PART II

CONCEPT DEVELOPMENT STAGE

Part II begins the systematic account of the key roles played by systems engineering throughout the three stages of the systems engineering life cycle. This initial stage of the life cycle is where systems engineering makes its greatest contribution to the success of the system development project by performing the function of "systems architecting." The system decisions made during this stage in most cases determine the success or failure of the project.

Chapter 6 introduces the origins of a new system, whether driven by new needs or by technological opportunities. The chapter focuses on the role of systems engineering in the validation of an operational need for a new system and the development of a definitive set of operational requirements.

Chapter 7 presents the concept exploration phase, which explains how system concepts are developed from the requirements, and how several alternative concepts are examined for the purpose of deriving a set of necessary and sufficient performance requirements suitable for defining a system meeting the operational needs.

The final phase in the concept development stage is selecting a preferred system architecture that meets the performance requirements established previously. Chapter 8 describes how systems engineering uses modeling, visualization, and analysis to

accomplish this result. In the acquisition of major systems, the satisfactory completion of this process leads to a commitment to proceed with engineering development and a possible ultimate production of the new system.

The final chapter in this part describes the process and activities involved in engineering-level decision making. A detailed description of the trade-off analysis is provided to provide formality to a systems engineer's thinking about decisions.