Systems Engineering (SE)

Return to Glossary

Systems Engineering (SE) is a transdisciplinary and integrative approach to enable the successful realization, use, and retirement of engineered systems, using systems principles and concepts, and scientific, technological, and management methods.

We use the terms “engineering” and “engineered” in their widest sense: “the action of working artfully to bring something about”. “Engineered systems” may be composed of any or all of people, products, services, information, processes, and natural elements.

Systems Engineering focuses on:

- Establishing, balancing and integrating stakeholders’ goals, purpose and success criteria, and defining actual or anticipated customer needs, operational concept and required functionality, starting early in the development cycle;
- Establishing an appropriate lifecycle model, process approach and governance structures, considering the levels of complexity, uncertainty, change, and variety;
- Generating and evaluating alternative solution concepts and architectures;
- Baselining and modelling requirements and selected solution architecture for each phase of the endeavor;
- Performing design synthesis and system verification and validation;
- While considering both the problem and solution domains, taking into account necessary enabling systems and services, identifying the role that the parts and the relationships between the parts play with respect to the overall behavior and performance of the system, and determining how to balance all of these factors to achieve a satisfactory outcome.

Systems Engineering provides facilitation, guidance and leadership to integrate the relevant disciplines and specialty groups into a cohesive effort, forming an appropriately structured development process that proceeds from concept to production, operation, evolution and eventual disposal.

Systems Engineering considers both the business and the technical needs of customers with the goal of providing a quality solution that meets the needs of users and other stakeholders, is fit for the intended purpose in real-world operation, and avoids or minimizes adverse unintended consequences.

The goal of all **Systems Engineering** activities is to manage risk, including the risk of not delivering what the customer wants and needs, the risk of late delivery, the risk of excess cost, and the risk of negative unintended consequences. One measure of utility of **Systems Engineering** activities is the degree to which such risk is reduced. Conversely, a measure of acceptability of absence of a System Engineering activity is the level of excess risk incurred as a result.

Source:
https://www.incose.org/about-systems-engineering/system-and-se-definition/systems-engineering-definition