

# 14. Architecture Roadmap

As outlined previously, the Exploration Systems Architecture Study (ESAS) team developed a time-phased, evolutionary architecture approach to return humans to the Moon, to service the International Space Station (ISS) after Space Shuttle retirement, and to eventually transport humans to Mars. The individual elements were integrated into overall Integrated Master Schedules (IMSS) and detailed, multi-year integrated Life Cycle Costs (LCCs) and budgets. These detailed results are provided in **Section 11, Integrated Master Schedule**, and **Section 12, Cost**. A top-level roadmap for ESAS architecture implementation is provided in **Figure 14-1**.

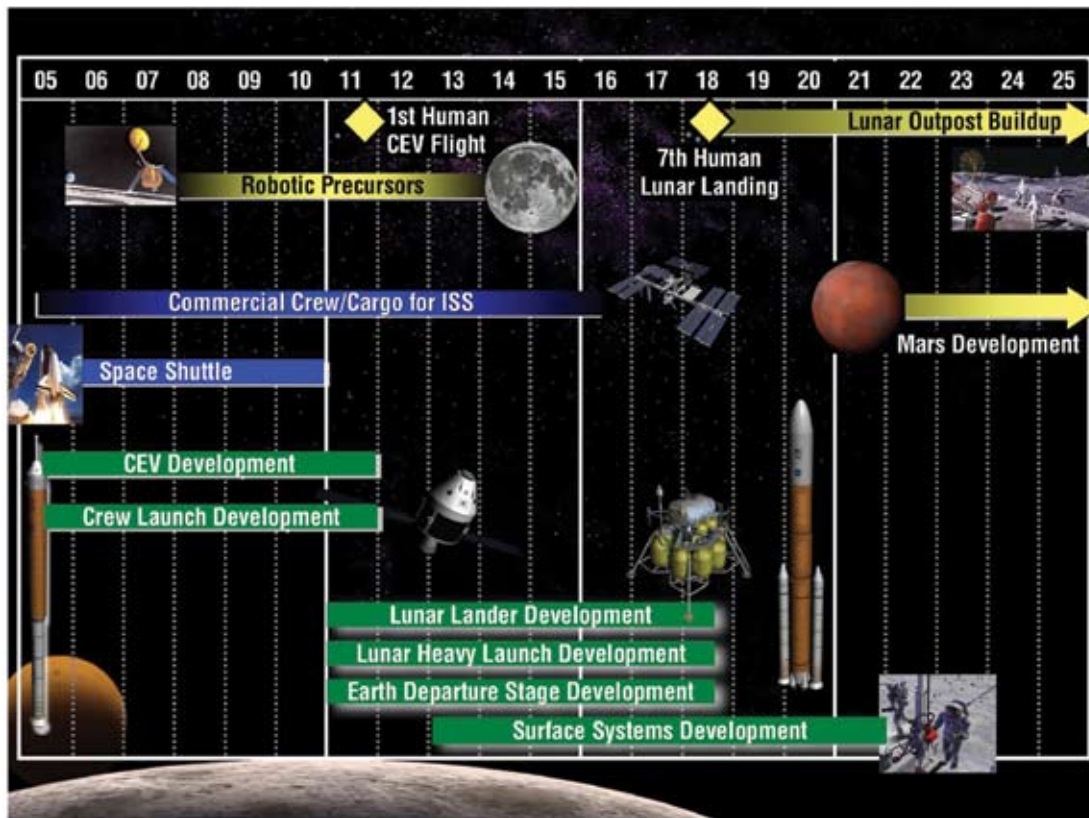


Figure 14-1. ESAS Architecture Implementation Roadmap

In this implementation, the Space Shuttle would be retired in 2010, using its remaining flights to deploy the ISS and, perhaps, to service the Hubble Space Telescope (HST). Crew Exploration Vehicle (CEV) and Crew Launch Vehicle (CLV) development would begin immediately, leading to the first crewed CEV flight to the ISS in 2011. Options for transporting cargo to and from the ISS would be pursued in cooperation with industry, with a goal of purchasing transportation services commercially. Lunar robotic precursor missions would begin immediately with the development and launch of the Lunar Reconnaissance Orbiter mission and continue with a series of landing and orbiting probes to prepare for extended human lunar exploration. In 2011, development would begin of the major elements required to return humans to the Moon—the Lunar Surface Access Module (LSAM), Cargo Launch Vehicle (CaLV), and Earth Departure Stage (EDS). These elements would be developed and tested in an integrated fashion, leading to a human lunar landing in 2018. Starting in 2018, a series of short-duration lunar sortie missions would be accomplished, leading up to the deployment and permanent habitation of a lunar outpost. The surface systems (e.g., rovers, habitats, power systems) would be developed as required. Lunar missions would demonstrate the systems and technologies needed for eventual human missions to Mars.