1. Record Nr. UNINA9910814834203321

Autore	De Weck Olivier L
Titolo	Engineering systems : meeting human needs in a complex technological world / / Olivier L. de Weck, Daniel Roos, and Christopher L. Magee ; foreword by Charles M. Vest
Pubbl/distr/stampa	Cambridge, Mass., : MIT Press, ©2011
ISBN	1-280-49933-8 9786613594563 0-262-29851-1 1-61344-589-X
Descrizione fisica	1 online resource (231 p.)
Collana	Engineering systems
Altri autori (Persone)	RoosDaniel MageeChristopher L
Disciplina	620
Soggetti	Engineering systems Systems engineering Engineering design - Psychological aspects
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Contents; Series Foreword; Foreword; Preface; Why This Book?; How Our Book Is Organized; Our MIT Connection; Acknowledgments; Chapter 1. From Inventions to Systems; The Genius of Invention; Inventions Begin to Be Connected; Networks and Infrastructures; Unintended Consequences; Growing Systems Interactions; From Engineering to Engineering Systems; Suggestions for Supplemental Reading; Chapter 2. What Is an Engineering System?; The Changing Role of the Engineer; A Definition; What Else Distinguishes an Engineering System?; Functional Types; Suggestions for Supplemental Reading Chapter 3. (Re)Thinking about SystemsThe (Re)Visioning Perspective; Scale and Scope; Function; Structure (or Architecture); Temporality; Complex Causality; Suggestions for Supplemental Reading; Chapter 4. Life-Cycle Properties of Engineering Systems: The Ilities; The Importance of Not Simply " Working "; Quality; Safety; Usability/Operability; Maintainability/Reliability; An Expanding View;

How the Ilities Are Related; Flexibility; Resilience; Interoperability; Suggestions for Supplemental Reading; Chapter 5. Modeling and Analyzing Engineering Systems; Defining the Scale and Scope of Systems
Describing and Delivering FunctionalityAnalyzing the Structure of Systems; Quantifying Temporality of System Behavior; Suggestions for Supplemental Reading; Chapter 6. Partially Designed, Partially Evolved; Influence of Designed Artifact Scale on Engineering Design; A Large-Scale, Sociotechnical Example: The Toyota Production System; The Partially Designed, Partially Evolved Electrical Grid; The Partially Designed, Partially Evolved Boston Transport System; The Partially Designed, Partially Evolved Internet; Characteristics and Future of Large-Scale Sociotechnical Design
Suggestions for Supplemental ReadingChapter 7. Engineering Systems Research and Education; A Brief History of Engineering Education; Engineering Education ' s New Phase; The Growing Impact of Engineering Systems in Academic Institutions; Much of Traditional Engineering Education Has Changed Focus; An Identity Problem Revealed; Challenges in Academia from Other Integrative Disciplines; The Future Engineering Systems Curriculum; Suggestions for Supplemental Reading; Chapter 8. What the Future Holds; Grand Challenges; Enablers of Success; Scenarios for the Future
Where Are Engineering Systems and the (Re)Visioning Perspective Headed?What Does the Future Hold for Engineering Systems as a Discipline?; A Global System of Systems?; Suggestions for Supplemental Reading; Appendix: Engineering Systems Terms and Definitions; 1. Complexity in Engineering Systems; 2. Basic Terms Related to Engineering Systems; 3. Ilities and Related System Issues; 4. Design/Manufacturing Concepts and Approaches; 5. Risk/Uncertainty/Safety in Design/Manufacturing and Operation; 6. Management and Related Social Science Issues; 7. General Concepts and Approaches Related to Systems
8. System Theories

Sommario/riassunto

Engineering, for much of the twentieth century, was mainly about artifacts and inventions. Now, it's increasingly about complex systems. As the airplane taxis to the gate, you access the Internet and check email with your PDA, linking the communication and transportation systems. At home, you recharge your plug-in hybrid vehicle, linking transportation to the electricity grid. Today's large-scale, highly complex sociotechnical systems converge, interact, and depend on each other in ways engineers of old could barely have imagined. As scale, scope, and complexity increase, engineers consider technical and social issues together in a highly integrated way as they design flexible, adaptable, robust systems that can be easily modified and reconfigured to satisfy changing requirements and new technological opportunities. Engineering Systems offers a comprehensive examination of such systems and the associated emerging field of study. Through scholarly discussion, concrete examples, and history, the authors consider the engineer's changing role, new ways to model and analyze these systems, the impacts on engineering education, and the future challenges of meeting human needs through the technologically enabled systems of today and tomorrow.