

**NASA ADVISORY COUNCIL (NAC)  
Exploration Committee**

**DRAFT MINUTES: Public Session**

Meeting Date: January, 11, 2011

AGENDA:

- Exploration Program Status
- Human Exploration Framework Team Phase 2
- Status of Commercial Crew Initiative
- Ad-Hoc Task Force on Planetary Defense

ATTENDING:

Exploration Committee: Richard Kohrs (Chair), Nancy Ann Budden, Bo Bejmuk, Joe Cuzzupoli, Les Lyles, John Logsdon, David Longnecker, Carolyn Griner, Richard Malow, Bette Siegel (Acting Executive Secretary), Shawanda Robinson (Administrative Officer), Leslie Baerwald (Assistant)

Members Absent: None

NASA: See detailed list, p. 7

Public: See detailed list, p. 7

**OUTCOMES**

FINDINGS:

- The NAC Exploration Committee applauds the Human Exploration Framework Team (HEFT) report. The HEFT approach has evolved over the last months with a strategy able to support multiple mission options that could be selected in future decisions, based on budget availability. The Committee agrees with HEFT's conclusion that a capabilities-based strategy for future exploration can be an excellent basis for a sustainable, realistic, and affordable space exploration program.
- The Committee is concerned about how NASA will handle the management aspects of this strategy; e.g. acquisition strategy, contract incentives, internal organization within NASA. The Committee also encourages NASA to continue its dialogue with external organizations to seek best practices and benchmarks for successful affordability initiatives. (This includes initiatives currently underway in the Air Force, and the initiatives defined in the Defense Science Board's 'Adaptability Study.')

Recommendation to NAC:

RATIONALE:

- The previous administrator had a NAC that operated as one unit, with all members attending the Advisory Council meeting. The current administrator has chosen to organize the NAC into nine NAC committees that operate somewhat independently and are represented at the NAC by only the committee chairs. Each committee has an average of eight members and all members have exceptional experience. Some of the committees have met jointly to share their experience with each other and have brought forward joint observations, findings, and recommendations. But it would seem beneficial to NASA to have all committees come together at least once a year to interact with each other and with the NASA leadership.

RECOMMENDATION:

- The NAC recommends to the Administrator that its nine committees meet together at least once a year with an agenda that cuts across the interests of all committees, and with an opportunity to hear from the Administrator and share their perspectives on issues related to NASA's activities.

**DISCUSSION**

**Exploration Program Status**

Mr. Doug Cooke presented a status report on the Exploration Program. He started with the 2010 Authorization Act and ESMD response. NASA is operating under a Continuing Resolution (CR) until March 4, 2011. He then highlighted some of ESMD's accomplishments since the last meeting of the Committee on September 21, 2010. He concluded by presenting the current options for the Space Launch System (SLS) and the Multi-purpose Crew Vehicle (MPCV) and the near term ESMD activities.

Discussion Points

- The Exploration Committee does not fully understand the multiple implications of the new commercial crew transportation requirements for NASA. The change from a human rating plan to a certification is primarily a change in how NASA treats the issue from a process standpoint. NASA's responsibility will be to certify that requirements are met to fly NASA and partner crews.
- J2X testing is proceeding at Stennis Space Center.
- Contractors submitting proposals for Broad Agency Announcements (BAA) must follow specific guidelines. Preliminary inputs are being reviewed and ESMD will report the results in the May 2011 timeframe.
- The MPCV launches on the SLS, and is capable of handling up to 6 passengers (a requirement initially created for the Mars mission). There have been trade-offs on what is required for the crew vehicle. Currently, Orion Block 2 is the best understanding of what is required beyond LEO. Once completed studies are documented, a determination of what vehicle to develop will be made.
- NASA is drafting a response to the press reports that it has been forced to waste half a billion dollars continuing the Ares project. Budget constraints have dictated that NASA scale back on some activities; however, focus continues to be on funding work that meets multiple needs and is most applicable to the flexible path.

## **Exploration Program Status**

### Discussion Points (cont'd)

- ESMD is doing everything it can not to waste money. Its teams are motivated to make progress, although NASA would do some things differently if it were not operating under the constraints of the CR.

## **Human Exploration Framework Team Phase 2**

Dr. John Olson presented the results of Phase 2 of the HEFT Study. This was the first public briefing of this report. Phase 1 of the study was from April to August 2010 and Phase 2 was from September to December 2010. He started with key guiding principles of human exploration planning. The study was put in the context of previous studies and the 2010 Authorization Act. The Flexible Path as defined by the Augustine Committee was discussed. The HEFT developed a "Capability-Driven Framework" rather than one based on a specific destination and schedule. It identified technologies that are required to build the architecture. The role and need for partnerships with other agencies, international partners, and industry was highlighted. The HEFT affordability study was also discussed. The Capability Framework shows that bold, smart, affordable and sustainable opportunities exist and that NASA must begin to implement them.

### Discussion Points

- General Lyles commented that much of HEFT is similar to the work previously done by the NASA Policy Analysis and Evaluation office (PA&E) and wanted to know if ESMD is going to incorporate PA&E capabilities into HEFT.
- Dr. Olson replied that HEFT is a cross-agency initiative that is managed out of ESMD and that the PA & E approach is an integral part. HEFT's richness is partly because it brought the centers and NASA Headquarters together. By working efficiently, tools are now in place to run an entire cost analysis in two weeks or less, greatly reducing the time it took previously.
- A question was raised about the design of the Heavy Launch Vehicle (HLV) in the HEFT study and if it was the same as what Mr. Cooke depicted as the current baseline design.
- The HLV design has remained primarily the same with the exception of minor changes; however, there will be refinements to operation costs and affordability measures.
- Using the NASA/Air Force Cost Model (NAFCOM), there has been some dispersion evaluation done, but ESMD is still working with program planning and implementation teams. This is a very complex thing to do and ESMD is still in the process of trying to understand the cost model. It will not be easy to determine what the planned effort will really cost. Non-traditional cost models will be considered.
- In response to the question, "What is HEO?" - High Earth Orbit (HEO), is above the Van Allen radiation belt, an orbit near Earth escape, where heavy loads could be transported without the crew, and then dropped at a certain point (the Earth-Moon Libration Point 1), allowing for better reuse of vehicles. At this time, staging HEO and beyond missions from Lower Earth Orbit (LEO) is not feasible.
- Mr. Kohrs asked if you can go to Mars without going to a Near Earth Asteroid (NEA) and the answer is yes.
- General Lyles wants to make sure that we are talking to other agencies and in particular Department of Defense (DoD), especially at the GS-15 level to the level of colonel. The response was that NASA is working with the Critical Technology working group, which is a sub group of the Space Industrial Base Council, and with the Joint Space Team. These are only two examples. There are many more committees that NASA is involved with.

## **Human Exploration Framework Team Phase 2**

### Discussion Points (cont'd)

- Mr. Bejmuk stated: "If you do something with internationals you cannot easily cancel contracts because they've invested their money. You can't do that when you have these international treaties. You help them be sustainable and funded in their country and do the same for NASA."
- NASA agreed. It considers the international commitments the first priority for funding. This is a key part to this approach. They are called beneficial alliances.
- The HEFT began looking at the president's budget and at the Authorization Act. Then it incorporated planning for a full year CR. The team set two different sets of marks for two different scenarios. As NASA gets new direction, HEFT will update its study. It is generic on purpose.
- Mr. Bejmuk asked, in a cautionary sense, "Are you aware of what pay-as-you-go did for Constellation?"
- Dr. Olson replied, "We can show what's needed and how to get there but if there are other higher priorities, we can do that too."
- NASA has been making progress on the technology budget. The focus of technologies needed has been based on the HEFT study.
- General Lyles stated that, "This is excellent teamwork, and you should be congratulated." He then asked, "How are you going to manage to this now? In terms of acquisition strategy, how you do business here?" This will be something for discussion at our next meeting.
- Dr. Budden applauds this study as well. She stated that it is refreshing to see a positive trend in the discussions compared to what the Committee heard at its last meeting, when Mr. Cooke talked about not locking into any mission for now. We see supporting technology that could be used on any mission, enabling us to make progress regardless of the mission. Chart 27 is exactly what NASA needs for a blueprint on what are common technologies required for the different missions.
- General Lyles stated that there is a national security element of where we are going. How are NASA and HEFT factoring in cyber security?
- Dr. Olson stated that IT security is in his division within ESMD. NASA has a comprehensive plan and is integrating across the teams. ESMD is working with the operations network. That is the integrated picture. It is one that needs and will continue to need a lot of work.
- Mr. Bejmuk asked when will NASA make a decision on what type of launch vehicle NASA will build?
- Mr. Cooke responded, "All studies that we talked about lead to the information we need to make decisions. It's probable that a decision will be made in about 6 months."

### **Status of Commercial Crew Initiative**

Mr. Phil McAlister briefed the Committee on the status of the Commercial Orbital Transportation System (COTS) and Commercial Crew effort. First he gave the status of SpaceX and Orbital under COTS. Five partners are part of Commercial Crew Development (CCDev). The CCDev 2 Announcement for Proposals was released to industry on October 25, 2010 and the proposals were due December 13, 2010. They are currently under review. He concluded with an update on Commercial Crew.

### Discussion Points

- General Lyles asked "Will NASA see raw or sanitized test data for SpaceX?"

## **Status of Commercial Crew Initiative**

### Discussion Points (cont'd)

- Mr. McAlister responded that under the COTS agreement, NASA does not have access to the raw test data. NASA's obligation is to ensure that milestones are met. NASA will have a brief post flight review followed by a more robust review of results later.
- In the past, NASA had experiences with anomalies. Is that something NASA looks back at to see if the anomaly was consequential? Is there risk in not looking at the raw data to make sure there's nothing to cause NASA concern? Do you have the rights to the raw data?
- NASA has no legal authority to see the raw data. This is key for COTS cost-effectiveness. SpaceX answered all NASA questions and determined the recent Falcon 9 launch was a safe flight. It was a good process and similar to the way NASA manages unmanned launches. SpaceX has now proposed to merge demonstration flight 2 and 3. ESMD will work with the Space Operations Mission Directorate to make the determination if NASA will approve it or not.
- SpaceX uses hazardous fluids and Hazardous Materials Suits. Mr. Kohrs thinks the use of hazardous fluids should be prohibited, as this would eliminate the need for Hazardous Materials Suits thus saving money.
- NASA considered the use of methane fuel in future launch vehicles, but because of the technology gap backed off.
- NASA envisions the need for CCDev 3 or 4. Once round 2 is completed, and with Congressional approval it is possible to get started on a big commercial crew program. NASA would like to narrow the gap between the shuttle program ending and CCDev in order to minimize reliance on foreign systems. NASA would like to get assured crew access and domestic capability in order to rotate our crew. This is incentive for Congressional approval.
- NASA has not made a final determination regarding the acquisition strategy for commercial crew beyond CCDev 2.
- NASA does not know yet if three crew flights a year is sufficient to meet International Space Station (ISS) requirements, or whether commercial companies can make a business case for it. Every company will have a different view on this issue. Some companies are conservative when it comes to the number of flights. It will depend on the cost of the vehicle. How much money the commercial companies want to invest is determined by each company. NASA wants to have a number of interactions with industry to see if they can close their business case. We did the same thing with COTS for cargo and modified what was in the Commercial Resupply Services (CRS) contract based on industry feedback.
- It is not clear how NASA will go about flying people from other countries and what the certification process will be. It has not yet had that conversation with the International Partners.
- NASA should not be presenting commercial crew requirements without receiving comments from other countries. NASA and its partners haven't converged on a solution yet. NASA will need a regulatory regime for the entire mission.
- NASA is releasing a Request for Proposal (RFP) or an Announcement for Proposal (AFP) for commercial crew services in late summer 2011 and will be choosing 4-6 companies for the first round of efforts. RFP is for a contract and AFP is for Space Act Agreements.
- CCDev 2 will be more costly than CCDev 1.
- General Lyles asked, "When do NASA and the International Partners decide to announce the extension of ISS to 2025?"
- NASA does not yet have agreement from their International Partners to 2025.

## **Status of Commercial Crew Initiative**

### Discussion Points (cont'd)

- US leadership in space will be significantly affected if we do not have human access to space. Commercial Crew, if successful, will end that gap and allow NASA to concentrate on going beyond lower earth orbit.
- Bo asked, "Can you give an example where the shuttle doesn't meet commercial crew human requirements?" Mr. Kohrs responded, "loss of crew and loss of mission."

## **Final Report of the Task Force on Planetary Defense**

Dr. Tom Jones briefed the Committee on the *Final Report of the Ad-Hoc Task Force on Planetary Defense*. His co-chair, Mr. Rusty Schweickart was available via conference call. The Task Force started in April 2010 and finalized its report and recommendation by the October 2010 meeting of the NAC. Dr. Jones summarized what the Task Force discussed and its final recommendations. The NAC has accepted all of these recommendations. The Task Force believes that NASA should take a leading role in planetary defense against asteroids, with an associated increase in the NASA budget.

### Discussion Points

- There was discussion about this report. The Committee learned that the recommendations had already been accepted by the full NAC and that this presentation was for information purposes only. Therefore there were no findings/observations or recommendations concerning this briefing. The Committee was supportive of the report.

### **FUTURE BRIEFING SUGGESTIONS:**

- Precursors – robotics, analogs
- ESMD participation in science missions, with joint meeting with NAC Science Committee
- Skunk works at NASA centers – Johnson Space Center

See next page for Attendees other than Exploration Committee Members.

*Presentation charts and materials are posted on the NAC Exploration Committee web site:*  
<http://www.nasa.gov/exploration/about/explorationcommittee.html>

## NASA and Public Attendees:

|            |            |                       |                                                                                      |
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