

Development of a Skill and Knowledge Taxonomy
Aligned with Systems Engineering Capability Model, EIA-731
(INCOSE CAB, June 08, 1998)

Background

A need for standards associated with essential practices for systems engineering has been both understood and facilitated through the development of the various systems engineering capability models. These models provide standard process frameworks that may be used in a variety of ways to enhance organizational effectiveness and promote engineering economy. Further, they provide a potential basis for the identification of education and training requirements.

Goal

Develop a knowledge and skills taxonomy framework that may be employed by systems engineering managers and technical practitioners to guide professional development. The knowledge and skill elements in the framework should be aligned with the practices in the Systems Engineering Capability Model. The resulting model should provide an objective basis for developing standard training and education modules or courses that could be appropriately targeted for individuals or groups assigned specified roles. It would probably be advisable to consider various systems engineering roles¹ in the taxonomy or framework as well as both technical needs and systems engineering management needs. Such a framework might be developed that includes levels of knowledge and skill as represented by Bloom's Taxonomy of Educational Objectives (both objective domain and affective domain).

Products

- A Knowledge and Skill Framework or Taxonomy that relates knowledge and skills to standard practices or processes as specified in EIA-731. The resulting product should include a process description for applying the Knowledge and Skill Framework either at a group or individual level.
- A survey of available systems engineering training courses and a mapping of these to the knowledge and skill elements of the taxonomy.

Discussion

In the discussion of the knowledge and skill issue, the CAB recognized a coupling of this issue with the Center of Excellence proposal being pursued by INCOSE. The discussion led to the recognition that there was a larger issue associated with a need to pursue understanding and the systematic cataloging of a body of systems engineering knowledge of which the knowledge and skills proposal is but an instance. The CAB expects to continue exploring the more general issue and possibly bring a recommendation to the INCOSE board at a later date.

It was noted that a number of companies have implemented some variations of a knowledge and skill definition pertaining to systems engineering or software engineering that may be a source of information. It may be worthwhile to survey organizations for relevant information. Rockwell-Collins, Inc. (Ian Philpott), Raytheon (Karl Arunski), IBM (no contact, but IBM Dallas), and NSWCDD (David McConnell) have each done some knowledge and skill taxonomy efforts.

¹ Such as suggested in the paper by Sarah Sheard, Software Productivity Consortium (SPC).