

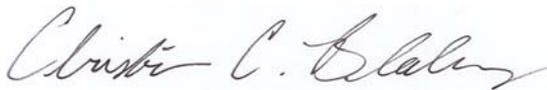
**National Aeronautics and Space Administration
Washington, DC**

NASA ADVISORY COUNCIL

July 19, 2007

**Marshall Space Flight Center
Huntsville, AL**

MEETING MINUTES



**Christopher C. Blackerby
Executive Director**



**Harrison H. Schmitt
Chair**

**NASA ADVISORY COUNCIL
Marshall Space Flight Center
Huntsville, AL
July 19, 2007**

**Meeting Report
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*Meeting Report Prepared By:
Paula Burnett Frankel*

**NASA ADVISORY COUNCIL
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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 Council members and meeting attendees to the Council's eighth meeting. He reminded everyone that the full 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 requested by the Chair. He thanked Mr. David King, Director of the Marshall Space Flight Center (MSFC), and the MSFC staff for assistance with meeting logistics as well as an excellent tour of the Center facilities on July 17, 2007. He introduced the Council's newest member, Dr. Kenneth Ford, Founder and Director of the Florida Institute for Human and Machine Cognition and Dr. Ford summarized his background for the Council.

Sen. Schmitt noted that minutes from the April meeting are available. The bulk of the recommendations from that meeting involved the Lunar Science Conference in Tempe, Arizona, and NASA has put together an aggressive team to respond to those recommendations. Sen. Schmitt showed the tentative schedule for future Council meetings: October 16-18, 2007 - Langley Research Center (LaRC); February 5-7, 2008 - NASA Headquarters; April 16-17, 2008 - Kennedy Space Center (KSC); July 22-24, 2008 - Glenn Research Center (GRC); and October 14-16, 2008 - Ames Research Center (ARC).

On behalf of Council attendees, Sen. Schmitt expressed appreciation for the fact-finding tour on July 17. The Council was able to see first hand how the MSFC team is contributing to the Exploration Vision, particularly with respect to the development and testing of the Ares family of launch vehicles.

Exploration Committee Report and Discussion

Gen. James Abrahamson reported on the Exploration Committee recent discussions and fact-finding activities. The Committee was very impressed with the tour and the enthusiasm of the people at MSFC. The Committee has been engaged in an ongoing review on requirements documents and the flow to specifications and procurement documents. The review is continuing with how "stretch" requirements (Goals that start from a requirement but are such a jump ahead that something out of the paradigm is needed) can be instituted effectively. Included in this review is an examination of small business initiatives within the Vision for Space Exploration. This review activity has led the Committee in some interesting directions. It is beginning to see a program that will lead to future improvements and other changes. At this point, the program is being implemented in a very specific way against well-defined stretch requirements. The Committee was impressed with this NASA initiative. The Agency should be

documenting how well this is working and the lessons learned for the reference of others. There were also discussions with small business experts, and the Committee is pleased with the active small business program. In this session, the Committee also specifically focused on two topics: threats to NASA computers, software, and operations; and balancing advancing technology against proven and flown technology.

The Committee participated in several joint fact-finding sessions with the Space Operations Committee on July 18th: transition infrastructure (also with the Audit and Finance Committee); NASA/NIH Memorandum of Understanding (MOU) status and the results from the Workshop on Biomedical Implications of Lunar Outpost Architecture; Constellation operations planning; Constellation capability for near-Earth object (NEO), i.e., asteroid destinations; and the status of the Lunar Architecture Team's current work. In addition, the Committee participated in the MSFC project and facilities tour with the entire Council on July 17th.

The Exploration Committee had two recommendations for the Council to consider forwarding to the Administrator. Dr. Ford discussed the first—threats to NASA computers and operations. The Committee discussed the topic of operational security, stimulated by recent and forthcoming Department of Defense (DOD) studies that give rise to concern, particularly with respect to any systems directly or indirectly exposed to the internet. NASA missions are very high-value targets for terrorists. Recent studies have illuminated vulnerabilities in the DOD systems. One in particular applies to NASA. While the internet offers greatly improved capabilities for public engagement, it also may open new vulnerabilities. Dr. Ford discussed the levels of “cyber warfare.” The third level is a big one for NASA: vulnerability of operational systems and malicious manipulation of those systems. This is also where the current worry is in DOD. Dr. Ford cited some examples—social engineering, and “bots” or zombies (aimed at getting access to operational systems). The Committee recommends that the Exploration Systems Mission Directorate engage in a thorough review of its envisioned information technology (IT) architecture and cyber security plan. Emphasis should be on identification of potential internet-based vulnerabilities associated with operational systems. Training and doctrine should prepare astronauts and ground staff to operate in the presence of vulnerabilities and their potential exploitation by adversaries. All federal agency Chief Financial Officers (CFO's) are working hard at keeping unauthorized people out of networks, but this issue related to operational system does not appear to be addressed adequately.

Sen. Schmitt suggested that the recommendation be expanded to include the other three mission directorates at NASA. Gen. Lyles suggested that someone from the Air Force Scientific Advisory Board (SAB) study panel may be interested in briefing the Council on this issue. He also mentioned the possibility of establishing a relationship with the new Cyberspace Command in DOD. He also suggested that Dr. Griffin make this a topic for future joint meetings with the National Reconnaissance Office (NRO). NASA needs to take advantage of other government sources that have a global picture on this issue. Mr. McPherson noted that there are principles that have been found to be effective: determine areas of potential chaos and work backwards; take a risk management

approach; and accept that conventional solutions are not the most effective. Col. Collins commented that although Shuttle and Station email systems are encrypted, there are holes. She also noted that the Shuttle guidance and navigation systems are not on the same network. Dr. Ford observed that no system can be made totally invulnerable.

The Council agreed to go forward with the recommendation.

Dr. Fraser and Capt. Hauck addressed the second recommendation. The basic issue is that NASA should not be too conservative in selecting technology that is proven but may be behind the state of the art; NASA specifically should not start the design on the “edge of obsolescence.” Dr. Fraser showed examples of how electronic and computer technologies have advanced rapidly. The dilemma is how to select the best technology level for a new design that demands high reliability. Another issue is how the architecture is set up, e.g., allowing for flexibility for future technology advances and block upgrades. The Committee has suggested a wide range of initiatives for consideration by the Agency. NASA must be intimately aware of the speed, direction and advantages of advanced technology. It must have the internal processes and controls to turn knowledge into realistic, low risk, cost-effective solutions. The Committee recommendation is: Be sure the architecture will accommodate future upgrades and ensure that the program office has a team focusing on managing the acquisition of systems that take advantage of the newest usable technologies for their applications. Dr. Tapley noted that there are also mechanical systems technologies, e.g., micro-machines, which advance rapidly. Gen. Lyles added that one of the major challenges that need to be addressed is how to contract for and award the ability to add new technology downstream. Dr. Lyles noted that the ability to manage a system long term is an important component of the recommendation. Dr. Covert observed that the other aspect is reliability—it is the key that underlies all of this. For example, there has to be a cut-off point in the state of the art when developing new designs. The Council agreed that it should make a recommendation in this area, and Dr. Hauck agreed to work on the language of the final recommendation.

Ad-Hoc Biomedical Committee Report and Discussion

Dr. Longnecker reviewed the results of the recent Lunar Biomedical Workshop. The Committee presented a set of twelve draft recommendations that it compiled from its findings and insights from the workshop, as well as an additional recommendation on the NASA/NIH Memorandum of Understanding (MOU).

The guiding principle was to recognize that humans represent the overarching system of systems within the complexity of spaceflight, and the human has to be integrated fully into the process.

Eight of the recommendations dealt with biomedical research; four addressed health-related operations:

Recommendation 1

Define baseline human physiological response to one sixth Earth's gravity. Humans develop adaptive systems over several months in space. For most individuals, it is two to four months; however, bone and muscle continue to deteriorate over time in many individuals. Also, there may be some deterioration in human behavior and performance over long exposures to micro-gravity. Partial gravity may prevent deterioration in some biological systems. Failure to implement this recommendation would result in a serious detriment to the ability to inhabit the Moon safely and go on long trips to Mars. In response to a comment from Dr. Garriott, Dr. Longnecker clarified that the recommendation does not envision use of centrifuges. Dr. Tyson asked whether the problem of deterioration in human behavior in space is one of confined quarters rather than a consequence of micro-gravity. Dr. Longnecker and Sen. Schmitt noted that it could be either or both.

Recommendation 2

Adhere to a rigorous sequential data collection approach during lunar missions, combined with integrated analysis of existing archived data, to compensate for small sample size in flight personnel. Dr. Fisk observed that one of the long-standing issues among research doctors has been limited access to astronaut data. Dr. Longnecker noted that the next recommendation addresses this issue.

Recommendation 3

Integrate all relevant clinical, operational, and research data into a single encompassing archive of spaceflight and bioinformatics data. All information and informatics related to human performance and health during spaceflight (including pre- and post-flight) should be accessible to qualified physicians and investigators. Data appropriately related to individual privacy should be protected unless specifically released by the individual; however, data that relates to space flight should be more broadly available than has been the case in the past.

Recommendation 4

Supplement limited human data with data from non-human research models to certify crews for the Mars mission. The proposed Lunar Science Laboratory (in the next recommendation) must include research facilities to support non-human research models for appropriate time periods approximating the Mars Design Reference Mission. It is not prudent to send humans on missions of this duration without a reasonable attempt to fill this knowledge gap. Dr. Fisk noted that there may be an opportunity for a small investigation on the periodic robotic Mars missions. Mr. Garriott observed that with the exception of deep space radiation exposure, the International Space Station (ISS) would be an appropriate low Earth orbiting (LEO) platform for initial baseline research of this nature.

Recommendation 5

Establish a Lunar National Laboratory during the lunar outpost interval. It could be used both for developing autonomous health care approaches as well as in situ analysis of

samples. Identifying a national laboratory would facilitate work and be consistent with the same designation now give to the US components of the ISS.

Recommendation 6

Enhance both research and operations to maintain behavioral health of the crew during extended-duration missions of isolated and confined micro-societies over two to three year periods. There may be significant deterioration in human performance unless effort is expanded to ensure that teams work together as teams and all members contribute fully and usefully. Other historic terrestrial expeditions have gathered psychological data, but the data is dispersed. It would be useful to collect and integrate this data. Dr. Fraser noted that it would be interesting to see if there is any research work that has been done on previous long duration missions that included an examination of what works and what doesn't work. He suggested that if this has not been done it is advisable that someone at NASA consider doing it.

Recommendation 7

Crew should be involved as colleagues on the scientific teams undertaking biomedical research.

Recommendation 8

Enhance the involvement of Human Factors in design of vehicles, displays and controls, and habitats. This needs to be undertaken all the way through the process, beginning with preliminary designs.

Recommendation 9

Enhance the capabilities for autonomous health care during exploration missions. Rapid evacuation to Earth is not normally feasible from the Moon and definitely not for flights to Mars. Autonomous health care is the only option for crew health and mission success. Sen. Schmitt noted that the reduction in mass and size of various diagnostic tools is quite high, and the flexibility in the architecture to include such tools needs to be there. Additionally, Dr. Longnecker noted that more than just one trained crew member will be needed.

Recommendation 10

Use preflight preventive medicine strategies to reduce the risk of endogenous health problems. Preventive medicine programs should be implemented to the fullest to mitigate potential problems and to guide crew training and selection for arduous long duration missions.

Recommendation 11

Enhance personalized medicine for crew members during exploration missions. Personalized medicine consists of four components: predictive, preventive, personalized, and participatory. These principles must be a part of the process for crew health and safety.

Recommendation 12

Use the spacecraft as a simulator to maintain human performance during long duration voyages. Develop robust primary flight systems with inherent simulation capabilities that can be used to maintain crew skills and proficiency throughout the mission. Sen. Schmitt noted there is some data that indicates that eye-hand coordination deteriorates over long duration missions. Investigation of this area should be pursued.

Mr. McPherson noted that many of the recommendations involve “how to” or methodologies. He suggested that the recommendations be distilled down to what is really needed. Dr. Longnecker agreed that there would be greater impact with fewer recommendations, and the Ad-Hoc Committee tried to focus on what was missing. He observed that it might be helpful to have some overarching recommendations, with subgroups under them. Sen. Schmitt indicated that the cover letter could be used as a way to emphasize the key recommendations. The first recommendation is particularly important since it could take the architecture in a wholly new direction. Another important recommendation is access to data. Col. Collins felt that the recommendation should acknowledge that there is a current privacy issue in this area. With respect to behavioral issues, the ISS could be used as a platform for investigation. Dr. Longnecker agreed to take this under advisement. He noted that the Ad-Hoc Committee identified the studies that would be essential for the lunar sortie phase of the exploration vision, the lunar outpost phase, and the Mars mission. In a parallel process, the Ad-Hoc Committee should follow up on these recommendations as the architecture evolves. Dr. Fisk raised the issue of solar and cosmic ray risk for astronauts on lunar sorties. Dr. Longnecker indicated that this has been discussed. It is a cross-cutting issue. One of the recommendations from the Tempe Lunar Workshop involved prediction and forecasting. An integrated look at radiation protection and operational response would be very worthwhile.

The Committee had one additional recommendation for the Council to consider. Pending final review of the NIH approved draft, the Committee recommends approval of the MOU between NASA and the NIH regarding cooperation in space-related health research. The MOU is nearing completion and the agreement could provide additional opportunities for both agencies in selected areas.

The Council agreed to move forward on the recommendations as discussed.

Science Committee Report and Discussion

Dr. Edward David reported on the Science Committee. The Committee is pleased with recent progress made by the Science Mission Directorate (SMD) on the Research and Analysis (R&A) processes, increasing the suborbital and small mission flight rate, and early discussion of future planetary mission plans. However, across the science subcommittees, there is concern with access to space for medium-class payloads at prices comparable to the Delta II. SMD is studying this issue.

The Earth Science community produced its first National Research Council (NRC) Decadal Survey in January 2007. There is a mismatch between the budget proposed in

the Survey and SMD's FY08 out-year budget, although Congress has not yet acted on this budget. The Science Committee endorses the steps that NASA has already taken to implement the Decadal Survey, focusing on independent cost estimation of missions, discussion with potential international partners, and validation of mission concept science via community workshops. The Committee recommends that NASA present to the Science Committee at the February 2008 meeting the revised Earth Science plan and a comparison of the budget elements with the Survey recommendations, along with accompanying rationale.

Dr. David discussed the climate free-flyer option for recovery of the NPOESS sensors. The Committee focused on two of the options. It recommends that long-term monitoring of climate variables from space, eliminated from the NPOESS mission, be conducted from "climate free-flier" satellites, rather than through the NPOESS suite, for reasons of both reliability and cost. NASA as the space agency can assist NOAA with satellite development. With respect to the NPOESS sensor issue, Dr. Tapley indicated that NOAA is going in for the budget, but NASA needs to advise NOAA on the four baseline options. [The four options are identified in the January 8, 2007 document entitled NASA/NOAA White Paper titled, "Impacts of NPOESS Nunn-McCurdy Certification on Joint NASA-NOAA Climate Goals."] The Office of Science and Technology Policy (OSTP) has requested input from NASA to NOAA. NASA prefers options two and three. Dr. Fisk added that the Decadal Survey and NPOESS are coupled recommendations. The Decadal made the assumption that NOAA would fulfill its funding responsibility.

The Committee developed the following recommendation on the addition of the Earth-Moon L1 point to the lunar architecture options: The Lunar Exploration Architecture should recognize that satellites at the Earth-Moon L1 point supporting lunar operations would also represent excellent platforms for observing the Earth. Sen. Schmitt suggested that the write-up make reference to the Tempe conference and the fact that this issue was an item considered at that time.

NASA's SMD has instituted new minimum experience requirements for Principal Investigators (PI) on space missions. SMD is currently conducting a study of mission cost drivers in response to a past Council recommendation, and will report the results to the Science Committee in October. The community is concerned that the minimum experience requirements may impede the career paths of new investigators. Dr. Fisk noted that the standards will not be onerous, but since there is community concern, NASA should put forth the data and rationale on which the decision was based. SMD's major concern is cost and reliability. He added that this requirement is specific to major hardware programs. Dr. Mather confirmed that it does not apply to smaller investigations. It is currently being applied to the Small Explorer (SMEX) Announcement of Opportunity (AO). There are a variety of experiences that could qualify an investigator. Dr. Fisk noted that NASA has been very clear on what the qualifications are, and a PI can be "pre-certified." The intent is to preclude a team getting

together under an inexperienced PI and then finding out that it doesn't qualify. The Committee will gather more information before taking a position on the new policy.

The Council concurred with the three recommendations as discussed.

Space Operations Committee Report and Discussions

Dr. Paul Robinson introduced the Space Operations Committee report. Committee members have attended some of recent major management reviews. Dr. Robinson focused on two of these: Dr. Tom Jones attended the ET-124 Senior Management Review (May 14); and Dr. Pat Condon attended the STS-117 delta Flight Readiness Review (May 30-31). At the last Council meeting in April, the Committee addressed the repair approach to the External Tank (ET) and was impressed with how this issue was sorted out. Dr. Jones reported on the Senior Management Review. Hailstorm damage was assessed and repair was made using a variety of techniques. The types of repair were like the ones that had been done in the past. Dr. Jones described the repairs. He observed that NASA was faced with a big challenge, and he was impressed with how the Agency showed that the various repair techniques were the right way to go. There were a lot of questions, but everyone was satisfied with the decision to fly the repaired tank. Dr. Jones commented that NASA has the talent in place to deal with unforeseen problems over the next three years. Col. Collins added that the Shuttle Program does more testing now, and that is a good thing.

Dr. Condon commented on the delta Flight Readiness Review (FRR). A lot of time was spent reviewing and discussing the ET repair. There were a couple of impressive things: the depth and scope of analysis and testing on each of the issues; and the degree to which Mr. Gerstenmaier went to ensure that everyone had an opportunity to express his or her views. There was a tremendous amount of detail work, sometimes supplemented with an internal review. There was spirited discussion over some of the issues, and a lot of probing of the details. Great steps were taken to make sure that everyone was satisfied on the discussion before moving on to the next point. There was a unanimous vote for moving forward to the next step. A final review of a few things requiring additional work was held over to the "Launch minus 2" review. Dr. Condon felt that the review was extremely informative and he was very impressed with the process. In response to a question from Gen. Lyles, Col. Collins noted that the Engineering, Safety & Mission Assurance, and Health & Medical technical authorities are separate entities from the program, and that they are responsible for independently approving changes to and waivers of Independent Technical Authority (ITA)-owned requirements.

Dr. Robinson concluded with some Committee observations. A significant amount of analysis and testing supported the decision to repair ET-124 rather than switch tanks. The review processes went into great technical detail. Alternative options were encouraged and were discussed at length. The review processes show no sign of becoming less rigorous five flights after the Columbia accident. On STS-117, success benefited from having sufficient manpower reserves to deal with the magnitude of "touch-labor" to repair the ET. For Constellation, there is a focus on reducing touch-labor in operations. In that era, there may not be enough reserve workforce capability to

deal with unanticipated issues during the operational phase of that program. The question is: What approaches will be taken then, and are people thinking about this issue? Gen. Abrahamson asked if questions are rolling up from the working levels the way that they should. Col. Collins noted that the FRR is a senior management review, but pre-FRR work had already been done at lower levels. Dr. Jones said that he saw civil servants and contractors tied into the ET-124 management review from Michaud and KSC. Dr. Condon noted that when technical issues arose at the FRR it was not senior managers who briefed, but lower level technical people. Dr. Covert added that the real issue is whether the middle managers are confident enough to allow their people to raise questions and issues in open forum at the FRR's.

The Committee heard a briefing from the Exploration Systems Mission Directorate (ESMD) on Constellation-enabled missions to near-Earth objects (NEO). Dr. Jones noted that NASA has done a feasibility study, and decided that missions to NEOs can be done provided the right asteroid is in the right orbit. No suitable asteroid target has yet been discovered, but plenty will be over the next ten years of planned observation. A NEO mission would test Constellation technology, benefit planetary science, test in-situ resource utilization, serve as preparation for an Earth impact prevention measure in the future, and sustain the momentum of the Vision. It would be a nice operational bridge between lunar and Mars missions. Sen. Schmitt suggested increasing the emphasis on the benefit of impact prevention and how NASA would deal with an Earth-impacting object in the future as the science and resource arguments are not as well developed. Dr. Condon added that two systems will provide observation capabilities for following impact courses.

In the future, the Committee will focus on operations and the ISS, as well as take a look at the principal support capability of Commercial Orbital Transportation Services (COTS). The Committee will follow up on the Ares I vehicle structure dynamic testing. The question of sizing and capabilities of the future astronaut corps will be raised. It also is necessary to get a briefing to the full Council on risk assessment methodologies for Moon/Mars missions.

In response to a comment from Sen. Schmitt, Dr. Robinson indicated that NASA's attention on transition has been focused on the government side; there has not been enough focus on the contractor side, but the Committee has been assured that it is coming. The Committee will continue to follow this issue. He invited other members to attend NASA reviews if they had the opportunity.

Aeronautics Committee Report and Discussion

Mr. Neil Armstrong reviewed the areas of interest explored to date. The Committee has been trying to increase its understanding and knowledge of the Next Generation Air Transportation System (NGATS)/NextGen. At this meeting the Committee focused on NASA's support of NextGen. NASA's role in NextGen is to sustain foundational research to achieve NextGen transformation, deliver research results for FAA implementation, and support the Joint Planning and Development Office (JPDO) governance and activities. Dr. Sullivan showed how the foundational research would fit

in with the activities at FAA and how that research would progress through the FAA. In the airspace systems area, there are two focus areas: airspace and air portal. There are about fifteen projects in the air portal area. NASA already has developed an air transportation simulation program which has been handed off to FAA.

NextGen will increase the capacity of the entire system and will impact a lot of areas other than traffic control. Gen. Lyles discussed Aviation Safety. NASA is responsible for four research areas: integrated vehicle health management, integrated intelligent flight deck, aircraft aging and durability, and integrated resilient aircraft control. In response to a question from Sen. Schmitt, Gen. Lyles noted that the subject of crash survivability did not come up in the discussion, but he agreed that the Committee would take a look at that topic. In response to a comment from Gen. Abrahamson, Gen. Lyles indicated that there have been major changes in the types of wiring, and the Committee probably needs to address this area as well. Dr. Covert discussed the fundamental aeronautics research areas. The work has concrete output that will be of value to the nation's air transportation system. He showed the effects of NextGen design trades on noise, emissions, and performance (fuel burn). The goal is for the airplane to take off without significant noise effects outside the boundary of the airport. There need to be trades in all of the activities. NASA is concerned that the NextGen will constrain what can be done in the next regime unless there is understanding on how the factors affect each other.

Mr. Armstrong indicated that next steps for the Committee are to follow up on the Thermal Protection Systems (TPS) Working Group being held by NASA and the Air Force, and review the National Aeronautics R&D Plan and related Infrastructure Plan that is due out by the end of September/beginning of October. The Committee also has a workforce issue in which it is interested, and invited the Human Capital Committee to take a look at this with them. TPS is one of the focus areas for future Committee meetings, and there may be an opportunity for a joint Committee review.

Gen. Lyles noted that the Committee benefited from the objective views of Dr. Juan Alonso, a former Council member. Dr. Alonso noted that the leadership depth in the Aeronautics Research Mission Directorate is far better than he expected, and the relationship and coordination of stakeholders is also much better.

Human Capital Committee Report and Discussion

Dr. Gerald Kulcinski presented the Human Capital Committee observations. The Committee received presentations on the Small Business Improvement Plan from Mr. Glenn Delgado, and on the Strategic Communications Implementation Plan from Ms. Kristen Erickson. The Committee also received a hands-on demonstration of "Workforce Data Cubes" from Mr. Craig Conlin.

Council member Dr. Garriott briefed the Committee on the Astronaut Scholarship Foundation as an example of non-governmental scholarship funding. In addition, the Committee discussed the upcoming national meeting of organizations and individuals to bring top students into science, technology, engineering, and mathematics (STEM) fields.

The Committee opened its briefing with a discussion of the Small Business Programs (SBP). NASA has not satisfied the Small Business Administration (SBA) goals previously negotiated for participation in NASA business. However, the present Assistant Administrator for SBP, Mr. Delgado, is starting to turn that around, and he has restructured his office to rectify the deficiencies. With respect to the poor “grades,” Dr. Kulcinski reported that the Committee was told that there had been number of disagreements between Mr. Delgado’s office and the relevant Congressional Subcommittee over interpretation of the statistics. The small business offices at the Centers are almost uniformly understaffed and they may need to find a better reporting chain of command to avoid conflicts of interest. As of June 30, 2007, about 15.37% of NASA’s procurement dollars in FY 2007 went to small business. The House statistics only include money that goes directly to small business, not dollars that go to small business through large contractors. There are some challenges to the NASA’s Small Business Office that the Committee observed: the shift from Shuttle to Exploration, which may cause a drop on dollars going to small business; the definition of small business, which has not been adjusted for inflation; new recertification laws; low staffing levels for small business programs at Centers; the need for a technical advisor at Headquarters; and resources to run the Mentor-Protégé Program. Mr. Maddox commented that over the years, small businesses in the US have supported NASA and have helped NASA achieve its successes. However, in the last five to six years, small businesses have not been doing as much NASA business. It would be very unfortunate to lose that group. Many small businesses are finding it difficult to do business with NASA because a lot of contracts are being “bundled” and are going to large contractors. Dr. Kulcinski noted that there is a federal mandatory goal of 23% of procurement dollars to small business, and NASA has not met that goal under current definitions of eligible contract designation. In response to a comment, he noted that Small Business Innovative Research (SBIR) contracts do not fall under this Office. The Committee will delve into this subject further at future meetings.

Sen. Schmitt observed that when the Council “digs” into the non-mission units of NASA it finds a variety of problems, e.g., staffing and high turnover. It does not appear that these smaller NASA organizational support units are being taken care of, and it appears to be an endemic problem. He suggested that the Committee look at the potential of an organizational change that gives a coherent home, with Associate Administrator responsibility, for these organizational units.

Dr. Kulcinski noted that there has been a lot of progress in developing the Strategic Communications Network. A great deal of insight into the public’s perception of NASA has been gained, and a plan to go forward has been developed. The Committee was impressed with the progress; however, the Office of Communications Planning needs support at the highest NASA management level in order to implement its plan. Dr. Kulcinski briefly discussed a major survey that was recently conducted and showed some findings on relevance. The survey indicates that most of the public doesn’t really know what NASA does. Dr. Tyson commented that there is also a mismatch in the public perception of how much money NASA gets and what the budget really is. Dr. Kulcinski

suggested that by the next meeting, it may be appropriate to have a Council briefing on this topic. Ms. DiGennaro added that the Committee felt it was premature at this meeting to expect a leap from the marketing study to a plan for public affairs, but the organization is moving in the right direction. It was noted that there will be a kick-off of the 50th anniversary celebration of NASA in September 2007, concluding in October 2008.

Mr. Conlin gave the Committee a demonstration of the Workforce Data Cubes [A way in which NASA keeps track of its civil service personnel through a set of multi-dimensional cubes. These cubes contain information extracted from various operational systems, especially the personnel/payroll system and labor distribution system. Committee members had an opportunity to actually work hands-on with the system. Members were impressed by the level of sophistication and ease of access to the NASA workforce database. The Cubes can be accessed, without password on the Website: <http://hgpowerplay.hq.nasa.gov/workforce/>. The human resources component at each Center should be better able to make more informed decisions on the past, present, and future workforce. As an example, Dr. Kulcinski showed a chart, extracted from the Cubes, which compared the numbers of personnel in each age group in 1994 and 2007.

The Committee has been strong proponent of a way to get gifted and talented students who are interested in STEM into NASA. For the past 20 years, the Astronaut Scholarship Foundation, like many other organized entities, has 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 Committee recommends that NASA support foundations that can assist in bringing these highly qualified students into the pool of potential NASA employees. One possibility to consider would be for NASA to match the current efforts by qualified entities in order to help satisfy future NASA workforce needs.

NASA plans to host a meeting regarding coordinating and partnering with individuals and organizations that have extensive experience with K-12 programs for top students who have achieved excellence in STEM areas. This meeting is to be held in conjunction with the STS-120 launch in October 2007. The Committee is concerned that while planning the details of this meeting, the Education Office may blur the focus on STEM by excessively broadening the topic into other subjects. The Committee recommends that the thrust of this meeting focus remain on how NASA can recruit and retain high achieving students in STEM. Dr. Fisk noted that NASA's educational program with universities is not through the Education Office—it is through the Science Mission Directorate. If recruitment into NASA is a concern, the Committee may want to probe the educational activities in this and other parts of NASA, which may turn out to be even more important avenues to recruit people into the space program. Ms. DiGennaro noted that the high achieving high school students in STEM are already working at the university level. Career choices are being made at that level and pursued in relationships with sponsoring organizations. Therefore, NASA needs more focus in this area. Dr. Tyson noted that this recommendation clearly recognizes that what NASA wants is the

best students brought into the community of STEM, and he applauded the recommendation.

The Committee continued on the theme of how NASA would meet its future engineering needs. One way to address NASA's needs for high achieving engineers would be to hold a major Forum to consider "What Next Beyond the Gathering Storm?" The Committee recommends that a Council-facilitated, NASA sponsored Forum to discuss future engineering needs for NASA and corporate suppliers should be organized and implemented in 2008. One possible scenario would be a Forum in Spring 2008, in Washington DC, with approximately 150 attendees together with the media. It could include a keynote address by one of the authors of "Beyond the Gathering Storm" and comments by the NASA Administrator, Congressional presence and comments, panels representing NASA, Academia, and corporations, extensive public distribution of proceedings, and recommendations for action. Dr. Fisk noted that this would be an opportunity to correct the exclusion of NASA from the first "Gathering Storm" report. The Council agreed to consider forwarding the recommendation to get the support of the Administrator. *(Note from the Executive Director: After further consideration it was decided to delay forwarding of these recommendations to NASA until after additional fact finding and Council deliberation at an upcoming meeting.)*

Audit and Finance Committee Report and Discussion

Mr. Robert Hanisee presented the report on the Audit and Finance Committee activities. He reviewed old business concerning the status of material weaknesses cited in the auditor's report. As of June 30, the unreconciled Treasury balance was down to \$3.5 million, and NASA received a "green" (passing grade) from Treasury on cash balances. Environmental Liability tracking is ready for use, but there is still no Independent Verification and Validation (IV&V) on the software from the vendor. As of today, all but two of the update problems from the SAP version have been resolved, and the outstanding items are not show stoppers. Subsequent testing continues and more work remains. SAP is a very complex and unforgiving system, and it is very difficult to correct entries.

There are encouraging results on Property and Plant Equipment (PP&E). The Federal Accounting Standards Advisory Board (FASAB) accepted NASA's changed accounting interpretation permitting expensing of Research and Development (R&D) theme assets. Consequently, NASA was allowed to write off \$12.4 billion in assets and is planning another adjustment at year end 2007. The PP&E on the books is about \$20.6 billion; about \$18 billion is associated with ISS and Shuttle, and a majority of this is contractor held. NASA needs to get contractors to report purchases and held property on a timely and accountable basis, particularly for current and future development programs. Under the transition plan, NASA should consider treatment of terminating programs and equipment not needed for future programs as "discontinued operations." The future plan is to treat new programs under Constellation (Ares, Orion, and COTS) as R&D, therefore to be expensed.

Mr. McPherson addressed the Committee observations on financial staff personnel issues. Staffing is a serious concern. In April, the NASA Headquarters office was down 10 FTEs; it is now down 21 FTEs, and effective productivity is insufficient to get the right work done. Mr. Hanisee noted that the problem is exacerbated by the shortage of accountants in the DC area. On the other hand, Centers are not experiencing staffing shortages or major performance problems. The understaffing problem also is being exacerbated by lack of skilled accountants in major metro areas, including in DC. One of the consequences of the Sarbanes-Oxley Act is that the accounting bill of many large companies has doubled, especially in cities. Based on this input, Sen. Schmitt noted that the Administrator would favorably consider a recommendation concerning relocation of the financial offices. Mr. Hanisee agreed that the Committee would draft such a recommendation for consideration.

The reformulating of the Grants process is currently underway and a task force is in place. NASA's portfolio of open grants is about 4400, representing about \$850 million. NASA does not manage grants on a timely basis. The new system, which should improve the process, will implement grant-by-grant tracking. Implementation is planned for FY08. Dr. Fisk noted that there is an effort underway in the SMD to look at the grants process in terms of its efficiency. A lot of the problems began when the Headquarters grants processing function was transferred to a Center. Another problem is unobligated balances.

The NASA Shared Services Center (NSSC) is currently processing four financial functions satisfactorily. A Task Force that includes participants from the Office of the Chief Financial Officer (OCFO), Centers, and NSSC is evaluating additional financial functions for transfer to the NSSC.

Field work is underway on the year-end audit progress report. The outside auditor appears to be more motivated to do an actual audit than in recent years due to NASA's improved overall accounting posture. Future Committee actions include: a fact finding meeting with Mr. Bobby German on the Integrated Enterprise Management Program (IEMP); a fact finding meeting on unobligated balances; a meeting with the Deputy Administrator; and joint meetings to monitor costs and progress on new programs. Sen. Schmitt observed that the Committee has stimulated a great deal of NASA action on the audit and financial issues.

The Council agreed to move forward with the recommendations as discussed. *(Note from the Executive Director: After further consideration it was decided to delay forwarding of these recommendations to NASA until after additional fact finding and Council deliberation at an upcoming meeting.)*

Before adjourning at 3:30 pm, Sen. Schmitt, on behalf of the Council, once again thanked MSFC staff for all of their efforts associated with hosting the meeting.

The next public meeting will be at Langley Research Center on October 18, 2007.

Draft Agenda – Subject to Change

NASA Advisory Council Meeting
Marshall Space Flight Center
Huntsville, Alabama
July 19, 2007

Meeting Location

Marshall Space Flight Center
Huntsville, AL 35812-0001
Building 4200, Room 900

8:00 a.m.	Exploration Committee Report and Discussion	Gen. James
Abrahamson		
8:45 a.m.	Ad-Hoc Biomedical Committee Report and Discussion	Dr. David
Longnecker		
9:30 a.m.	Science Committee Report and Discussion	Dr. Edward
David		
10:15 a.m.	Break	
10:30 a.m.	Aeronautics Committee Report and Discussion	Mr. Neil
Armstrong		
11:15 a.m.	Human Capital Committee Report and Discussion	Dr. Gerald
Kulcinski		
12:00 p.m.	Lunch	
1:30 p.m.	Space Operations Committee Report and Discussion	Dr. C.
Paul Robinson		
2:15 p.m.	Audit and Finance Committee Report and Discussion	Mr.
Robert Hanisee		
3:00 p.m.	Council Discussion and Agreement on Recommendations	
4:00 p.m.	Adjournment	

**NASA Advisory Council Members
July 19, 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.
Exploration Committee	<ul style="list-style-type: none"> • <i>Chair: Lieutenant General James A. Abrahamson, USAF (Ret.)</i> • Dr. Kenneth Ford, Director, Florida Institute for Human & Machine Cognition • Dr. Donald Fraser, DRS Technologies • Capt. Rick Hauck, USN (Ret.), Astronaut (Ret.) • Dr. John M. Logsdon, Director, Space Policy Institute, George Washington University
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 • 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 Jolliff, Research Associate Professor, Department of Earth and Planetary Sciences, Washington University • Dr. Byron Tapley, Director, Center for Space Research, Professor, Aerospace Engineering, University of Texas, Austin • 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>Chair: Dr. C. Paul Robinson, Former President and Director, Sandia National Labs (Ret.)</i> • Col. Eileen Collins, Astronaut (ret.) • Dr. Pat Condon, Chairman of the Board, Air Force Association (ret.) • Dr. Thomas Jones, Astronaut (ret.) • Dr. David Longnecker, Institute of Medicine, National Research Council • Adm. Benjamin Montoya, DEO, SmartSystems Technologies
<i>Ex-Officio</i>	<ul style="list-style-type: none"> • Dr. Lennard A. Fisk, Chair, Space Studies Board, National Research Council
Unable to Attend	<ul style="list-style-type: none"> • Dr. Raymond S. Colladay, Chair, Aeronautics and Space Engineering Board, National Research Council

	<ul style="list-style-type: none">• Dr. Wanda M. Austin, Senior Vice President, National Systems Group, The Aerospace Corporation• Ms. Kay Coles James, President, The Gloucester Institute• Dr. Stephen I. Katz, M.D., Ph.D., Director, National Institute of Arthritis and Musculoskeletal and Skin Diseases• Hon. Michael Montelongo, Senior VP, Strategic Marketing, Sodexo, Inc.• Dr. Mark S. Robinson, Research Associate Professor, Department of Geological Sciences, Arizona State University• Mr. Howard J. Stanislawski, Partner, Sidley Austin, LLP
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**NASA ADVISORY COUNCIL
Marshall Space Flight Center
Huntsville, Alabama
July 19, 2007**

ATTENDEES

<i>Council Members</i>	<i>NASA Attendees</i>
Abrahamson, James A.	Cooke, Doug HQ
Armstrong, Neil	Dunwoody, Cathy HQ
Blackerby, Christopher, <i>Executive Director</i>	Horack, John MSFC
Collins, Eileen	King, Marla HQ
Condon, Pat	Mather, John GSFC
Covert, Eugene E.	Ostrach, Louis HQ
David, Edward	Parham, Jane HQ
DiGennaro, Joann	Rugg, Karen HQ
Fisk, Lennard A.	Six, Frank MSFC
Ford, Kenneth	Williams, Greg HQ
Fraser, Donald	
Garriott, Owen	
Hanisee, Robert M.	
Hauck, Rick	
Jolliff, Bradley L.	
Jones, Thomas	
Kulcinski, Gerald L.	
Logsdon, John M.	
Longnecker, David	
Lyles, Lester L.	
Maddox, Wendell	
McPherson, Edward R.	
Milgram, R. James	
Montoya, Benjamin	
Robinson, C. Paul	
Schmitt, Harrison H.	
Sullivan, John	
Tapley, Byron	
Tyson, Neil DeGrasse	

Other Attendees:

Koshut, Tom
O'Brien, Sue
Reed, Cheryl

University of Alabama, Huntsville
University of Alabama, Huntsville
Johns Hopkins University/Applied Physics Lab

Simmons, David
Stanley, Hugh
Szenasi, Scott

University of Alabama, Huntsville
Schafer Corp.
Schafer Corp.

NASA ADVISORY COUNCIL
Marshall Space Flight Center
Huntsville, AL
July 19, 2007

LIST OF PRESENTATION MATERIAL¹

- 1) An Attractive Target [Ford]
- 2) Exploration Committee Summary Report to the NAC – 19 July 2007 [Abrahamson]
- 3) NAC Lunar Biomedical Workshop [Longnecker]
- 4) Science Committee Report to the NAC [David]
- 5) NAC Space Operations Committee [Robinson]
- 6) Aeronautics Committee Report to the NAC [Armstrong]
- 7) Observations from the Human Capital Committee [Kulcinski]
- 8) Report of Audit & Finance Committee [Hanisee]

Other material distributed at the meeting:

- 1) NASA Advisory Council February 2007 Meeting Minutes
- 2) NASA Response to NASA Advisory Council Recommendations NAC-07-1
- 3) Bio – Dr. Kenneth Ford

¹ Presentation and other material distributed at the meeting are on file at NASA Headquarters, OER/ACMD, 300 E Street SW, Washington, DC 20546. Material also available online at <http://www.hq.nasa.gov/office/oer/nac/>.