

Systems Engineering Analysis Decision Support (SEADS) Methods and Tools for Improved S&T Development of Future Warfighter Capabilities

Systems engineering methods and tools provide the structure for improving effectiveness and efficiency of program management and for improving success of technology transitions and transfers. This paper presents tool-development work aimed at automating the process called Systems Engineering Tailored for Science and Technology (SETFST), which is used effectively throughout the Air Force Research Laboratory (AFRL). Under a Cooperative Research and Development Agreement (CRADA) with AFRL/RX (Materials and Manufacturing Directorate), SynGenics is developing an integrated set of Excel-based applications, the SEADS Toolkit, which assists program teams in applying this process. Under the terms of this five-year agreement, SynGenics provides the SEADS Toolkit, including periodic upgrades, at no monetary cost to AFRL. In return for free use of the software, AFRL users will provide feedback and suggested improvements to the SEADS Toolkit.

SETFST utilizes a variety of mathematical techniques to determine valuable characteristics of a new product or technology and the priority of those wants and needs (*desirements*) among its eventual users. Employing the SETFST Process often shortens the time and reduces the cost of the research program. The SEADS Toolkit leads to a value model to support investment decision-making to maximize the likelihood of satisfying those desirements and achieving Capability Concepts for the warfighter. Using a case study, this paper illustrates how the SEADS Toolkit provides the following capabilities:

- Automation and linking of decision-support functions;
- Execution of burdensome mathematics and data reduction to quantify parameters as teams work toward a best-value decision;
- Facilitation of real-time documentation of ideas, assumptions, rationale and conclusions derived during team meetings; and
- Probabilistic benefit and risk assessments for alternate solutions under consideration.

The Toolkit makes the SETFST process more accessible to program teams, thereby encouraging broader application of the process, which leads to the realization of better research results in shortened timeframes and ultimately to timely technology delivery for the warfighter.