Systems Engineering Overview

Section Overview

- This section of the course will discuss:
  - Motivation for Systems Engineering
  - Systems Engineering Process
  - Systems Engineering Method

Acknowledgments

- Portions of this work are from the book, *A Practical Guide to SysML*, by Sanford Friedenthal, Alan Moore, and Rick Steiner, published by Morgan Kaufmann Publishers, Copyright 2009 Elsevier Inc. All rights reserved.

  A Practical Guide to The Systems Modeling Language

  A volume in The MK/OMG Press

  Book • Third Edition • 2015

- This section is based primarily on Chapter 1 of *A Practical Guide*

Motivation for Systems Engineering

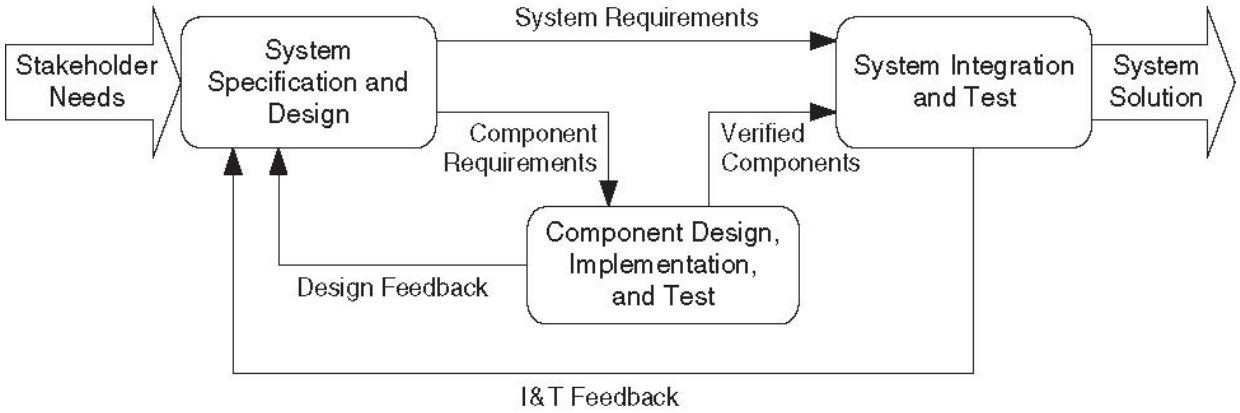
- Competitive pressures demand that systems leverage technological advances to continuously increase capability, reduce cost, and shorten delivery cycles
  - Imposes requirements for increased functionality, interoperability, performance, reliability, and smaller size
  - System interconnectivity drives unanticipated uses and changing requirements
- System development practices must evolve to support these increasing demands

Systems Engineering Process

- Systems Engineering is a multidisciplinary approach to develop balanced system solutions in response to diverse stakeholder needs
- Systems Engineering includes both management and technical processes to achieve this balance
  - Management processes ensure that cost, schedule, and performance objectives are met
  - Technical processes are applied to specify, design, and verify the system

Systems Engineering Process (cont'd)

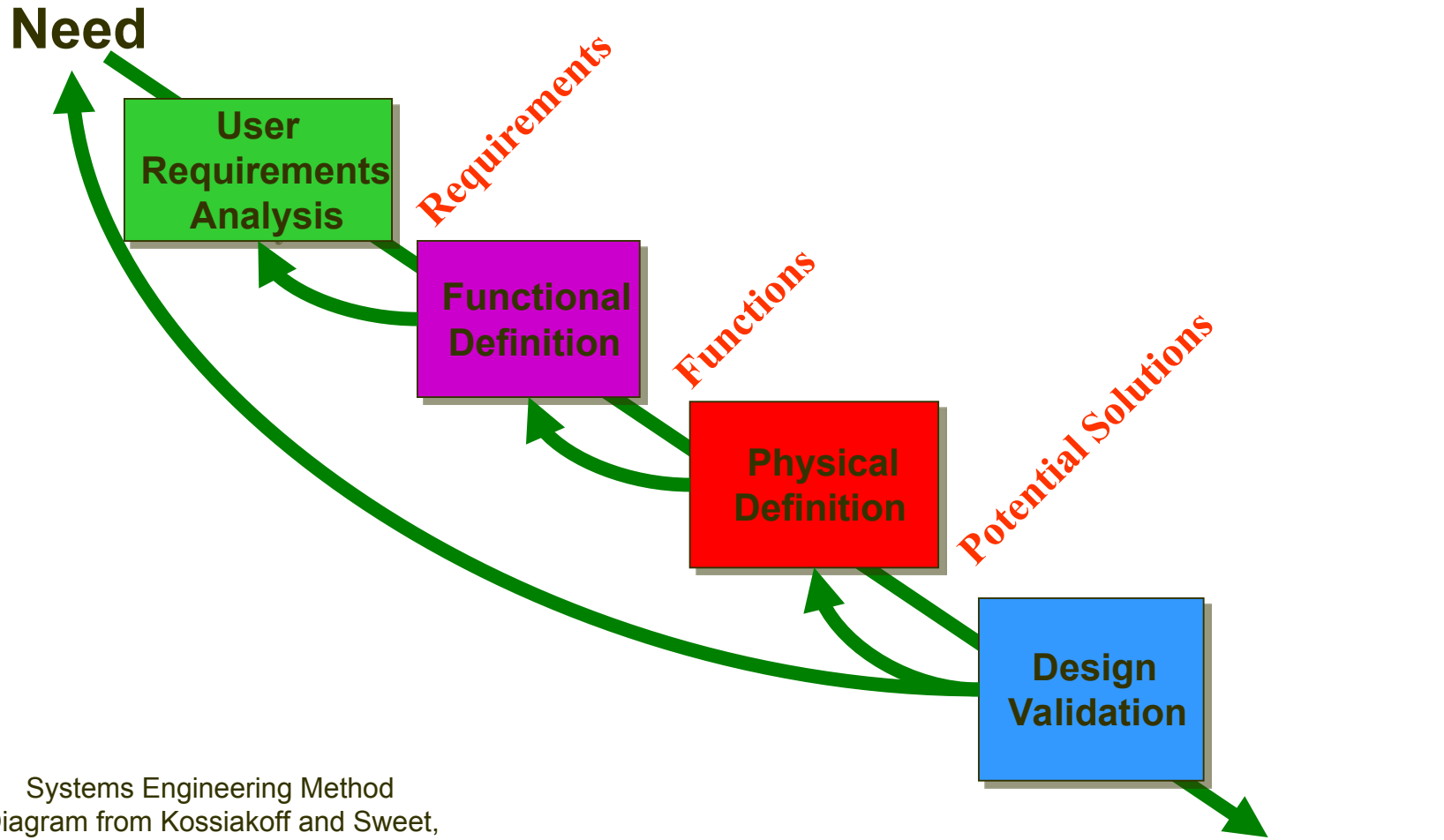
- Simplified view of the systems engineering technical process
  - System Specification and Design
    - Specifies the system and component requirements
  - Component Design, Implementation, and Test
    - Design, Implement, and Test components
  - System Integration and Test
    - Integrates the components into a system and verifies that the system requirements are met



Systems Engineering Method

- Systems Engineering Methods – describes how Systems Engineering activities are performed
- Several Model-Based Systems Engineering (MBSE) Methods available
  - Survey of Model-Based Systems Engineering Methodologies [INCOSE –TD-2007-003-01, 10 June 2008, Estefan]
    - Traditional structured analysis
    - Object-oriented Systems Engineering Method (OOSEM)
    - Rational Unified Process for Systems Engineering (RUP SE)
    - Etc.
- SysML concepts can be applied to various MBSE methodologies

Sample Systems Engineering Method



Systems Engineering Method
Diagram from Kossiakoff and Sweet, p. 70