At NASA, “systems engineering” is defined as a methodical, multi-disciplinary approach for the design, realization, technical management, operations, and retirement of a system. A “system” is the combination of elements that function together to produce the capability required to meet a need. The elements include all hardware, software, equipment, facilities, personnel, processes, and procedures needed for this purpose; that is, all things required to produce system-level results. The results include system- level qualities, properties, characteristics, functions, behavior, and performance. The value added by the system as a whole, beyond that contributed independently by the parts, is primarily created by the relationship among the parts; that is, how they are interconnected.1 It is a way of looking at the “big picture” when making technical decisions. It is a way of achieving stakeholder functional, physical, and operational performance requirements in the intended use environment over the planned life of the system within cost, schedule, and other constraints. It is a methodology that supports the containment of the life cycle cost of a system. In other words, systems engineering is a logical way of thinking.

Systems engineering is the art and science of devel­oping an operable system capable of meeting require­ments within often opposed constraints. Systems engineering is a holistic, integrative discipline, wherein the contributions of structural engineers, electrical engineers, mechanism designers, power engineers, human factors engineers, and many more disciplines are evaluated and balanced, one against another, to produce a coherent whole that is not dom­inated by the perspective of a single discipline.2

Systems engineering seeks a safe and balanced design in the face of opposing interests and multiple, some­times conflicting constraints. The systems engineer should develop the skill for identifying and focusing efforts on assessments to optimize the overall design and not favor one system/subsystem at the expense of another while constantly validating that the goals of the operational system will be met. The art is in knowing when and where to probe. Personnel with these skills are usually tagged as “systems engineers.” They may have other titles—lead systems engineer.