The purpose of this subtopic is to develop technologies and concepts that will improve launch processing safety through the use of automated systems with limited human contact; make launch operations more cost- and time-efficient through standardization, commonality, and interoperability of launch systems and spaceport infrastructure; and improve the flexibility and adaptability of spaceport infrastructure in order to accommodate multiple vehicle types and diverse missions. Improvements in launch site operations can enable airport-like efficiencies at reduced cost and shortened processing turnaround time, thereby contributing significantly to the goal of a sustained and affordable space exploration program. Additionally, advanced launch operations technologies and concepts that may significantly improve launch vehicle specific energy or otherwise improve launch performance, affordability, and sustainability for space exploration missions are of interest. Topic areas that will be emphasized for improvements in launch site operations include:

- Propellant handling systems: autonomous propellant loading; automated umbilicals; improved control of cryogenic mass loss; hazardous leak and flame detection; and improved cryogenic cooling, insulation, and sealing technologies;
- Common integrated command and control system technologies for launch site operations: ground integrated health management systems, work control, configuration management, and other support systems;
- Test equipment: universal avionics test equipment and automated and wireless built-in test equipment that reports launch vehicle and/or payload status;
- Launch acoustic modeling and mitigation systems; and
- Payload and launch vehicle systems handling equipment.

Modular designs that employ open architectures and interface standards are very important to assure cost-effectiveness and flexibility of launch site technologies. These architectures should promote extensibility/evolvability and accommodate future system upgrades. Topic areas related to advanced launch operations technologies and concepts include:

- Horizontal launch assist ground systems, including systems that preclude the need for vehicle take-off
gear. Specific technology areas of interest include: vehicle acceleration mechanisms, vehicle structural support or levitation systems, control and stabilization systems, separation mechanisms, runway or track stability and maintenance systems, and energy storage and delivery systems; and

- Other novel launch operations technologies and concepts.

Focus should be on the following applications:

- Earth-based launch site systems for human and robotic space exploration missions.

Note: Related technologies of interest but covered under other SBIR subtopics include:

- X6.01 Intelligent Operations Systems.