the NASA Centers being visited by the Council, the host Center should invite the deans of engineering schools that are in proximity to the meeting location to accompany five of their most outstanding scholars in any engineering department as guests at the Council meetings. Sen. Schmitt took this suggestion under consideration.

Science Committee Report and Discussion

Dr. Edward David introduced the report on the Science Committee. Dr. Mark Robinson briefly discussed Lunar Advanced Science and Exploration Research (LASER), which is a program for small to medium sized grants for Principal Investigators (PI's) to analyze existing lunar data. Another major initiative is the NASA Lunar Science Institute (NLSI). The purpose of the NLSI is to provide for focused research teams larger than PI-led Research and Analysis (R&A) groups. It is modeled after the highly successful focused research initiative of the NASA Astrobiology Institute (NAI). It will be funded from the President's FY08 Lunar Initiative. It will address basic lunar science, lunar sorties, and outpost applications. The selections should be made around this time next year. Each Node will be initially funded for three years, then up to five years for renewals.

Dr. Robinson presented the first proposed recommendation on the Lunar Goals Roadmap:

The Science Committee recommends that the Lunar Exploration Analysis Group (LEAG) be tasked to prepare a Lunar Goals Roadmap that maps science goals to objectives, and to observations and measurements. This roadmap should include an assessment of needed technology developments, areas of potential coordinated activities for commercial and international participation, and potential feed-forward activities for the exploration of Mars and beyond.

In response to a question from Capt. Hauck, Dr. Jolliff noted that prioritization of lunar science still comes from the NRC decadal survey, the Council's own reviews (such as the Tempe Workshop), and the Science Strategic Plan. The roadmap provides a flow chart on how priorities might be addressed, updated annually. LEAG reports through the Council but has its connections in the science community. The roadmap helps organize the thinking, i.e., what needs to be done in what sequence. There needs to be a continual update from an external source. Sen. Schmitt noted that LEAG should be tasked by the Council as a whole and not through a recommendation by the Council to the Administrator. It was decided that this item will be worked through the Science Committee's Executive Secretary directly with the LEAG. In response to a question from Mr. McPherson, Dr. Robinson noted that there is US participation in European and Japanese missions. Dr. Jolliff added that there are foreign experiments on Mars rovers. There is actually a very good mechanism for this—Missions of Opportunity—and there are some very good, solid international partnerships.

Dr. Robinson showed the Science Mission Directorate (SMD) launch calendar, updated since the last meeting for a few missions that have gone from planned to actual, as well as some recent launches. There are a number of launches in 2008 and 2009, then a drop-off. He noted that a large amount of funds is associated with the Mars Science Laboratory (MSL). Further, there are a number of missions that are sending back Mars data. Phoenix is now on its way to Mars. Stardust and Genesis are done with their primary missions, but are still operational. The community has presented some good ideas on what to do with them next. The Messenger mission is on its way to Mercury. Cassini has been sending data from Saturn for several years. Voyagers I and II are reaching the edge of the heliopause and are still sending back science data. Dawn is on its way to two asteroids. ICE is in a halo orbit and will make its approach to

Earth. Fifteen missions are sending down data. This is a golden age of solar system exploration. Sen. Schmitt posed a question for Committee thought: How is NASA going to deal with all of this information?

Dr. Jolliff discussed Mars Sample Return (MSR). Getting samples back from Mars has been a goal of the science community for a long time. SMD has initiated planning for a MSR mission to be launched by 2020. This was formerly in NASA's program, but was deferred in the 2006 budget process. The scope and cost of MSR is commensurate with a potential international partnership. MSR aligns very well with European plans and interests, and the Europeans are very interested in cooperating. SMD is working on how an earlier MSR integrates with the current Mars Exploration Program (MEP). The Program is actively assessing MSR feasibility and implementation options. The minimum sample size depends on the objectives. A lot could be learned from a sample return of 100 grams (a very small sample). With respect to the search for life, the only things expected at the hostile Martian surface are materials that might give indirect evidence of the signs of life. For anything more, a drill core is a key element. We are at the point where we can significantly advance our understanding of the planet and potentially of the origins of life on Earth.

Dr. Jolliff discussed a Mars Sample Return Containment Facility. The PPS concurs with the 1997 NRC report that a high-level containment facility is mandatory for any non-sterilized sample returned to Earth from Mars, and the PPS has come forward with this recommendation. Capt. Hauck noted that there might be some parallels in the planning of this containment facility as with licensing and building a new Nuclear Power Facility in the U.S. Regulations now allow for nuclear power plants to seek approval to build and operate before they even break ground. He advised that in the planning for the containment facility, approval to both build and bring back samples should be obtained at the same time. Dr. Jolliff said this was a very good point that has been a contentious issue for sometime and has received a lot of discussion and debate. The planning of this facility needs to be understood from end to end before any samples are returned. He noted that the PPS would like to see the issue elevated in priority. The Science Committee will ask its Planetary Science Subcommittee (PSS) and the PPS to work this issue together and bring a joint recommendation to a future Science Committee meeting. Senator Schmitt made reference that he hopes what should be a simple sample return from Mars is not construed as a life threatening risk to Earth. Tests can be accomplished during the return flight, he added. Dr. Jolliff noted that those who are most concerned about planetary protection say that there is not a 100% probability that there will be samples without life forms. One option around this is to bring back samples that have been sterilized. Dr. Jolliff indicated that this debate on sample returns is not over and further discussions between the PPS and PSS will need to occur. A number of issues regarding planetary protection go beyond the scope of the specific considerations that are the focus of the PPS. Eventually, NASA may need a separate ongoing organizational mechanism for encouraging discussion and obtaining guidance concerning public engagement and broader international contexts for human exploration. An effective way to begin would be to sponsor a study by the NRC. The Science Committee suggested that the Exploration Committee take this up as a topic for future discussion. Sen. Schmitt cautioned the Science Committee to be careful of the types of questions it asks and who it asks. NASA and the State Department will formally interpret these issues for this and future Administrations under the Outer Space Treaty of 1967.

Dr. Jolliff presented a proposed recommendation for the creation of a Small Bodies Assessment Group (SBAG),

Recommendation 1: NASA should approve the formation of a Small Bodies Assessment Group under the Planetary Sciences Subcommittee. Establishment of SBAG will ensure full participation of the small-bodies community in NASA planning. The Outer Planets Analysis Group (OPAG) is on board with this recommendation. Dr. Jolliff added that this is endorsed by the SMD. The Council accepted the recommendation.

Dr. Garriott discussed the Science Committee recommendation on maintaining cost discipline on missions.

Recommendation 2: Continue efforts to develop management approaches that maintain fiscal responsibility from the formulation of missions through their development and launch. Take necessary actions throughout mission conceptual design and development to assure that projects

maintain a proper balance between requirements and funding including proper reserves. Report to the Science Committee on the efforts to maintain fiscal discipline, including studies to identify the drivers responsible for cost growth.

This recommendation provides support to SMD. In response to a question from Sen. Schmitt, Dr. Garriott noted that there are a number of yardsticks that provide the original cost estimation and any growth beyond that. The Council accepted the recommendation. Dr. Garriott acknowledged that there will be some friction involved in implementation of the recommendation. All of the programs must understand that there is a new rule in SMD. There are “warning shots” at Preliminary Design Review (PDR) and Critical Design Review (CDR). An important part of the recommendation is the report on the drivers responsible for cost growth. The emphasis is on early detection of cost growth factors. Gen. Lyles added that EVM could be applied to small programs as well as large programs.

Dr. Garriott discussed the background and recommendation on “Scientist Astronauts.” About four decades ago, there were Scientist Astronauts. After selection of two groups in 1965 and 1967, this category was dropped, primarily for internal political reasons. The Science Committee presented a recommendation for re-establishment of the Scientist Astronaut designation for lunar exploration.

Recommendation 3: NASA should re-examine the rationales and methods used in prior Scientist Astronaut selections, improve where possible (but retain the designation previously used) and fully incorporate those selected with other Pilot Astronauts and Mission Specialists in the Astronaut Office cadre.

In response to a question, Dr. Garriott noted that one of the things lost when the “Scientist Astronaut” category was dropped was the contact with the science community. In response to a comment, he noted that NASA would have to think about whether it would want to give Scientist Astronauts the full flight training. Capt. Hauck noted that there are Mission Specialists that are highly trained scientists, and that he did not understand the need for the specific designation of this category. Dr. Collins clarified that the Science Committee is not recommending deleting the Mission Specialists category. The Johnson Space Center (JSC) is now hiring a new class that initially will be Space Station astronauts, and may already be working on this aspect. She added that NASA would probably go along with this if they saw a difference in training in Science Astronauts and Mission Specialists. Dr. Garriott opined that there would be a difference in background. There is no doubt that the science community would be more motivated about the program if there were this category. In addition, he believed that there would be a broader spectrum of people applying to be astronauts. Sen. Schmitt commented that once the sequence of exploration missions is defined, the skill requirements will be recognized. If things are left as is, there would be a good chance that the skills wouldn’t be there when they are needed. Dr. Collins noted that there is a breakdown within the Mission Specialist category that includes various science backgrounds.

Sen. Schmitt noted that NASA Headquarters is on the verge of completing the responses to the recommendations from the Lunar Science Workshop. They have not yet been signed off by the Administrator. It will be necessary for the Science Committee to review these quickly. Once the recommendations are finalized, the entire Council will receive them and all comments will be welcome.

Exploration Committee Report and Discussion

Mr. Gen. Abrahamson introduced the report from the Exploration Committee. Capt. Hauck then discussed the life sciences research that leads to lunar exploration and going to Mars. He noted that except for the last two, the slides he showed were prepared by Dr. Longnecker. It has been recognized for some time that the process of developing standards for health, safety, and performance could benefit from a more disciplined process. This started with a report from the Institute of Medicine (IOM) in 2001, and continued through the Columbia Accident Investigation Board (CAIB) report in 2003, the Vision for Space Exploration in 2004, and the Exploration Systems Architecture Study in 2005. The IOM recommended a review of the bioastronautics roadmap. A “standards to deliverables” process has been established. Risk is a number—the likelihood of consequence as a result of exposure to a hazard. NASA STD 3001, which is the new Space Flight Human System Standard document, is being developed with this process. Volume 1 specifies human health and performance standards and levels of medical care. Volume 2 specifies

habitability and environmental health standards. Development of standards is initiated by the Chief Health and Medical Officer (CHMO) at JSC with participation of other Centers and external sources as appropriate. Capt. Hauck showed the contents of Volume 1 and Volume 2. Sen. Schmitt noted that the last four topics in Volume 1 imply a monitoring element. Capt. Hauck stated that the life sciences program is using an evidence-based approach to risk management. There also is a great wealth of data from the longitudinal health study. However, this data has not been set up to be easily mined. Sen. Schmitt noted that the one long term health effect that appears to be space flight-related is a greater number of cataracts in the astronaut population, although he personally questions whether all co-factors have been fully evaluated.

The National Institutes of Health (NIH) and NASA have signed a Memorandum of Understanding (MOU) for collaborative research. Sen. Schmitt added that Dr. Katz deserves a most of the credit for this, along with Mr. Mark Uhran who worked this on the Agency side.

Capt. Hauck discussed the Risk Mitigation Analysis Tool (RMAT). The tool flows from a standard to a deliverable for a particular mission. It provides a framework to facilitate the documentation of the risk management approach. "Risk," "Human Health and Performance Standard," and "Risk Factor" have been defined. Capt. Hauck showed how the RMAT would be used for different architectures. One example was the Risk of Radiation Induced Carcinogenesis. As defined by NASA, the Risk of an Exposure Induced Death (REID) is less than 3% at a 95% confidence level with application of ALARA below this risk limit. The Risk Factor contributing to the outcome is exposure to space radiation including galactic cosmic rays and solar particle events, mission length and timing dependent. Capt. Hauck showed the draft RMAT for Radiation Carcinogenesis. (The draft RMAT is based on the current reference missions.) The 3% limit currently established by NASA is violated by one year duration on ISS. One of the questions is whether to use people willing to accept greater risk, i.e., tailored adjustment of limits for individuals. It was noted that this raises a future health care, an ethical, philosophical, and moral discussion. NASA is well on the way to this disciplined approach, and there are thirty-two risk categories that are going through this process. In response to a question from Dr. Collins, Dr. Louis Ostrach indicated that there are three Technical Authorities—engineering, safety, and health. They are all independent, i.e. not involved in formulating the research program.

Capt. Hauck observed for the Exploration Committee that this is a new way of doing business and offers great potential for methodically establishing standards, deliverables, and guidelines. The Exploration Committee cautioned against using jargon associated with everyday risks. NASA should use terminology that recognizes the difference between the Earth environment and the space environment. This minimizes misleading analogies.

Capt. Hauck stated that the Exploration Committee had no recommendations at this time. The Ad hoc Biomedical Subcommittee will continue to monitor this area.

Dr. Ford referred to the past recommendation on reliability of software (with respect to hackers, Internet exposure, etc. in the outside environment). It has gone forward to the Administrator; there was a request for additional information and some additional research is being done. The other area that has been a major effort has been the study of requirements, including how requirements generated at different points and different places get translated into the procurement process, and how a project maintains continuity in investigating problems.

Gen. Abrahamson attended the System Definition Review (SDR) for Ares 1 at the Marshall Space Flight Center (MSFC). He stated that he was impressed with the scope and depth of the review. There were over 100 participants from all Centers, SAIC, Aerospace, and others. This was a derivation of the old System Design Review. The automated Review Item Discrepancy (RID) tool was very important in documentation and tracking and seemed to be well understood by the participants. The SDR review process incorporates many eyes and brains on the mission. It ensures NASA technical leadership for the contractors. The SDR is one key step in the new NASA design review process. It provides control over the flow of requirements, whether they are in a NASA specification, standard for certification of a model, etc. There was important emphasis on cost control up front, including clear attention to progress milestones and dollar availability. Affordability planning and project cost analysis was discussed. One of the big questions is planning of

future NASA employee costs. The importance of clear, technical decisions was emphasized, rather than letting the paper drive the process. Gen. Abrahamson cited some examples of decisions made early in the process that are now being validated. There were some serious looks at the way non-conformance risks would be evaluated.

Gen. Abrahamson noted some areas for more Council emphasis, such as the interactions between significant system components (e.g., the mismatch between Ares lift capability and Orion mass), the comparative funding of key elements, NASA integration of contractor elements, and the relationship between policy statements and the risk management system itself. In this very tough environment, there must be good person-to-person communication at all levels. In response to a question from Sen. Schmitt, Gen. Abrahamson indicated that the Committee's review process may not immediately generate a set of recommendations. He invited participation from other Council members. Gen. Lyles agreed with the Administrator's emphasis on putting more controls at the NASA centers. He offered the following question for consideration: What management disciplines, techniques, and lessons learned are being utilized to avoid the mistakes in previous federal programs where the government was the integrator of contractor work. Gen. Abrahamson agreed to put this on his list of questions.

The Exploration Committee had no recommendations to report at this time.

Council Discussion

Gen. Lyles brought up the issue of marketing, recruiting, etc. There are at least some lessons learned by the DOD and other agencies that could be useful for NASA. Perhaps the Council could help on these issues. Sen. Schmitt suggested that Gen. Lyles form a small fact finding group to develop a set of questions for the Agency. Ms. DiGennaro asked: Within NASA and the directorates, who is overseeing international partnerships? How is "sharing information" defined? What constitutes this? Sen. Schmitt stated that NASA's International Relations Office should be monitoring these agreements. It might be worthwhile to get a briefing from this group, either to the Human Capital Committee or to the Council as a whole. A focus question could be: Except for the ISS, how are NASA/international partnerships established? Ms. Diane Rausch, formerly in the International Affairs Office, noted that there are many ways that NASA cooperates internationally. NASA has a track record of over 400 agreements. She agreed that a briefing from the External Relations Office would be very useful. Sen. Schmitt indicated that he would work on this for a future meeting.

Mr. Stanislawski reported nothing new on the International Traffic in Arms Regulation (ITAR). Sen. Schmitt related two anecdotal events. One involved a film company that wanted to do an engineering film on the guidance and control systems for Apollo, and someone told them that was ITAR controlled. There have been several other films that document the Apollo astronauts. "The Wonder of It All" is especially good, and Sen. Schmitt recommended it to the Council for viewing.

Sen. Schmitt adjourned the meeting at 4:10 pm. The next meeting is Thursday, February 7, 2007, in Washington, DC.

**NASA Advisory Council Meeting
Chesapeake Room
Point Plaza Suite & Conference Hotel
950 J. Clyde Morris Blvd.
Newport News, VA 23601
October 18, 2007**

Meeting Location

**Point Plaza Suite & Conference Hotel
950 J. Clyde Morris Blvd.
Newport News, VA 23601
Chesapeake Room**

8:00 a.m.	Opening Remarks	Hon. Harrison Schmitt
8:15 a.m.	Aeronautics Committee Report and Discussion	Mr. Neil Armstrong
9:15 a.m.	Space Operations Committee Report and Discussion	Dr. Tom Jones
10:15 a.m.	Break	
10:30 a.m.	Audit and Finance Committee Report and Discussion	Mr. Robert Hanisee
11:30 a.m.	Human Capital Committee Report and Discussion	Dr. Gerald Kulcinski
12:30 p.m.	Lunch	
2:00 p.m.	Science Committee Report and Discussion	Dr. Edward David
3:00 p.m.	Exploration Committee Report and Discussion	Gen. James Abrahamson
4:00 p.m.	Discussion and Agreement on Recommendations	Council Members
4:15 p.m.	Adjournment	

NASA Advisory Council Members
October 18, 2007

Chair	<ul style="list-style-type: none"> Hon. Harrison H. Schmitt, Apollo 17 Astronaut and Scientist
Aeronautics Committee	<ul style="list-style-type: none"> <i>Chair: Mr. Neil Armstrong, Apollo 11 Astronaut</i> General Lester L. Lyles, USAF (Ret.), Consultant, The Lyles Group Dr. Eugene Covert, T. Wilson Professor of Aeronautics, Emeritus, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology Dr. John Sullivan, Professor of Aeronautics and Astronautics Director of the Center for Advanced Manufacturing, Purdue University
Audit and Finance Committee	<ul style="list-style-type: none"> <i>Chair: Mr. Robert M. Hanisee, Trust Company of the West</i> Hon. Edward R. "Ted" McPherson, Chief Executive, Intersolve Group, Inc. Hon. Michael Montelongo, Senior Vice President, Strategic Marketing, Sodexho, Inc. Mr. Howard Stanislawski, Partner, Sidley Austin, LLP
Exploration Committee	<ul style="list-style-type: none"> <i>Chair: Lieutenant General James A. Abrahamson, USAF (Ret.)</i> Dr. Kenneth Ford, Founder and Director, Florida Institute for Human & Machine Cognition Dr. Donald Fraser, DRS Technologies Capt. Rick Hauck, USN (Ret.), Astronaut (Ret.)
Human Capital Committee	<ul style="list-style-type: none"> <i>Chair: Dr. Gerald L. Kulcinski, Associate Dean of Research, College of Engineering, University of Wisconsin-Madison</i> Ms. Joann DiGennaro, President, Center for Excellence in Education Ms. Kay Coles James, President, The Gloucester Institute Mr. Wendell Maddox, President and Chief Executive Officer, ION Corporation Dr. R. James Milgram, Professor, Department of Mathematics, Stanford University
Science Committee	<ul style="list-style-type: none"> <i>Chair: Dr. Edward David, President, EED, Inc.</i> Dr. Owen Garriott, Astronaut (ret.) Dr. Bradley L. Jolliff, Research Associate Professor, Department of Earth and Planetary Sciences, Washington University Dr. Mark S. Robinson, Research Associate Professor, Department of Geological Sciences, Arizona State University Dr. Neil DeGrasse Tyson, Frederick P. Rose Director, Hayden Planetarium, Department of Astrophysics, American Museum of Natural History
Space Operations Committee	<ul style="list-style-type: none"> <i>Acting Chair: Dr. Thomas Jones, Astronaut (ret.)</i> Col. Eileen Collins, Astronaut (ret.) Adm. Benjamin Montoya, DEO, SmartSystems Technologies
Unable to Attend	<ul style="list-style-type: none"> Dr. Raymond S. Colladay, Chair, Aeronautics and Space Engineering Board, National Research Council Dr. Stephen I. Katz, M.D., Ph.D., Director, National Institute of Arthritis and Musculoskeletal and Skin Diseases Dr. Pat Condon, Chairman of the Board, Air Force Association (ret.) Dr. Stephen I. Katz, M.D., Ph.D., Director, National Institute of Arthritis and Musculoskeletal and Skin Diseases Dr. John M. Logsdon, Director, Space Policy Institute, George Washington University Dr. David Longnecker, Institute of Medicine, National Research Council Dr. C Paul Robinson, Former President and Director, Sandia National Labs (Ret.) Dr. Byron Tapley, Director, Center for Space Research Professor, Aerospace Engineering, University of Texas, Austin

NASA ADVISORY COUNCIL
Point Plaza Suite and Conference Hotel
Newport News, VA
October 18, 2007

ATTENDEES

<i>Council Members</i>	<i>NASA Attendees</i>
Abrahamson, James A.	Barrett, Connie
Armstrong, Neil	Bloxon, Deborah
Collins, Eileen	Cooke, Doug
Covert, Eugene E.	Dunwoody, Cathy
David, Edward	Engle, Chuck
DiGennaro, Joann	Fishman, Jack
Ford, Kenneth	Fletcher, Cecilia
Fraser, Donald	Green, Thomas
Garriott, Owen	Hodges, Todd
Hanisee, Robert M.	Holloway, C. Michael
Hauck, Rick	Iademarco, Paul A.
James, Kay Coles	Kimmerly, Guy
Jolliff, Bradley L.	King, Marla
Jones, Thomas	Krezel, Jonathan
Kulcinski, Gerald L.	Kyle, Jean
Lyles, Lester L.	Kyle, Robert
Maddox, Wendell	Lawson, Donna
McPherson, Edward R.	Levine, Joel
Milgram, R. James	Lunsford, Benny
Montelongo, Michael	McClain, Susan
Montoya, Benjamin	O'Connor, Laura
Robinson, Mark S.	O'Connor, Neil
Schmitt, Harrison H.	Obland, Michael
Stanislowski, Howard J.	Ostrach, Louis
Sullivan, John	Owens, Bruce
Tyson, Neil DeGrasse	Parham, Jane
	Rausch, Diane
	Skora, Manny
	Stigberg, Ellen
	Wahls, Rich
	Williams, Greg

Other Attendees:

Gantt, John
 Holter, Michael
 McBeth, Michael
 Reck, George
 Weinstein, Leonard

Mizrack & Gantt, NY
 Old Dominion University student
 Navy
 George Mason University
 NIA

**NASA ADVISORY COUNCIL
Point Plaza Suite and Conference Hotel
Newport News, VA
October 18, 2007**

LIST OF PRESENTATION MATERIAL¹

- 1) Report of Audit and Finance Committee [Hanisee]
- 2) Science Committee Presentation to NAC [David]
- 3) The System Definition Review (SDR) Kickoff Meeting [McPherson]

Other material distributed at the meeting:

- 1) NASA Advisory Council February 2007 Meeting Minutes
- 2) 2008 Proposed Council Plans
- 3) Memorandum of Understanding Between the National Institutes of Health and the National Aeronautics and Space Administration for Cooperation in Space-Related Health Research

¹ Presentation and other material distributed at the meeting are on file at NASA Headquarters, OER/ACMD, 300 E Street SW, Washington, DC 20546.