

Technology Roadmaps for Space Exploration (09)
Technology Development Concepts (2)

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CYGNUS DERIVATIVES FOR TECHNOLOGY DEMONSTRATION AND EXPLORATION
APPLICATIONS**Abstract**

Orbital Sciences' Cygnus spacecraft is designed to provide pressurized cargo services to the International Space Station (ISS) through NASA's COTS and CRS programs. Providing over 25 m³ of pressurized volume and 3.5 kW of solar array power, Cygnus provides a capable, robust, fault tolerant platform for future technology demonstration and exploration applications.

Cygnus provides two key elements that may be efficiently evolved for future applications. First, the Cygnus Pressurized Cargo Module (PCM) is currently optimized for cargo transportation to the station. The PCM has multiple potential paths for PCM evolution, including providing pressurized cargo storage, a capability for human support system development and testing, and pressurized cargo return. The second element of Cygnus is the service module. Enhancement of the service module, like the PCM, may take several paths for enhanced missions. Potential enhancements include upgrades to subsystems to support long duration and deep space missions, and vehicle propulsion system enhancement to support exploration missions. Cygnus also has the capacity to host payloads for technology demonstration missions such as providing a test platform for rendezvous and docking sensors.

This paper presents a roadmap towards developing additional mission capability for Cygnus, and discusses the specific technology demonstration and exploration missions that such a system might support. These missions support NASA's overall exploration goals in the Earth-Moon system, near-Earth, and beyond.

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