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The National Aeronautics and Space Administration (NASA) is currently studying lunar outpost architecture concepts, including habitation, mobility and communication systems, to support U.S. lunar exploration and science objectives. Elements of a surface architecture will rely on the Ares I and Ares V launch vehicles, the Orion crew exploration vehicle, and the Altair lunar lander for transport to the Moon. The European Space Agency (ESA) is currently studying scenarios and associated architectures for human space exploration to follow the International Space Station Program. These studies are at their earliest conceptual stage and fall into three general scenario categories (see below), each with their own technical capabilities and related timeframes, and each having the potential to constitute a distinct European contribution to future lunar exploration missions.

In January 2008, NASA and ESA agreed to conduct a comparative architecture assessment to determine if their respective lunar architecture concepts could complement, augment, or enhance the exploration plans of the other. Representatives from NASA and ESA engaged in a series of joint, qualitative assessments of potential ESA capabilities as applied to NASA's architecture concepts. Initial findings from these assessments, with respect to each potential ESA category under study, are as follows:

1) Provision of Stand-Alone Capabilities

Automated Lunar Cargo Landing System: This capability (approximately 1.5 metric tons of payload to the lunar surface) would significantly extend surface exploration opportunities by enabling enhanced mobility or extended habitation, and creates more opportunities for science. Further quantitative analysis is required to determine how an ESA lander, combined with various mission scenarios could enhance global lunar surface exploration and enable potential joint missions.

Communication and Navigation Systems: Beyond a basic capability for communication to be secured by NASA, ESA systems for enhanced communication and navigation could provide significant mission enhancement for all NASA mission scenarios. There are also opportunities for international commercial engagement for the provision of communications services. In both cases, opportunities for detailed collaboration merit further dialogue.

2) Crew Transportation Elements Development

Human Crew Transportation to low-Earth orbit (LEO), including a human-rated Ariane 5 launch vehicle and a crew transportation vehicle: Experience on the ISS demonstrates that redundant transportation is welcome. However, real redundancy with NASA's architecture requires a transportation capability that has at least access to lunar orbit.

Orbital Infrastructures: A low lunar orbiting station as analyzed within the ESA transportation architecture studies and that can be utilized by NASA has the potential to enhance mission safety and performance, and could enable different mission profiles. To fully understand the benefits of this station would require further dialogue. Other ESA orbital infrastructure concepts (LEO, Lagrange points) do not have synergy with NASA's architecture.

3) Development of Lunar Surface Elements

Surface Habitation Elements or a Surface Rover: Each of these is a fundamental, enabling component of any surface architecture. These capabilities merit further quantitative analysis to determine how they may enable joint lunar exploration missions or enhance total mission capabilities.

There are differences between what NASA believes to be its key capabilities and the three categories of potential ESA contributions to space exploration. For NASA, the key capabilities identified include the transportation elements of the Constellation Program that NASA is committed to developing; they are part of NASA's mandate to explore, as expressed in both the 2004 U.S. Space Exploration Policy and 2005 NASA Authorization Act. For ESA, future contributions to human space exploration are similar to NASA's key capabilities in that they address areas of high strategic interest to the agency and to Europe as a whole, but final decisions on their development and implementation have yet to be made, and likely will not be made final until 2011. In this respect any particular ESA contribution is more like the surface exploration elements NASA has examined during its LAT exercises, which will not receive funding for development until 2011. An important goal of the of the CAA therefore is to provide the reader an early perspective on opportunities for long-term collaboration between NASA and ESA; a perspective which can be valuable in the near-term as programmatic and funding decisions are being made. Details of the joint NASA-ESA work which has lead to the above findings will be presented together with updates on the continuing joint work.