

1. Record Nr.	UNINA9910154761903321
Autore	Crawley Edward F.
Titolo	Systems architecture : strategy and product development for complex systems / / Bruce Cameron, Edward Crawley, Daniel Selva
Pubbl/distr/stampa	Boston : , : Pearson, , 2016
ISBN	1-292-11085-6
Edizione	[Global edition.]
Descrizione fisica	1 online resource (481 pages) : illustrations
Disciplina	620.001/171
Soggetti	Systems engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Foreword -- Preface -- Part 1 System Thinking -- Introduction to System Architecture -- Architecture of Complex Systems -- The Advantages of Good Architecture -- Learning Objectives -- Organization of the Text -- References -- System Thinking -- 2.1 Introduction -- 2.2 Systems and Emergence -- 2.3 Task 1: Identify the System, Its Form, and Its Function -- 2.4 Task 2: Identify Entities of a System, Their Form, and Their Function -- 2.5 Task 3: Identify the Relationships among the Entities -- 2.6 Task 4 Emergence -- 2.7 Summary -- References -- Thinking about Complex Systems -- 3.1 Introduction -- 3.2 Complexity in Systems -- 3.3 Decomposition of Systems -- 3.4 Special Logical Relationships -- 3.5 Reasoning through Complex Systems -- 3.6 Architecture Representation Tools: SysML and OPM -- 3.7 Summary -- References -- Part 2 Analysis of System Architecture -- Form -- 4.1 Introduction -- 4.2 Form in Architecture -- 4.3 Analysis of Form in Architecture -- 4.4 Analysis of Formal Relationships in Architecture -- 4.5 Formal Context -- 4.6 Form in Software Systems -- 4.7 Summary -- References -- Function -- 5.1 Introduction -- 5.2 Function in Architecture -- 5.3 Analysis of External Function and Value -- 5.4 Analysis of Internal Function -- 5.5 Analysis of Functional Interactions and Functional Architecture -- 5.6 Secondary Value-Related External and Internal Functions -- 5.7 Summary -- References -- System Architecture -- 6.1 Introduction -- 6.2 System Architecture: Form and Function -- 6.3 Non-idealities, Supporting Layers, and Interfaces in

System Architecture -- 6.4 Operational Behavior -- 6.5 Reasoning about Architecture Using Representations -- 6.6 Summary -- References -- Solution-Neutral Function and Concepts -- 7.1 Introduction -- 7.2 Identifying the Solution-Neutral Function -- 7.3 Concept.

7.4 Integrated Concepts -- 7.5 Concepts of Operations and Services -- 7.6 Summary -- References -- From Concept to Architecture -- 8.1 Introduction -- 8.2 Developing the Level 1 Architecture -- 8.3 Developing the Level 2 Architecture -- 8.4 Home Data Network Architecture at Level 2 -- 8.5 Modularizing the System at Level 1 -- 8.6 Summary -- References -- Part 3 Creating System Architecture -- The Role of the Architect -- 9.1 Introduction -- 9.2 Ambiguity and the Role of the Architect -- 9.3 The Product Development Process -- 9.4 Summary -- References -- Upstream and Downstream Influences on System Architecture -- 10.1 Introduction -- 10.2 Upstream Influence: Corporate Strategy -- 10.3 Upstream Influence: Marketing -- 10.4 Upstream Influence: Regulation and Pseudo-Regulatory Influences -- 10.5 Upstream Influence: Technology Infusion -- 10.6 Downstream Influence: Implementation-Coding, Manufacturing, and Supply Chain Management -- 10.7 Downstream Influence: Operations -- 10.8 Downstream Influence: Design for X -- 10.9 Downstream Influence: Product and System Evolution, and Product Families -- 10.10 The Product Case: Architecture Business Case Decision (ABCD) -- 10.11 Summary -- References -- Translating Needs into Goals -- 11.1 Introduction -- 11.2 Identifying Beneficiaries and Stakeholders -- 11.3 Characterizing Needs -- 11.4 Interpreting Needs as Goals -- 11.5 Prioritizing Goals -- 11.6 Summary -- References -- Applying Creativity to Generating a Concept -- 12.1 Introduction -- 12.2 Applying Creativity to Concept -- 12.3 Develop the Concepts -- 12.4 Expand the Concepts and Develop the Concept Fragments -- 12.5 Evolve and Refine the Integrated Concepts -- 12.6 Select a Few Integrated Concepts for Further Development -- 12.7 Summary -- References -- Decomposition as a Tool for Managing Complexity -- 13.1 Introduction -- 13.2 Understanding Complexity.

13.3 Managing Complexity -- 13.4 Summary -- References -- Part 4 Architecture as Decisions -- System Architecture as a Decision-Making Process -- 14.1 Introduction -- 14.2 Formulating the Apollo Architecture Decision Problem -- 14.3 Decisions and Decision Support -- 14.4 Four Main Tasks of Decision Support Systems -- 14.5 Basic Decision Support Tools -- 14.6 Decision Support for System Architecture -- 14.7 Summary -- References -- Reasoning about Architectural Tradespaces -- 15.1 Introduction -- 15.2 Tradespace Basics -- 15.3 The Pareto Frontier -- 15.4 Structure of the Tradespace -- 15.5 Sensitivity Analysis -- 15.6 Organizing Architectural Decisions -- 15.7 Summary -- References -- Formulating and Solving System Architecture Optimization Problems -- 16.1 Introduction -- 16.2 Formulating a System Architecture Optimization Problem -- 16.3 NEOSS Example: An Earth Observing Satellite System for NASA -- 16.4 Patterns in System Architecting Decisions -- 16.5 Formulating a Large-scale System Architecture Problem -- 16.6 Solving System Architecture Optimization Problems -- 16.7 Summary -- References -- Appendices -- Chapter Problems -- Index -- Principles of System Architecture.

Sommario/riassunto

For courses in engineering and technical management

Architecture and Function of Complex Systems

System architecture is the study of early decision making in complex systems. This text teaches how to capture experience and analysis about early system decisions, and how to choose architectures that meet stakeholder needs, integrate easily, and evolve flexibly. With case studies written by leading practitioners,

from hybrid cars to communications networks to aircraft, this text showcases the science and art of system architecture.
