

MEMORANDUM

FROM: DoD Space Architect
2461 Eisenhower Avenue, Suite 164
Alexandria, VA 22331-0900

SUBJECT: DoD Space Weather Architecture Study Decision Coordination Group Meeting Minutes

Maj Gen Dickman welcomed the group and presented the DoD / IC Space Architect Organizational Relationships and the architectural process being used. He, also addressed why Space Weather Architecture Study was deemed appropriate.

Maj Gen Dickman remarks covered the following key points: Military operations are increasingly reliant on space and ground systems that are susceptible to failure or degraded performance during extreme space weather conditions. For this reason, the DoD Space Architect Office initiated a multi-Service Space Weather Architecture Study. The study began in December 1997. The study is divided into two phases. The purpose of Phase I of the study is to identify and assess operational impacts caused by space weather effects and to evaluate how well the current and evolved baseline systems will monitor and mitigate the impacts. If the Phase I findings warrant, the study team will enter Phase II to develop and recommend a Space Weather Architecture that will address the warfighter needs and requirements for the 2010-2025 timeframe. The goals of the DCG meeting are to review Phase I Space Weather study results, preview Phase II plans and make a phase II go/no-go recommendations.

Table 1 lists the April 22 Decision Coordination Group (DCG) representatives.

Table 1: Key DCG Representatives

| Organization | Representative |
|------------------------|------------------------------------|
| Hq NASA | Dr. George Withbroe (SES-5) |
| NOAA/ OAR | Dr. Joe Friday (SES-5) |
| DUSD(Space) | Mr. John Landon (SES-4) |
| NRO | Colonel Rick Jones |
| Joint Staff/ J8 | Colonel Tim Murphy |
| USA SMDC | COL Bob Billings |
| CNO/ N6 | CAPT Mary Crawford |
| AF/XO | Colonel Mike Jamilkowski |
| USSPACECOM/ J3 | Lt Col Chris Chapin |

Lt Col Strathearn then presented to the DCG the Space Weather Architecture Study Phase I results and recommendations. For detail refer to the briefing. Below are listed the questions and comments made during the presentation. The format is the slide title, who made the comment or question, what the comment or question was, the following discussion and any action required and the assigned staff.

Operational Impact - Ionospheric Effects Summary

Capt Crawford - Discussed here experience with frequency management during Desert Storm and the frequent UHF SATCOM outages at night in the January/February timeframe reported by CENTCOM. The DNA rep she was working with at the time identified the cause as Space Weather effects. Action: Follow up and get more information for Operational Impact Database, Marsha Korose

Operational Impacts - Radiation Effects on Spacecraft

Lt Col Puahak - Are we not getting smarter and having less problems. Dr. Friday noted that we saw a problem with the last GOES attributed to an ESD. Maj Gen Dickman noted that budgets are often a driver sometimes we reduce shields on the solar panels to cut weight to help in design, always designers are pushing the edge of the envelope. Other comments were that we learn and forget on every new system, new technologies, designs and materials have unknown effects. Also concerned with the commercial world's approach to rad hardness is an unknown. Action: Follow up and get more information on GOES. Marsha Korose

Operational Impacts Other

Lt Col Puahak - Will we have false positives with the Aurora? Maj Gen Dickman stated no the Aurora just increased the background clutter and denies detecting the target as early as it could without Aurora. No Action

Operational Impacts Joint Warfighting Capability Objectives

Maj Gen Dickman - Coming out of Phase II we will need NOAA/NASA to help get acceptance of the Space Weather architectural recommendations. Dr. Friday agreed. No Action

Unknown - You need to look at all the systems. Lt Col Strathearn answered that the Space Weather ADT in Phase I, the military utility analysis has looked at an extensive list of warfighter systems. The displayed list is just a representative sample. No Action

U.S. Space Weather Investment (Yearly Average)

Lt Col Hoene - Can you give insight into basic research break-out. LTC Campbell provided material. Maj Gen Dickman directed that we also provide 6.1 / 6.2 break downs Action Document break out R&D costs LTC Campbell

Assessment of Space Weather Requirements vs Capability

Unknown - Could you elaborate on where requirements were pulled from. Lt Col Strathearn stated AF Space Command has done a good job of creating the current draft of

the Space Weather CRD, however, due to a lack of understanding Space Weather users did not verbalize requirements and needs well. Col Whitman added that AF Space Command's plan for the CRD is to coordinate for the next several month and get sign out. Maj Gen Dickman directed that without a reasonable coordinated draft CRD, Space Weather recommendations cannot be presented to the JROC. Action Coordinate a CRD draft US Space Command

Dr. Friday expanded on the point that the user community does not usually know what they need. This is true in most predictive services, it is true in terrestrial weather. - What is the definition of users in this study? Operators or Manufactures - Col Whitman stated that Gretchen Lindsey did address both. It is important also to address models, NASA and DoD should address this.

Future Needs

Dr. Friday stated that the FAA is looking toward differential GPS that provides errors then enable a 0/0 landing 99.9% of the time. It is vital for safety that cases where this is not possible be identified. Then just like terrestrial weather, have FAA not authorize use of 0/0 in questionable conditions. Action - Follow up and get documentation especially as applies to military use of same technology. J. Picantine

Dr. Withbroe cautioned the study participants to be careful that the message is properly interpreted. Yes, space weather can cause signal loss, but information from space is overall very reliable. No action

Colonel Tim Murphy expressed concern that the presented impacts were good but have been too low key on the human in space issue. This is important to address. We need a better predictive capability. Dr. Friday stated that the issue is not being ignored. NOAA/NASA is very aware of the problem and the need to have this capability. No Action

Future Needs Findings

Unknown - Caution need to understand commercial way of working on systems. They make decisions on business considerations. The commercial developer faces customer loss / market share problems, the military losses are more dramatic in lives lost. Lt Col Strathearn agreed that as military relies more on commercial systems it becomes more important to have insight into these decisions and also interest has been expressed design guidelines. Action Plan RFI M Korose

Criteria for Proceeding to Phase II - Projected Technologies

Unknown - What techniques to mitigate are being proposed? Change Operational plans based on prediction or plan operations around Space Weather just like weather. Dr. Friday stated that for this to happen the confidence in prediction must be reasonably high. No Action

Technology Potential

Lt Col Byers CME not a Solar Max phenomena it occurs at all times No Action

Potential Systems & Technology Trades

?? Hoene?? How trades effect Space Weather? Is it intended as a bell ringer or real-time Col Whitman answered that when we get enough information on the scintillation cells then the mitigation can be planned. The scintillation cells travel and with the enough sensors these can be tracked and hours of warning given.

Decision Criteria Review

Unknown - Is there a MNS for this? Gretchen Lindsey answered that the MNS addressing this subject is the Aerospace Weather Capability. Colonel Tim Murphy stated that it appeared to be a need to generate a specific MNS for Space Weather.

General Comments

Puhack - The schedule is very aggressive for Phase II. Will you need dedicated resources from the ADT participants? Lt Col Strathearn stated that we expect to continue with the Phase I participants with the same level of participation. We are looking for smarter ways to do our work utilizing our Space Weather web site, teleconferences and video teleconferences. Also looking into holding meetings in the Colorado Springs area for those where a majority of team is there. Maj Gen Dickman the phase I schedule was also aggressive and it was met. As NSSA comes on line it has other architectures directed to be performed. We need to have the majority of the Space Weather ADT completed. The next architecture proposed may be a data dissemination architecture. The Space Weather Architecture should not create a stove pipe dissemination but rather be part of the overall work. Action Define what should and should not be considered during Phase II in Space Weather. Kevin O'Brien