



**NASA Advisory Council (NAC)  
Aeronautics Committee**

**January 20-21, 2011  
NASA Headquarters  
ARMD Conference Room**

**Meeting Minutes**

**Participants:**

<b>First</b>	<b>Last</b>	<b>Organization</b>	<b>Role</b>
Marion	Blakey	AIA	Chair
Ilan	Kroo	Stanford U.	Member
Preston	Henne	Gulfstream	Member
Mark	Anderson	Boeing	Member
Mark	Lewis	UMD	Member
Henry	McDonald	Univ. of Tenn.	Member
John	Hansman	MIT	Member
Paul	Adams	Pratt & Whitney	Member (via phone)
Jaiwon	Shin	NASA	ARMD AA
Susan	Minor	NASA	Executive Sec.
Tom	Irvine	NASA	ARMD DAA
Ed	Waggoner	NASA	Presenter
Jay	Dryer	NASA	Presenter
Robert	Pearce	NASA	Presenter
Tony	Strazisar	NASA	Presenter
Lourdes	Maurice	FAA	Presenter
Brian	Cook	EPA	Presenter
Katherine	Sibold	EPA	Presenter
Steven	Chesley	NASA	Presenter
Pat	Stollicker	NASA	Observer
Virginia	Neale	Cal Tech	Observer
Brian	Elson	AIA	Observer
Pamela	Franklin	EPA	Observer
Bill	Wessel	NASA	Observer

Allen	Li	House Space, Science, & Technology staffer	Observer
Anne	Conner	AIA	Observer
John	Cavolowsky	NASA	Observer
Diane	Brown	NASA	Observer
Jean	Wolfe	NASA	Observer
Davis	Hackenberg	NASA	Observer
Douglas	Rohn	NASA	Observer
Lon	Forehand	NASA	Observer
Lee	Olson	FAA/NASA	Observer
Jon	Montgomery	NASA	Observer
Akbar	Sultan	NASA	Observer
Rob	Anderson	NASA	Observer

**January 20th:**

*The meeting was called to order at 9 a.m.*

**Aeronautics Budget Overview** (Dr. Jaiwon Shin, NASA)

Dr. Jaiwon Shin opened by saying that NASA was under a continuing resolution until March 4<sup>th</sup> and that a full-year continuing resolution was still an option. He affirmed that NASA could not start any new activities until an appropriations bill is approved. This affects ARMD's ability to pursue certain activities such as verification and validation (V&V) work in Aviation Safety and a new project called Innovative Concepts in Aviation (ICA) whose purpose is to stimulate external ideas through non-conventional procurement vehicles. Dr. Shin indicated that, while there was some concern if a full year CR at a reduced funding level gets implemented, there are no major issues from the Administration and Congress concerning the current direction of the aeronautics programs.

Dr. Harry McDonald inquired about planning for the new activities including V&V and Unmanned Aircraft Systems (UAS). Dr. Shin said that planning for these activities has been largely completed, and both are ready to proceed. Dr. McDonald asked what ARMD's approach would be if these activities are not funded as requested. Dr. Shin replied that V&V is already a part of the Aviation Safety Program, so NASA has already been executing work in this area. Without the requested funding, work would have to be scaled down from where NASA wants to go. He felt that a bigger problem existed for UAS since other than planning work; NASA has not been conducting work in this area. During fiscal years 2009 and 2010, NASA ARMD used stimulus money to invest in UAS planning and concept development. Without additional funding, performing additional

work is problematic. In response to a query from Ms. Marion Blakey, Dr. Shin stated that skills and staffing needs were estimated as part of the planning process but that neither V&V nor UAS work activities are fully staffed. Dr. Shin also indicated that Aeronautics is doing contingency planning in the event of a full-year continuing resolution. Ms. Blakey inquired about NASA's ability to reprogram funds. Diane Brown responded that appropriations are allotted at the program level, and any reprogramming amount above \$500k requires an operating plan change.

Dr. Shin also addressed the Fiscal Year 2012 budget, but indicated that since the President's Budget had not yet been released no details could be presented. In response to a query from Dr. Mark Lewis, he said that although Congress and OMB are generally supportive of Aeronautics at NASA it is unlikely to avoid a government-wide reduction. Mr. Preston Henne stated that given the critical nature of aeronautics research, he would hope that is not the case. Dr. Lewis said that of the three tiers of budget issues – macroscopic federal, NASA overall, and Aeronautics in particular – he feels that Aeronautics research has good standing. He likes the direction and progress that NASA Aeronautics has made. Ms. Blakey asked if Dr. Shin had briefed the incoming Congressional freshmen yet. Dr. Shin said the scheduling of those briefings is in progress.

Dr. Lewis asked how NASA was collaborating with other agencies, like the Department of Homeland Security, on issues like Unmanned Aircraft Systems. Dr. Shin replied that NASA has been reaching out on both technical issues and program planning. He added that there is recognition among various stakeholders that NASA Aeronautics is working well with other agencies and addressing the right problems overall. Mr. Tom Irvine said that it would be good to get the Committee's assessment of how well NASA Aeronautics communicates the benefits of its research. Dr. McDonald asked if the Committee would be addressing the finding of a recent National Research Council (NRC) study addressing the Aviation Safety Program (AvSP) within NASA. Dr. Shin indicated that NASA has been taking steps to address the findings within the NRC report including standing up an organization led by Mr. Robert Pearce that addresses strategic planning within ARMD. In particular, he indicated that the recent reformulation activity undertaken by AvSP would help address some of the NRC's concerns about planning.

In response to a question from Dr. Lewis, Dr. Shin said that infrastructure issues were becoming a larger problem for NASA. The testing demand has been going down for several years, and that the problem cannot be addressed solely by ARMD. Dr. Lewis asked if the problem centered on lack of resources to sustain the amount of infrastructure. He is concerned that the agency might rely too heavily on simulation at the expense of certain facilities such as wind tunnels. Dr. Shin agreed but said that funding infrastructure usually requires taking funds from elsewhere. He said that NASA is a member agency of the National Partnership for Aeronautical Testing (NPAT) which seeks to oversee strategic management of federal infrastructure related to aeronautics.

**Systems Analysis and Strategic Planning** (Mr. Robert Pierce and Mr. Tony Strazisar, NASA)

Mr. Pearce briefed the Committee on the activities of a newly formed organization within ARMD, the Strategy, Architecture and Analysis (SAA) Office which Mr. Pearce leads. The intent of his organization is to provide strategic analysis at the “corporate” level for ARMD at Headquarters and to provide analytical rigor and innovative thinking to the decision making process. Mr. Pearce addressed for the Committee the key mission products and services of the SAA activity.

**Federal Aviation Administration (FAA) role/policy in aviation GreenHouse Gas (GHG) mitigation** (Dr. Lourdes Maurice, FAA)

Dr. Lourdes Maurice started her presentation by explaining that the FAA role in this area is part of a larger United States government effort. In the environmental area, the International Civil Aviation Organization (ICAO) has been setting the international standards and most issues are dealt with on a bilateral basis. However, she said that when talking about GHG a lot of the issues are unilateral concerns and so aren't addressed in international contexts. As an example, Dr. Maurice cited that the U.S. wasn't part of the Kyoto Protocol so there aren't any U.S. targets for emissions reductions. Developing nations were also exempt from the protocol. Dr. Maurice further stated that while aviation only contributes 2-3% to emissions, it is the fifth largest contributor. Dr. Lewis stated that aviation tended to be looked at heavily for emissions reduction because of the location (altitude) where jets emit emissions into the atmosphere. Dr. Maurice next presented data indicating that 90% of aviation emissions come from 20 countries (lumping the European Union [EU] into one contributor). In response to a question from Dr. Lewis, she clarified that this represents the civil aviation contribution.

Dr. Maurice next covered the status of various international efforts being undertaken by ICAO, the United Nations Framework Convention on Climate Change (UNFCCC), and the EU. For example, the EU emissions trading system seeks to regulate international aviation which could cost the U.S. airlines billions and violates the Chicago protocol.

Addressing various climate and energy challenges related to aviation, Dr. Maurice indicated that, despite the trend toward lower consumption, fuel prices are still increasing. From a greenhouse gas (GHG) perspective, fuel consumption is a big driver toward lowering emissions. However, she emphasized that there are many tradeoffs and dependencies in the energy and environment arena (operations, aircraft modifications, etc...). Mr. Henne thought the interdependencies was interesting, but might lead to a false conclusion that slowing aircraft down was the correct approach. However, that doesn't serve the public interest. Dr. Maurice agreed that the overall

system had to be looked at. Dr. John Hansman felt that this is only looking at the environmental issues; where is the larger meta trade looked at between environmental performance and other performance issues? Dr. Maurice indicated that there are lots of external forces that need to be addressed and that FAA was only one of the players in the overall U.S. strategy.

Dr. Maurice next presented the overall strategy of the FAA to achieve U.S. goals involving noise, air quality, energy, climate, and water quality within the National Airspace System (NAS). She specifically covered the Aviation Environmental Design Tool (AEDT) which brings together noise, emissions, and fuel burn into the public mode. The tool looks at the interrelationships between these factors and tries to characterize the effect of change in one area has on the others. For example, a stringent noise standard will affect the ability to reduce emissions through technology such as open rotor. The FAA hopes to get this tool into the public domain by the end of next year. She pointed out that AEDT is dependent on NASA to provide the physics and the technology for the models. Dr. Maurice also covered program efforts in emissions reduction, aviation alternative fuels, air traffic modernization, and environmental standards and market-based measures. She said the FAA has a plan to address the problems, but program progress could be impacted by future budget restrictions. She also pointed out that the FAA is dependent on partner agencies (such as NASA) to provide certain things. And if those agencies budgets are cut in the future, decisions on where to take those cuts could affect FAA's work.

Dr. Lewis asked Dr. Maurice about the working relationship between NASA and the FAA. Dr. Maurice responded that, in her estimation, it's been a steadily improving relationship with ARMD. Mr. Mark Anderson thought that the collaboration between NASA and the FAA in environmental areas has been very successful. Dr. Maurice agreed and cited the Continuous Lower Energy, Emissions and Noise (CLEEN) program in which (although it is an FAA program), NASA is heavily engaged. She did point out that in some areas, such as climate research, the FAA could use more support from the Earth Science side of NASA but understands the resources constraints impacting this ability.

### **Environmental Protection Agency (EPA) Mandatory GHG Reporting Rule**

*(Ms. Katherine Sibold and Mr. Brian Cook, EPA)*

Ms. Katherine Sibold presented the Committee with a briefing on EPA's approach to "enforcing" the recently approved Mandatory GHG reporting rule. She stated that EPA is taking a "bottoms up" approach to collect accurate and timely data to inform future policy decisions. She noted to the Committee that right now the rule is focusing on reporting, and not control of emissions. She also said that EPA would be using a specific methodology to collect data including which types of emissions to include (or exclude, such as fleet emissions). Dr. Hansman inquired about the methodology concerning operating hours. Ms. Sibold said they are not collecting hours, but are basing emissions on a per-engine rate. In response to a query from Dr. Lewis, Mr.

Brian Cook said that the estimated total amount of non-reportable emissions is about 10-15% of the total. So, he feels that the data will be fairly representative. Dr. Hansman asked when the reporting by emissions emitters would commence. Ms. Sibold replied that reporting the reporting entities have finished one year of monitoring and are due to submit reports in March. Mr. Cook then demonstrated the reporting website and what analysis could be done with the data obtained. He acknowledged that the tool design for the website was still in draft form and does have some limitations. For example, a user won't be able to geographically represent mobile sources of emissions but it will represent suppliers of those sources. The goal for data publication is June 15<sup>th</sup> of this year. Ms. Sibold said the intent with the data is to help develop future policy by getting good baseline information. Mr. Anderson asked if the EPA had thought about how this would be extended to aviation sources. Mr. Cook indicated that right now sources such as airports would be included on the supplier side. In response to Dr. Lewis' question about government facilities, Mr. Cook said that some military bases might be included. Ms. Sibold said that they are implementing a very specific definition for a covered facility, and EPA has been working with a lot of trade organizations to make sure they (EPA) are covering the right areas. Mr. Henne asked how EPA accounted for respiration in their inventory accounting. Mr. Cook said those sources are covered by the Intergovernmental Panel on Climate Change (anthropogenic activities) and are not a defined category in this undertaking. Ms. Blakey asked if there was any coordination between GHG calculating and standard setting, and if EPA was involved with Committee on Aviation Environmental Protection (CAEP). Dr. Hansman said that FAA is a member in CAEP, and EPA participates. Ms. Blakey would like to ensure that the two (standard setting and reporting/calculating) are linked. Dr. Hansman felt that the bigger discussion is in establishing metrics for certification, and how manufacturers would be certified to meet a target. Mr. Henne agreed, saying that his concern is that the standard will not be directly connected to operational use. Ms. Blakey ended the discussion by thanking Ms. Sibold and Mr. Cook for an informative briefing.

### **NASA's related environmental research** (Dr. Ed Waggoner and Mr. Jay Dryer, NASA)

Dr. Ed Waggoner, Integrated Systems Research Program (ISRP) Director, and Mr. Jay Dryer, Fundamental Aeronautics Program Director, presented an overview of NASA's research addressing technical challenges of environmental impacts of aviation. Mr. Dryer noted that the work to reduce harmful emissions included work in the areas of computational fluid dynamics and alternative fuels. Dr. Lewis asked where the experiments on alternative fuels were conducted. Mr. Dryer responded that the work was conducted principally at Dryden Flight Research Center. He also stated that NASA was working very effectively with other agencies on alternative fuels research.

Dr. Waggoner said ISRP was looking at how to reduce noise, emissions and fuel burn simultaneously. One example of work being done concerns distributed roughness as a way to energize the boundary layer. NASA also is looking at vehicle concepts to demonstrate various technologies, such as propulsion and airframe integration, working

together in a relevant test environment. Dr. Hansman asked if NASA's level of investment would allow the technology to be developed enough for transition to industry. Dr. Shin noted that this was an issue, but that once these studies are completed the results will garner enough interest from industry and other federal agencies to allow the work to proceed even further. Dr. Ilan Kroo pointed out that commercial interest will be driven by economic forces. Dr. Hansman felt the path NASA was executing was somewhere between technology risk reduction and concept exploration. Mr. Henne felt the research was going in the right direction, but noted NASA might have to go pretty far down a particular path before making a decision if further work is warranted. Mr. Anderson agreed, saying that he personally had worked on open rotor activities twice and laminar flow work three times. He felt that current research may not make that application leap yet, but eventually someone was going to get there.

Dr. Shin stated that NASA pushes research in innovative concepts as far as it can, soliciting as much agreement as possible to take next steps particularly when discussing demonstrator concepts. He believes that providing technical basis for vehicle work will spark interest from such as the Air Force or Defense Advanced Research Projects Agency (DARPA), and NASA is also considering using cargo aircraft to demonstrate some technologies. Dr. Hansman agreed that having a vehicle does provide a focus for the external community. He also stated that while issues on the environment will force a paradigm shift, NASA is looking at the right research space. Dr. Lewis doesn't see a lot of interest from DARPA in building aircraft again. He also said that the only thing ahead for DoD is the next-generation bomber. Ms. Blakey noted that demonstrator vehicles were less compelling for the military, but that there is no design team working on a new aircraft design for the first time in quite a while.

### **Committee Deliberations** (*Committee members*)

Ms. Blakey opened the discussion by asking the Committee members if there were any recommendations, findings, or observations that anyone wanted to propose. Mr. Henne felt NASA participation in the carbon dioxide (CO<sub>2</sub>) standard activity was extremely important. He pointed out that currently there wasn't a goal concerning CO<sub>2</sub> and an update reflecting CO<sub>2</sub> or GHG goals was perhaps warranted. Dr. Hansman pointed out that the complete design space is currently unknown. Mr. Irvine said that if the Committee chose to write a recommendation in this area he didn't want them to lose sight of the current work that is going on between the FAA and NASA. Ms. Blakey agreed but felt the relationship could be even stronger. Any language would reflect that and the Committee would emphasize a science-based discussion and not focus on a single element.

Mr. Henne commented on the embryonic nature of the ARMD strategy discussion and noted that the Committee would need further information before commenting. Ms. Blakey agreed, indicating that the presentation today was setting the stage for future discussions. Dr. Hansman felt it was a good discussion and a difficult process to go

through. He also felt that the strategy and systems analysis activity needed to be separated. Mr. Irvine responded that this activity was derived from an NRC recommendation to have a more rigorous strategic planning process. Dr. Shin agreed with Dr. Hansman that a strategy could be derived from first principles, and noted that AMRD did a good job of deriving strategy from top down and bottoms up. NASA's challenge was linking the two.

Mr. Anderson commented on the NASA Office of Chief Technologist (OCT) roadmapping activity. He was still concerned about the exclusion of aeronautics in their activity. Dr. Kroo felt that Dr. Braun had some very specific plans for technologies which included aeronautics, and suggested that ARMD should maintain its own twenty year roadmap. Dr. Shin stated there was some internal motivation to keeping aeronautics separate from the OCT activity. When ARMD talks about technology development, it is more focused on the research that leads to technology development. Dr. Shin also didn't want the Committee to think that ARMD was completely left out of the roadmapping process and was very involved in the planning process. In response to a question from Dr. Lewis, Dr. Shin said that ARMD had personnel involved on the Entry, Descent, and Landing team, for example. Dr. Lewis felt that ARMD should ensure that its voice was being heard during the activity. Dr. Shin agreed noting that Dr. Braun has a very challenging portfolio.

### **January 21st:**

*The meeting was called to order at 8:07 a.m.*

### **Agency Workforce Hiring and Recruitment** (Mr. Stephen Chesley, NASA)

Mr. Stephen Chesley explained to the Committee that his job entails looking at the demographics of the workforce and performing workforce analysis. He has briefed the NAC and other NAC committees on two previous occasions. Mr. Chesley opened by explaining the current environment at NASA in terms of hiring. He said that hires are tied to the attrition rate and that overall the Agency has been getting smaller. Because hiring has been so limited, NASA tends to hire people with experience rather than "fresh outs," or people right out of college. In response to a question from Ms. Blakey, Mr. Chesley said that NASA has a contractor workforce of approximately 45,000. Mr. Chesley also confirmed that NASA does tend to hire from their contractor workforce, which also affects their ability to hire fresh outs. He said that another challenge was the planned discontinuation of the shuttle and exploration efforts. NASA has a goal to ensure good viable work for civil servants rolling off those efforts prior to hiring outside the agency. NASA is also limited in that the agency cannot execute a reduction in force since that is prohibited by the current authorization bill. From a planning perspective, Mr. Chesley noted that the agency is facing budgetary constraints and workforce planners need additional clarity on what the agency's future workforce needs will be. Ms. Blakey asked if the part of the strategy to transition the shuttle workforce involved work location moves. Mr. Chesley stated that NASA has usually tried to move the work



to the people, rather than the other way around. Mr. Chesley next addressed a current effort underway at NASA called the Early Career Hiring Initiative, which allowed the NASA centers to hire up to 200 new employees that were within 3 years of graduation in an effort to try and bring in the younger generation to the NASA workforce. Dr. Lewis felt that NASA should take a lesson from the success of the Apollo program where the average age of a person sitting in mission control was 26. Dr. Kroo observed that hiring from the contractor pool may not be the best choice for NASA, even though they are experienced. Mr. Chesley agreed with that observation, and indicated that NASA needed to do a better job of training the younger generation to replace current workers.

Mr. Chesley next focused on the college hiring and recruitment process. Mr. Dan Fusco of NASA's human capital management office stated that the federal hiring process is challenging, but the goal is to approach as many different schools as possible. Ms. Blakey noted that the concern of the Council is that NASA is hiring from a very narrow geographic base. Dr. Kroo expanded on that by saying that the concern was that hiring at any given center was largely from the geographic area of that center. Mr. Fusco said that NASA cooperative students provided another avenue of hiring for NASA. The agency tried to foster that approach with as many schools as possible. Dr. Lewis felt that the excitement and enthusiasm among university students to work at NASA is already present. He said the University of Maryland has been tracking demographics for the aerospace departments and that enrollments have been rising steadily over the past few years. In fact, there are more students than there are jobs. Dr. Lewis felt the problem is with number of opportunities for the students.

Mr. Chesley said that there is an increased emphasis by this Administration on recruitment and hiring. He cited several programs that are already in place that are affecting hiring the student population. All the federal agencies are being held accountable to metrics that target hiring specific populations, such as Pacific Islanders. Mr. Fusco said that reaching out to those target populations is challenging and NASA is trying to do a better job of filling the knowledge gap people might have about working for NASA.

Speaking specifically about the aeronautics research centers, Mr. Chesley said that hiring has been highly constrained because of workforce ceiling and amount of available work. He projects that a similar pattern will occur at the spaceflight centers for the next several years. In response to a question from Dr. McDonald regarding education level, Mr. Chesley said that about 40% of the science and engineering (S&E) workforce hired in 2010 had a masters or masters-equivalent degree. He also said that more people at NASA are engaged in S&E work than non-S&E work (such as administrative and budget work).

Ms. Blakey asked the Committee members if they had any other issues concerning this topic they wanted to raise. Dr. Kroo said that the data seemed to reflect that the hiring at the centers was done predominantly from the geographic area. He asked how NASA centers could be encouraged to reach out beyond their geographic borders. Ms. Blakey

noted that NASA should perhaps be asking colleges and universities where their students go to work: why not NASA? Dr. McDonald, a former center director for Ames Research Center, said that in his experience people who go to school in California want to work in California. A great many of the Ames S&E population had gone to colleges in California and had formed working areas of expertise at various California colleges. The result tended to be that hiring was done from colleges, such as Stanford, where these expertise relationships had been fostered. Dr. Lewis affirmed that conclusion that there are hiring biases based on expertise resident at universities. Ms. Blakey concluded the discussion by saying that while there are advantages in geographically diverse hiring, it's hard to see the benefit unless you are looking at targeted research areas. She provided an example of recruiting from the University of North Dakota for expertise in unmanned aerial vehicles.

**Subcommittee/Working Group discussion** (Dr. Shin, NASA, and Committee members)

Dr. Shin opened the discussion by going over his thinking regarding the use for a potential formal subcommittee. The Committee has in hand a draft for a potential Unmanned Aircraft Systems (UAS) Subcommittee. Dr. Shin stated that the desire for the UAS subcommittee is independent of the funding question, so that is being tabled for the purposes of this discussion. He feels that since the UAS community is emerging and with dynamic issues, that NASA would get benefit specifically targeting that community and also providing support to the Aeronautics Committee. The UAS effort is an activity that NASA will be undertaking with a current 5-year program lifetime, i.e., NASA is not targeting long-term research in this area. Ms. Blakey said that it would be helpful to know what the UAS program personnel feel are the thorniest problems that they will deal or are dealing with. The terms of reference are written high-level enough, but the substance of the issues would dictate what kind of expertise will be needed on the subcommittee. Dr. Shin said that his initial thinking upon initial formulation of the Aeronautics Committee was to have a member with particular expertise in UAS. Mr. Bolden chose to limit membership on the Aeronautics Committee to 8 members at that time so expertise in some areas was limited. Dr. Shin also feels that given the issues surrounding UAS, the membership of the subcommittee should be diverse with experts in technology, regulatory and market perspectives.

In addition, Dr. Shin stated that even though the terms of reference is very generic, a more detailed work plan would be generated to support the subcommittee. Ms. Blakey said the kind of challenges that should be looked at should be put on paper. For example, operational integration is one of the issues that is a problem. Dr. Shin agreed and said that the UAS Executive Committee (ExCOM) hasn't had a single meeting where this hasn't been brought up. Ms. Blakey said another interesting area to explore

would be the applicability of UAS for piloted aircraft. The capabilities and computing technology needed for UAS could potentially have applicability for improving safety and redundancy in piloted vehicles. She said this may not be of use to ARMD since it would take UAS in a different direction. Dr. Kroo felt that going beyond just a backup system that is autonomous would be a good area for NASA to address. He would like to see NASA's UAS effort expand beyond just integration in the National Airspace System (NAS). Dr. Lewis inquired if there was a case for subcommittees or working groups in other focus areas of NASA's portfolio. Dr. Shin felt that V&V could be another area where a subcommittee or working group could provide value. Dr. McDonald said that a V&V subcommittee could provide common expertise not typically found on an aeronautics committee. But since this area of knowledge is used across the agency, the Committee would need to make sure it isn't being duplicative of other efforts. Dr. McDonald advocated tailoring a V&V subcommittee for software and safety critical systems. He agreed it would be appropriate to consider a subcommittee in this area.

Dr. Lewis proposed an alternative schema, stating that he had been wrestling with this committee's ability to bore in on the technical details because the ARMD portfolio is so broad. He suggested that each Committee member could take a sub portion of the portfolio to hone in on and feedback information to the Committee. Ms. Blakey said that is something to consider. She approved the notion of a UAS subcommittee, as well as a potential V&V subcommittee. She felt these are areas that the Aeronautics Committee has struggled with and subcommittees could provide benefit to both NASA and the Committee itself. In addition, she indicated a preference for the subcommittee structure which would provide two levels of deliberations with a response mechanism involved. Ms. Blakey would like to have the other Committee members' inputs on subcommittee expertise and topics between now and when the Council meets in February (10-11). Dr. Hansman endorsed the idea and said that setting up a UAS subcommittee with a limited term was a good starting point. The decision to make the subcommittee permanent or form other ones could be made later. Dr. Shin agreed that UAS would be a good one to start with and indicated that he didn't have a specific timeframe for getting the subcommittee started. Ms. Blakey set a goal of having a refined list of names and skill sets at the April 14-15 Aeronautics Committee meeting. She also felt it would be a good idea to add members with UAS and V&V expertise to the full Committee. Ms. Blakey verified that the first steps would be for Dr. Shin to vet the request for a subcommittee with the NASA Administrator, Mr. Bolden and she would also vet with the NAC Chair, Dr. Ken Ford to get tacit approval to set up the subcommittee.

## **2011 Work Plan Discussion**

The Committee next turned its attention to the proposed calendar year 2011 work plan that will be presented to the Council in February. Ms. Blakey indicated that she had shared it informally with Dr. Ford. Dr. Shin said that he was comfortable with the 5 core items, but additionally would like the Committee to consider at least a subset of item 7 focusing on the international and commercial aspects. He wasn't advocating that it be raised to the "must address" section, but he would like to get the Committee's advice on international and commercial collaborations. He explained that since NASA has been involved in the World Trade Organization (WTO) trade dispute involving Boeing and Airbus, ARMD has been trying to engage the various domestic aeronautics communities differently. Dr. Shin felt the summertime might be a good time to address this issue. Dr. Lewis said that he had been reading conflicting statements about NASA's role in international relations, particularly in regards to China. Dr. Shin said ARMD has been doing well in its international aspects so far, without too much contradiction or controversy being raised. Traditionally, the major collaborations have been with the Europeans, but other partners (Australia, Asia, etc...) are being engaged more. However, he does have a desire to have a consistent collaboration policy within ARMD and some way to illustrate how the collaborations result in tangible benefits. This would also help the centers and the ARMD workforce to communicate the message. Ms. Blakey felt it would be prudent to move work plan item #7 above the line due to the amount of activity in the aeronautics community and the value of addressing competitive questions. Dr. Shin agreed that NASA is planning to address competitive issues. Dr. Lewis said they are also dealing with these types of issues at the American Institute of Aeronautics and Astronautics (AIAA) and treading very carefully on addressing them. In response to a question from Dr. Shin, Ms. Blakey agreed to reword the work plan item to focus on international issues and provide advice on NASA's activities and progress in that area. The revised work plan would be forwarded to the entire Committee for review and approval prior to the Council meeting in February.

Dr. Hansman asked if the presentations received at this meeting were the only ones the Committee would hear related to item 1 on the work plan. He voiced disappointment over the depth level of the presentations at this meeting and felt the Committee could not do a proper review because of this. For example, the environmental briefings did not provide the Committee with enough detail to illustrate how NASA was responding to this emerging need. He felt NASA needed to look at its total portfolio, and provide the Committee with more substantive information. Dr. Kroo provided a specific example in that he would like to hear what NASA is doing that is new and exciting in relation to DREs, and what makes that relevant to the environmental discussion. Ms. Blakey indicated that she was interested in hearing more about NASA's interactions with the

EPA and the FAA on the environmental issues, but acknowledged that one session was not adequate to address item 1 on the work plan. She said these presentations could be followed up in more depth at the April meeting. Dr. Hansman agreed that in order to address item 1 adequately, the Committee would need to go through the entire ARMD portfolio, and look at all the elements including funded and internal work. Dr. Shin said it was not NASA's intention to address the topic solely at this meeting. He also agreed that NASA needed to provide more emphasis on new work they are doing in regards to environmental issues and make that clearer to the members. Dr. Kroo agreed with the discussion on the need for more depth. He also said that it would be fruitful to send out in-depth technical information in advance of the meetings. Dr. McDonald also agreed with the need for more substance, but did say that subcommittees could dive into deeper technical detail on some subjects. He also felt the information being presented wasn't allowing the Committee to contribute to their fullest extent. Dr. Lewis agreed with the discussion thus far and again proposed a model of smaller groups of Committee members delving into a particular topic and reporting back to the full Committee. He said when the Air Force advisory board does a laboratory review, it is done by a smaller group of the board and they spend a week doing the review with a final report issued at the end of the process. Dr. Shin said that he wasn't necessarily looking for a full-up technical review and would also like the Committee's contributions at a strategic level, acknowledging that more technical detail would aid this goal. Dr. Lewis said the more focused meetings (held between the full Committee meetings) with smaller groups could provide that detail. Ms. Blakey said that some of this could be worked out with NASA on an ad hoc basis, but pointed out that since the Committee reports out at the Council quarterly, the timing for recommendations and findings are tied to that schedule. She also advocated the idea of having the full Committee meetings focus on one or two topics with more depth, rather than having multiple topics with not enough substance. For example, UAS might be a good topic for the April meeting. Dr. Shin acknowledged the Committee's concerns and indicated that NASA would take steps to address them. Dr. Shin also agreed that limiting the number of topics at a meeting and having smaller task teams getting engagement at a more detailed level on an as needed basis would help alleviate the concerns. He indicated that he would develop a yearlong plan detailing what particular issues he would like the Committee to address.

### **Committee Deliberations**

Ms. Blakey stated that she hadn't heard anything from the discussion thus far that would merit a recommendation from the Committee to the Council. Dr. Kroo asked the Committee about responding to Dr. Ford's request for a statement in regards to NASA's hiring patterns. He felt the Committee should respond, although it doesn't have to be a strong recommendation but worded more like a finding. Dr. McDonald felt the

Committee was addressing a non-problem. In his experience as Center Director of Ames Research Center (ARC), they always had a problem of recruiting outside the geographic area. For example, ARC did go to Massachusetts Institute of Technology and recruit but wasn't very successful so the center kept going back to Stanford for the actual hiring. He also feels that perhaps the Committee didn't see the information needed to accurately assess this, such as how many offers were made outside the geographical area that were turned down. In response to a question, Dr. Kroo felt that Dr. Ford's focus on the subject dealt with problems he (Dr. Ford) is aware of at a couple of centers but he wanted the question addressed more broadly. Ms. Blakey suggested that to speak to Dr. Ford's concerns the Committee might suggest that a report focused on addressing a few more focused questions should be developed by NASA. Dr. Lewis agreed that the information presented didn't provide any indication of a problem, so additional data might be warranted. Ms. Blakey asked the members if the recommendation for an in-depth report be prepared to take forward to the NAC was acceptable. Dr. Kroo agreed that with the data provided thus far, that would be the strongest recommendation the Committee could make. Dr. McDonald agreed, indicating that the report could address other questions such as the quality/nature of the attrition population. Dr. Kroo said the report could be broadened to address several interesting questions that the Committee would like to see addressed, but that might dilute Dr. Ford's concerns and cause some confusion.

In regards to the environmental discussion, Ms. Blakey suggested the Committee could make the observation that they are encouraging NASA to focus more on collaboration. Mr. Irvine asked if the Committee was pressing for more NASA involvement with ICAO, for example. Dr. McDonald thought that interaction with ICAO was important, but that Goddard Space Flight Center had the lead on things related to climate change. Mr. Irvine acknowledged that the Science Mission Directorate (SMD) clearly has the lead on monitoring things related to climate change (such as emissions), but ARMD participates through researching reduction technologies in aeronautics. Dr. Shin also said that responding to future rule making in the area of climate change would be an ARMD, SMD and interagency effort, and that an observation to this effect would be appropriate.

Ms. Blakey addressed the issue of the OCT Agency cross-cutting technology roadmapping efforts and the role that ARMD should or should not take. The Committee was concerned that the aeronautics perspective would be diluted or not present with the deletion of the technology area roadmap that dealt specifically with aeronautics. Dr. McDonald felt that it would have been better to have some NASA Aeronautics representation involved in most of the roadmapping activities. Dr. Shin informed the Committee that ARMD has not been completely severed from the activity, and has a lot of mechanisms to stay aware, but it does take additional effort. He also felt that the lack

of a specific aeronautics roadmap made things less confusing to the external community. Dr. Lewis asked for clarification on the impetus for deleting the 15<sup>th</sup> roadmap, which was the one focused on aeronautics. Dr. Shin replied that after internal debate about the question, there was an aeronautics roadmap initially developed. After engaging with the National Research Council (who is supporting the public vetting process), OCT felt that since aeronautics technology and research were governed by an existing national policy and plan that it would be better to hold the initial product internally to ARMD. ARMD also agreed with that approach.

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**Closing Remarks** (*Marion Blakey*)

Ms. Blakey thanked everyone for their contributions to the meeting and thought that the discussions and presentations were very helpful to the Committee.

*The public meeting was adjourned January 21<sup>st</sup> at 11:50 p.m.*