National Aeronautics and Space Administration

Carbothermal Reduction Demonstration (CaRD)

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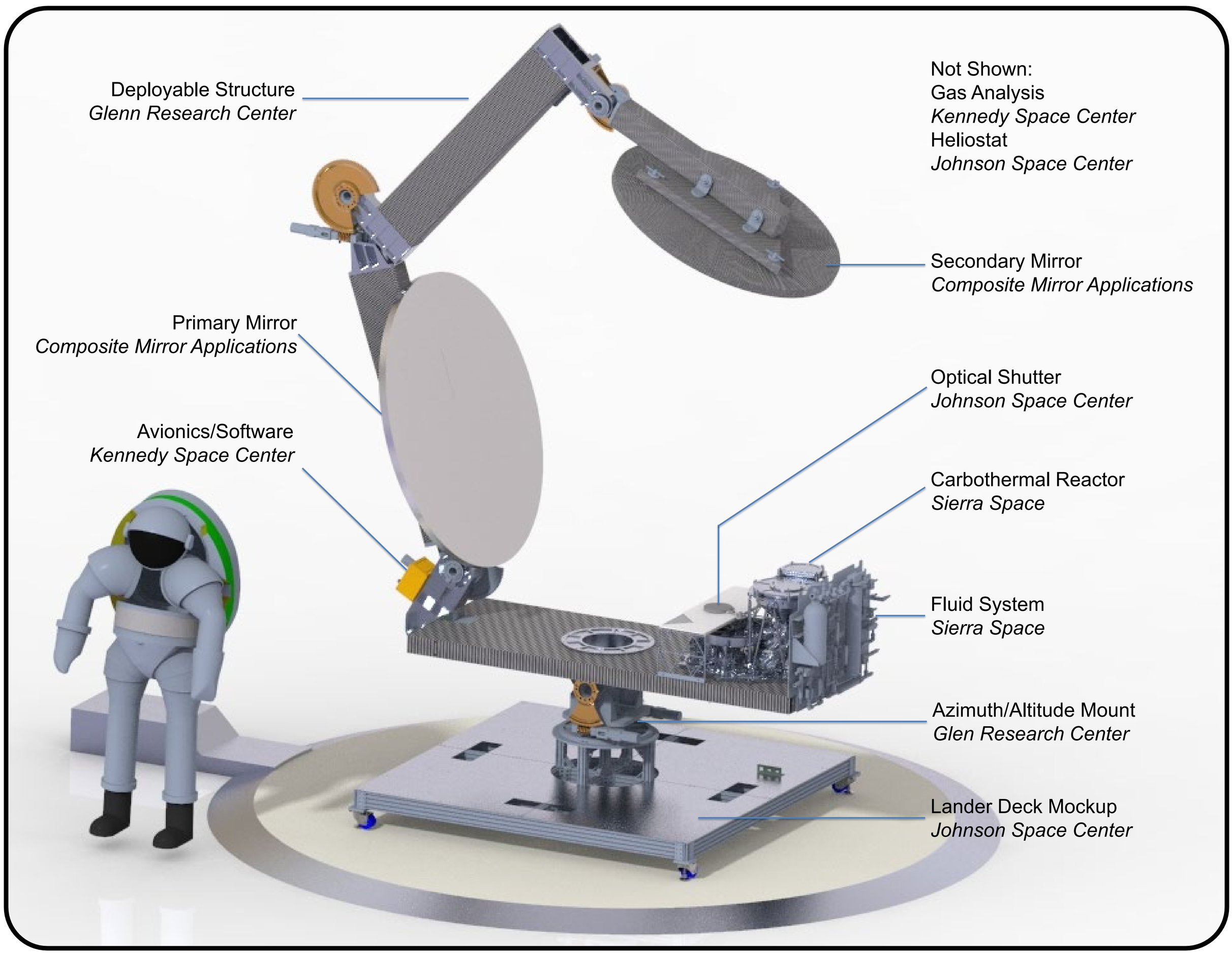
TX 7.1.3 Resource Processing for Production of Mission Consumables TRL: start 4 / current 5

OVERVIEW

This project will integrate the key components of the solar-carbothermal process (solar concentrator, carbothermal reactor, gas analysis, avionics, software) and demonstrate operations in a relevant environment. In the solar-carbothermal reduction process, concentrated solar energy is delivered into a pressurized reactor. The thermal energy delivered to the reactor is used to melt lunar regolith simulant contained within the reactor. The molten regolith reacts with a source of carbon and oxygen is removed from silicate minerals in the form of carbon monoxide. The reaction products are quantified using a mass spectrometer to determine the performance of the process.



CaRD Integrated Solar-Carbothermal Prototype System

CaRD will generate CO that can be combined with hydrogen to make methane and water like Mars ISRU