

The Space Flight Project is considered WBS Level 1, while the major activities supporting the Project are considered in WBS Level 2. The case study focuses on the following WBS elements for comparison of estimating tools and levels of detail:

- **WBS 1.0: Project Management (PM)** – Includes project management, business management, scheduling, procurement management, etc.
- **WBS 2.0: Systems Engineering (SE)** – Includes management of the technical program efforts such as design engineering, software engineering, system architecture development, integrated test planning, technical oversight, etc.
- **WBS 3.0: Safety & Mission Assurance (SM&A)** ¹ – Includes design, development, review, and verification of procedures to assure that the delivered spacecraft, ground systems, mission operations, and payloads meet performance requirements and function as intended.
- **WBS 5.0: Payload(s)** – The hardware and software serving as the primary purpose or mission-specific equipment, instruments, or experiments carried by a satellite, spacecraft, or launch vehicle. Payloads are mounted on the spacecraft bus and designed to collect data, transmit signals, or perform other relevant mission functions. There are various types of NASA payloads dependent on the mission, including but not limited to: optical telescopes, active/passive microwave instrumentation, and communication instrumentation. This element includes managing and implementing the hardware and software payloads.
- **WBS 6.0: Spacecraft** – The central structure housing various essential subsystems and components. Also referred to as a Bus, these typically include a standard set of subsystems to provide supporting services such as power supply, thermal control, command and data handling, propulsion, and structural support. This element includes all design,

¹ When estimating the costs of space missions, WBS elements 1.0, 2.0, and 3.0 are typically lumped together to cover general oversight and management tasks.

