

## SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)

New missions enabled by Extra-large launchers (8)

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## ARES V: SHIFTING THE PAYLOAD DESIGN PARADIGM

**Abstract**

NASA's Ares V heavy-lift cargo launch vehicle is being designed send more crew and cargo to more places on the lunar surface than the 1960s-era Apollo program and provide ongoing support to a permanent lunar outpost. In addition to that role, however, its unmatched mass and volume capability represent a global asset for exploration, science, and commerce. The Ares V also is an enabler of a large class of space missions not thought possible by scientists and engineers since the Saturn V program ended over 30 years ago. Compared to current systems, it will offer approximately 5 times the mass and volume to most orbits and locations. This should allow prospective mission planners to build robust payloads with margins that are 3 to 5 times the industry norm. The space inside the planned payload shroud has enough usable volume to launch the volumetric equivalent of approximately 10 Apollo Lunar Excursion Modules or approximately 5 equivalent Hubble Space Telescopes. This mass and volume capability to Low Earth Orbit enables a host of new scientific and observation platforms, such as telescopes, satellites, planetary and solar missions, as well as being able to provide the lift for future large in-space infrastructure missions, such as space based power and mining, Earth asteroid defense, propellant depots, etc. The Ares V team is engaging the potential payload community now, 2-3 years before System Requirements Review, in order to better understand the potential limitations and or additional requirements that could be added to the Ares V from the mission planning community. If a viable mission is determined and added to the Ares V as a design case, tradeoffs will be conducted to determine if other mission design requirements can be included in the system. Multiple shroud options for the Ares V have been analyzed to identify their impact on performance. Ares V is in a conceptual design stage prior to a formal design phase. The initial concept for the cargo launch vehicle (CaLV) that would later be dubbed "Ares V" was produced by the Exploration Systems Architecture Study in 2005. Since then, it has evolved through hundreds of concepts. The current point-of-departure (POD) concept was approved during the Lunar Capabilities Concept Review/Ares V Mission Concept Review in June 2008. This reference concept serves as a starting point for a renewed set of design trades and detailed analysis into its interaction with the other components of the Constellation architecture and existing launch infrastructure. This paper will discuss the Ares V design evolution, the most recent point-of-departure concept, and its capabilities to support future science missions.