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Model-oriented Systems Engineering Science-Duane W. Hybertson 2016-04-19 Systems engineering (SE) is experiencing a significant expansion that encompasses increasingly complex systems. However, a common body of knowledge on how to apply complex systems engineering (CSE) has yet to be developed. A combination of people and other autonomous agents, crossing organization boundaries and continually changing, these hybrid systems are less predictable while being more self-organizing and adaptive than traditional systems. The growing pains of this evolution and the ever-widening reach of SE technology require an effective foundation for integrating traditional and complex engineering methods, addressing machine and human interaction, as well as scaling up and down, from nano scale to the macro system-of-systems level. Model-oriented Systems Engineering Science: A Unifying Framework for Traditional and Complex Systems addresses solutions to that expansion and integration problem. This text takes advantage of better-understood systems science (SS) to support the transition, identifying and using commonalities between complex systems and other sciences, such as biology, sociology, cognitive science, organizational theory, and computational science. The author defines Model-oriented Systems Engineering Science (MOSES), an organized system that selects appropriate information from these disciplines and unifies it into a coherent framework. The result is a seamless approach to the class of systems across the extended scope of the new SE—a foundation upon which to develop an enhanced and unified SE. Modeling orientation (MO) provides a common perspective on the entire SES/SE enterprise, including all supporting sciences, engineering for the full range of traditional, complex, and hybrid systems, and their management. This book extends existing modeling approaches into an MO that views all science artifacts and engineering artifacts as models of systems. It organizes them into a virtual structured repository called the "SE model space"—effectively a container for the accumulating body of SE and SES knowledge in the form of models and patterns. By organizing and integrating all these elements into a common framework, the author makes the material not only easily accessible but also immediately applicable, and provides a well-grounded basis for future growth and evolution of the SE discipline.

Systems Engineering in Context-Stephen Adams 2019-06-21 This volume chronicles the 16th Annual Conference on System Engineering Research (CSER) held on May 8-9, 2018 at the University of Virginia, Charlottesville, Virginia, USA. The CSER offers researchers in academia, industry, and government a common forum to present, discuss, and influence systems engineering research. It provides access to forward-looking research from across the globe, by renowned academicians as well as perspectives from senior industry and government representatives. Co-founded by the University of Southern California and Stevens Institute of Technology in 2003, CSER has become the preeminent event for researchers in systems engineering across the globe. Topics include though are not limited to the following: Systems in context: · Formative methods: requirements · Integration, deployment, assurance · Human Factors · Safety and Security Decisions/ Control & Design; Systems Modeling: · Optimization, Multiple Objectives, Synthesis · Risk and resiliency · Collaborative autonomy · Coordination and distributed decision-making Prediction: · Prescriptive modeling; state estimation · Stochastic approximation, stochastic optimization and control Integrative Data engineering: · Sensor Management · Design of Experiments

Disciplinary Convergence in Systems Engineering Research-Azad M. Madni 2017-11-24 The theme of this volume on systems engineering research is disciplinary convergence: bringing together concepts, thinking, approaches, and technologies from diverse disciplines to solve complex problems. Papers presented at the Conference on Systems Engineering Research (CSER), March 23-25, 2017 at Redondo Beach, CA, are included in this volume. This collection provides researchers in academia, industry, and government forward-looking research from across the globe, written by renowned academic, industry and government researchers.

Systems Engineering of Software-Enabled Systems-Richard E. Fairley 2019-06-17 A comprehensive review of the life cycle processes, methods, and techniques used to develop and modify software-enabled systems Systems Engineering of Software-Enabled Systems offers an authoritative review of the most current methods and techniques that can improve the links between systems engineering and software engineering. The author—a noted expert on the topic—offers an introduction to systems engineering and software engineering and presents the issues caused by the differences between the two during development process. The book reviews the traditional approaches used by systems engineers and software engineers and explores how they differ. The book presents an approach to developing software-enabled systems that integrates the incremental approach used by systems engineers and the iterative approach used by software engineers. This unique approach is based on developing system capabilities that will provide the features, behaviors, and quality attributes needed by stakeholders, based on model-based system architecture. In addition, the author covers the management activities that a systems engineer or software engineer must engage in to manage and lead the technical work to be done. This important book: Offers an approach to improving the process of working with systems engineers and software engineers Contains information on the planning and estimating, measuring and controlling, managing risk, and organizing and leading systems engineering teams Includes a discussion of the key points of each chapter and exercises for review Suggests numerous references that provide additional readings for development of software-enabled physical systems Provides two case studies as running examples throughout the text Written for advanced undergraduates, graduate students, and practitioners, Systems Engineering of Software-Enabled Systems offers a comprehensive resource to the traditional and current techniques that can improve the links between systems engineering and software engineering.

Intelligent Diagnosis and Prognosis of Industrial Networked Systems-Chee Khiang Pang 2017-07-28 In an era of intense competition where plant operating efficiencies must be maximized, downtime due to machinery failure has become more costly. To cut operating costs and increase revenues, industries have an urgent need to predict fault progression and remaining lifespan of industrial machines, processes, and systems. An engineer who mounts an acoustic sensor onto a spindle motor wants to know when the ball bearings will wear out without having to halt the ongoing milling processes. A scientist working on sensor networks wants to know which sensors are redundant and can be pruned off to save operational and computational overheads. These scenarios illustrate a need for new and unified perspectives in system analysis and design for engineering applications. Intelligent Diagnosis and Prognosis of Industrial Networked Systems proposes linear mathematical tool sets that can be applied to realistic engineering systems. The book offers an overview of the fundamentals of vectors, matrices, and linear systems theory required for intelligent diagnosis and prognosis of industrial networked systems. Building on this theory, it then develops automated mathematical machineries and formal decision software tools for real-world applications. The book includes portable tool sets for many industrial applications, including: Forecasting machine tool wear in industrial cutting machines Reduction of sensors and features for industrial fault detection and isolation (FDI) Identification of critical resonant modes in mechatronic systems for system design of R&D Probabilistic small-signal stability in large-scale interconnected power systems Discrete event command and control for military applications The book also proposes future directions for intelligent diagnosis and prognosis in energy-efficient manufacturing, life cycle assessment, and systems of systems architecture. Written in a concise and accessible style, it presents tools that are mathematically rigorous but not involved. Bridging academia, research, and industry, this reference supplies the know-how for engineers and managers making decisions about equipment maintenance, as well as researchers and students in the field.

INCOSE Systems Engineering Handbook-INCOSE 2015-06-12 A detailed and thorough reference on the discipline and practice of systems engineering The objective of the International Council on Systems Engineering (INCOSE) Systems Engineering Handbook is to describe key process activities performed by systems engineers and other engineering professionals throughout the life cycle of a system. The book covers a wide range of fundamental system concepts that broaden the thinking of the systems engineering practitioner, such as system thinking, system science, life cycle management, specialty engineering, system of systems, and agile and iterative methods. This book also defines the discipline and practice of systems engineering for students and practicing professionals alike, providing an authoritative reference that is acknowledged worldwide. The latest edition of the INCOSE Systems Engineering Handbook: Is consistent with ISO/IEC/IEEE 15288:2015 Systems and software engineering—System life cycle processes and the Guide to the Systems Engineering Body of Knowledge (SEBoK) Has been updated to include the latest concepts of the INCOSE working groups Is the body of knowledge for the INCOSE Certification Process This book is ideal for any engineering professional who has an interest in or needs to apply systems engineering practices. This includes the experienced systems engineer who needs a convenient reference, a product engineer or engineer in another discipline who needs to perform systems engineering, a new systems engineer, or anyone interested in learning more about systems engineering.

Requirements Engineering-Elizabeth Hull 2005-12-06 Written for those who want to develop their knowledge of requirements engineering process, whether practitioners or students. Using the latest research and driven by practical experience from industry, Requirements Engineering gives useful hints to practitioners on how to write and structure requirements. It explains the importance of Systems Engineering and the creation of effective solutions to problems. It describes the underlying representations used in system modeling and introduces the UML2, and considers the relationship between requirements and modeling. Covering a generic multi-layer requirements process, the book discusses the key elements of effective requirements management. The latest version of DOORS (Version 7) - a software tool which serves as an enabler of a requirements management process - is also introduced to the reader here. Additional material and links are available at: <http://www.requirementsengineering.info>

Systems Engineering: Principles And Practice-Alexander Kossiakoff 2009-11-17 This book is based on class notes for a course in the MS program in Systems Engineering at Johns Hopkins University. The program was a cooperative effort between senior systems engineers from the Johns Hopkins University Applied Physics Laboratory and the Westinghouse Electric Company. The authors were part of the curriculum design team as well as members of the faculty.

Human-Systems Integration-Guy André Boy 2020-02-06 Human-Systems Integration: From Virtual to Tangible Subject Guide: Ergonomics and Human Factors This book is an attempt to better formalize a systemic approach to human-systems integration (HSI). Good HSI is a matter of maturity... it takes time to mature. It takes time for a human being to become autonomous, and then mature! HSI is a matter of human-machine teaming, where human-machine cooperation and coordination are crucial. We cannot think engineering design without considering people and organizations that go with it. We also cannot think new technology, new organizations, and new jobs without considering change management. More specifically, this book is a follow-up of previous contributions in human-centered design and practice in the development of virtual prototypes that requires progressive operational tangibility toward HSI. The book discusses flexibility in design and operations, tangibility of software-intensive systems, virtual human-centered design, increasingly autonomous complex systems, human factors and ergonomics of sociotechnical systems, systems integration, and changed management in digital organizations. The book will be of interest to industry, academia, those involved with systems engineering, human factors, and the broader public.

Model Based Systems Engineering-Patrice Micouin 2014-10-06 This book is a contribution to the definition of a model based system engineering (MBSE) approach, designed to meet the objectives laid out by the INCOSE. After pointing out the complexity that jeopardizes a lot of system developments, the book examines fundamental aspects of systems under consideration. It goes on to address methodological issues and proposes a methodic approach of MBSE that provides, unlike current practices, systematic and integrated model-based engineering processes. An annex describes relevant features of the VHDL-AMS language supporting the methodological issues described in the book.

MITRE Systems Engineering Guide- 2012-06-05

SysML Distilled-Lenny Delligatti 2014 The Systems Modeling Language (SysML) extends UML with powerful systems engineering capabilities for modeling a wider spectrum of systems and capturing all aspects of a system's design. SysML Distilled is the first clear, concise guide for everyone who wants to start creating effective SysML models. (Drawing on his pioneering experience at Lockheed Martin and NASA, Lenny Delligatti illuminates SysML's core components and provides practical advice to help you create good models and good designs. Delligatti begins with an easy-to-understand overview of Model-Based Systems Engineering (MBSE) and an explanation of how SysML enables effective system specification, analysis, design, optimization, verification, and validation. Next, he shows how to use all nine types of SysML diagrams, even if you have no previous experience with modeling languages. A case study running through the text demonstrates the use of SysML in modeling a complex, real-world sociotechnical system. Modeled after Martin Fowler's classic UML Distilled, Delligatti's indispensable guide quickly teaches you what you need to know to get started and helps you deepen your knowledge incrementally as the need arises. Like SysML itself, the book is method independent and is designed to support whatever processes, procedures, and tools you already use. Coverage Includes Why SysML was created and the business case for using it Quickly putting SysML to practical use What to know before you start a SysML modeling project Essential concepts that apply to all SysML diagrams SysML diagram elements and relationships Diagramming block definitions, internal structures, use cases, activities, interactions, state machines, constraints, requirements, and packages Using allocations to define mappings among elements across a model SysML notation tables, version changes, and sources for more information

Security and Quality in Cyber-Physical Systems Engineering-Stefan Biffl 2019-11-09 This book examines the requirements, risks, and solutions to improve the security and quality of complex cyber-physical systems (C-CPS), such as production systems, power plants, and airplanes, in order to ascertain whether it is possible to protect engineering organizations against cyber threats and to ensure engineering project quality. The book consists of three parts that logically build upon each other. Part I "Product Engineering of Complex Cyber-Physical Systems" discusses the structure and behavior of engineering organizations producing complex cyber-physical systems, providing insights into processes and engineering activities, and highlighting the requirements and border conditions for secure and high-quality engineering. Part II "Engineering Quality Improvement" addresses quality improvements with a focus on engineering data generation, exchange, aggregation, and use within an engineering organization, and the need for proper data modeling and engineering-result validation. Lastly, Part III "Engineering Security Improvement" considers security aspects concerning C-CPS engineering, including engineering organizations' security assessments and engineering data management, security concepts and technologies that may be leveraged to mitigate the manipulation of engineering data, as well as design and run-time aspects of secure complex cyber-physical systems. The book is intended for several target groups: it enables computer scientists to identify research issues related to the development of new methods, architectures, and technologies for improving quality and security in multi-disciplinary engineering, pushing forward the current state of the art. It also allows researchers involved in the engineering of C-CPS to gain a better understanding of the challenges and requirements of multi-disciplinary engineering that will guide them in their future research and development activities. Lastly, it offers practicing engineers and managers with engineering backgrounds insights into the benefits and limitations of applicable methods, architectures, and technologies for selected use cases.

Systems Architecting of Organizations-Eberhardt Rechtin 2017-10-19 The most difficult questions facing organizations today do not have scientifically or mathematically provable solutions. Many answers that do exist depend upon time and circumstance. Systems Architecting of Organizations: Why Eagles Can't Swim tackles a very difficult dilemma: how do even highly respected organizations maintain their vaunted excellence, accommodate the new world of global communications, transportation, economics and multinational security, and still survive against stiff competition already in place? As they are finding out, depending upon the circumstances, the demands of excellence on the one hand, and of change on the other, can be cruelly irreconcilable. This book does not just describe business strengths and weaknesses. First, it identifies potential weaknesses, then offers guidelines and insights to address them. Its approach is architectural and heuristic. Second, this book is about maintaining success in a dynamic world, not about achieving it in a static one; few are clear on what to do and not to do in the face of major change. Systems Architecting of Organizations: Why Eagles Can't Swim helps professionals gain new perspectives when reviewing their own organizations and to see problems and opportunities previously not apparent. Features

Complex Systems Design & Management-Marc Aiguier 2012-10-19 This book contains all refereed papers that were accepted to the third edition of the « Complex Systems Design & Management » (CSD&M 2012) international conference that took place in Paris (France) from December 12-14, 2012. (Website: <http://www.csdm2012.csdm.fr>) These proceedings cover the most recent trends in the emerging field of complex systems sciences & practices from an industrial and academic perspective, including the main industrial domains (transport, defense & security, electronics, energy & environment, e-services), scientific & technical topics (systems fundamentals, systems architecture & engineering, systems metrics & quality, systemic tools) and system types (transportation systems, embedded systems, software & information systems, systems of systems, artificial ecosystems). The CSD&M 2012 conference is organized under the guidance of the CESAMES non-profit organization (<http://www.cesames.net>).

Essentials of Project and Systems Engineering Management-Howard Eisner 2011-11-17 The Third Edition of Essentials of Project and Systems Engineering Management enables readers to manage the design, development, and engineering of systems effectively and efficiently. The book both defines and describes the essentials of project and systems engineering management and, moreover, shows the critical relationship and interconnection between project management and systems engineering. The author's comprehensive presentation has proven successful in enabling both engineers and project managers to understand their roles, collaborate, and quickly grasp and apply all the basic principles. Readers familiar with the previous two critically acclaimed editions will find much new material in this latest edition, including: Multiple views of and approaches to architectures The systems engineer and software engineering The acquisition of systems Problems with systems, software, and requirements Group processes and decision making System complexity and integration Throughout the presentation, clear examples help readers understand how concepts have been put into practice in real-world situations. With its unique integration of project management and systems engineering, this book helps both engineers and project managers across a broad range of industries successfully develop and manage a project team that, in turn, builds successful systems. For engineering and management students in such disciplines as technology management, systems engineering, and industrial engineering, the book provides excellent preparation for moving from the classroom to industry.

Mechatronic Futures-Peter Hehenberger 2016-06-10 Offering a comprehensive overview of the challenges, risks and options facing the future of mechatronics, this book provides insights into how these issues are currently assessed and managed. Building on the previously published book 'Mechatronics in Action,' it

identifies and discusses the key issues likely to impact on future mechatronic systems. It supports mechatronics practitioners in identifying key areas in design, modeling and technology and places these in the wider context of concepts such as cyber-physical systems and the Internet of Things. For educators it considers the potential effects of developments in these areas on mechatronic course design, and ways of integrating these. Written by experts in the field, it explores topics including systems integration, design, modeling, privacy, ethics and future application domains. Highlighting novel innovation directions, it is intended for academics, engineers and students working in the field of mechatronics, particularly those developing new concepts, methods and ideas.

Agile Systems Engineering-Bruce Powel Douglass 2015-09-24 Agile Systems Engineering presents a vision of systems engineering where precise specification of requirements, structure, and behavior meet larger concerns as such as safety, security, reliability, and performance in an agile engineering context. World-renown author and speaker Dr. Bruce Powel Douglass incorporates agile methods and model-based systems engineering (MBSE) to define the properties of entire systems while avoiding errors that can occur when using traditional textual specifications. Dr. Douglass covers the lifecycle of systems development, including requirements, analysis, design, and the handoff to specific engineering disciplines. Throughout, Dr. Douglass couples agile methods with SysML and MBSE to arm system engineers with the conceptual and methodological tools they need to avoid specification defects and improve system quality while simultaneously reducing the effort and cost of systems engineering. Identifies how the concepts and techniques of agile methods can be effectively applied in systems engineering context Shows how to perform model-based functional analysis and tie these analyses back to system requirements and stakeholder needs, and forward to system architecture and interface definition Provides a means by which the quality and correctness of systems engineering data can be assured (before the entire system is built!) Explains agile system architectural specification and allocation of functionality to system components Details how to transition engineering specification data to downstream engineers with no loss of fidelity Includes detailed examples from across industries taken through their stages, including the "Waldo" industrial exoskeleton as a complex system

Systems Engineering-Reinhard Haberfellner 2019-06-06 This translation brings a landmark systems engineering (SE) book to English-speaking audiences for the first time since its original publication in 1972. For decades the SE concept championed by this book has helped engineers solve a wide variety of issues by emphasizing a top-down approach. Moving from the general to the specific, this SE concept has situated itself as uniquely appealing to both highly trained experts and anybody managing a complex project. Until now, this SE concept has only been available to German speakers. By shedding the overtly technical approach adopted by many other SE methods, this book can be used as a problem-solving guide in a great variety of disciplines, engineering and otherwise. By segmenting the book into separate parts that build upon each other, the SE concept's accessibility is reinforced. The basic principles of SE, problem solving, and systems design are helpfully introduced in the first three parts. Once the fundamentals are presented, specific case studies are covered in the fourth part to display potential applications. Then part five offers further suggestions on how to effectively practice SE principles; for example, it not only points out frequent stumbling blocks, but also the specific points at which they may appear. In the final part, a wealth of different methods and tools, such as optimization techniques, are given to help maximize the potential use of this SE concept. Engineers and engineering students from all disciplines will find this book extremely helpful in solving complex problems. Because of its practicable lessons in problem-solving, any professional facing a complex project will also find much to learn from this volume.

Industrial Internet of Things-Sabina Jeschke 2016-10-12 This book develops the core system science needed to enable the development of a complex industrial internet of things/manufacturing cyber-physical systems (IIoT/M-CPS). Gathering contributions from leading experts in the field with years of experience in advancing manufacturing, it fosters a research community committed to advancing research and education in IIoT/M-CPS and to translating applicable science and technology into engineering practice. Presenting the current state of IIoT and the concept of cybermanufacturing, this book is at the nexus of research advances from the engineering and computer and information science domains. Readers will acquire the core system science needed to transform to cybermanufacturing that spans the full spectrum from ideation to physical realization.

Handbook of Human Factors and Ergonomics-Gavriel Salvendy 2012-05-24 The fourth edition of the Handbook of Human Factors and Ergonomics has been completely revised and updated. This includes all existing third edition chapters plus new chapters written to cover new areas. These include the following subjects: Managing low-back disorder risk in the workplace Online interactivity Neuroergonomics Office ergonomics Social networking HF&E in motor vehicle transportation User requirements Human factors and ergonomics in aviation Human factors in ambient intelligent environments As with the earlier editions, the main purpose of this handbook is to serve the needs of the human factors and ergonomics researchers, practitioners, and graduate students. Each chapter has a strong theory and scientific base, but is heavily focused on realworld applications. As such, a significant number of case studies, examples, figures, and tables are included to aid in the understanding and application of the material covered.

Systems Engineering Tools and Methods-Ali K. Kamrani 2010-12-16 With coverage that draws from diverse disciplines, Systems Engineering Tools and Methods demonstrates how, using integrated or concurrent engineering methods, you can empower development teams. Copiously illustrated with figures, charts, and graphs, the book offers methods, frameworks, techniques, and tools for designing, implementing, and managing

Mechatronics for Cultural Heritage and Civil Engineering-Erika Ottaviano 2018-01-11 This book presents recent advances in mechatronic and integrated monitoring and management systems with applications to architectural, archaeology survey, construction management and civil engineering. It consists of 16 chapters authored by recognized experts in a variety of fields including dynamics, signal processing, inverse modeling, robotics and automation, in particular, here applied to design and construction of civil structures and architectural survey, monitoring and maintenance of cultural heritage assets, structures and infrastructure. The book is organized in three main sections: "Robotics and Automation", "Digital Technologies for Cultural Heritage" and "Civil Structural Health Monitoring". Topics include image processing for automated visual inspection, fiber optical sensor technology, wireless sensor monitoring, bridge inspection and monitoring of tunnel infrastructures, design tools for construction engineering, smart cities. Direct and inverse modeling of multibody systems and robots contributes to the development of applications for civil engineering and smart cities. Digital technology and mechatronic systems changes the way of looking at restoration of historical and archeological sites, analysis, inspection, visualization, management systems and sensor network for Human-Machine Interfaces (HMI). Combined use of geographical information system (GIS), laser scanner, remote sensing, digital thermography and drones as integrated systems permits to highlight new frontier for building and infrastructure knowledge. The book offers a valuable reference work for scientists, architects, engineers, researchers and practitioners in engineering and architecture since the integrated development of new technologies for the design and management of existing and new infrastructure may produce a new market of services and products for safe and economically optimized infrastructure management. Through the dissemination of advanced research developments in mechatronics and integrated management systems, the book promotes exchanges and collaborations among researchers of different disciplines. The book contributes to further advancements in the rapidly growing field of integration of robotic, automation and information technologies in the area of facilities and infrastructure management and construction processes.

Software Project Management in a Changing World-Günther Ruhe 2014-09-04 By bringing together various current directions, Software Project Management in a Changing World focuses on how people and organizations can make their processes more change-adaptive. The selected chapters closely correspond to the project management knowledge areas introduced by the Project Management Body of Knowledge, including its extension for managing software projects. The contributions are grouped into four parts, preceded by a general introduction. Part I "Fundamentals" provides in-depth insights into fundamental topics including resource allocation, cost estimation and risk management. Part II "Supporting Areas" presents recent experiences and results related to the management of quality systems, knowledge, product portfolios and global and virtual software teams. Part III "New Paradigms" details new and evolving software-development practices including agile, distributed and open and inner-source development. Finally, Part IV "Emerging Techniques" introduces search-based techniques, social media, software process simulation and the efficient use of empirical data and their effects on software-management practices. This book will attract readers from both academia and practice with its excellent balance between new findings and experience of their usage in new contexts. Whenever appropriate, the presentation is based on evidence from empirical evaluation of the proposed approaches. For researchers and graduate students, it presents some of the latest methods and techniques to accommodate new challenges facing the discipline. For professionals, it serves as a source of inspiration for refining their project-management skills in new areas.

Complex Systems Design & Management-Omar Hammami 2012-01-12 This book contains all refereed papers that were accepted to the second edition of the « Complex Systems Design & Management » (CSDM 2011) international conference that took place in Paris (France) from December 7 to December 9, 2011. (Website: <http://www.csdm2011.csdm.fr/>). These proceedings cover the most recent trends in the emerging field of complex systems sciences & practices from an industrial and academic perspective, including the main industrial domains (transport, defense & security, electronics, energy & environment, e-services), scientific & technical topics (systems fundamentals, systems architecture & engineering, systems metrics & quality, systemic tools) and system types (transportation systems, embedded systems, software & information systems, systems of systems, artificial ecosystems). The CSDM 2011 conference is organized under the guidance of the CESAMES non-profit organization (<http://www.cesames.net/>).

Case Studies in System of Systems, Enterprise Systems, and Complex Systems Engineering-Alex Gorod 2014-07-01 Suitable as a reference for industry practitioners and as a textbook for classroom use, Case Studies in System of Systems, Enterprise Systems, and Complex Systems Engineering provides a clear

understanding of the principles and practice of system of systems engineering (SoSE), enterprise systems engineering (ESE), and complex systems engineering (CSE). Multiple domain practitioners present and analyze case studies from a range of applications that demonstrate underlying principles and best practices of transdisciplinary systems engineering. A number of the case studies focus on addressing real human needs. Diverse approaches such as use of soft systems skills are illustrated, and other helpful techniques are also provided. The case studies describe, examine, analyze, and assess applications across a range of domains, including: Engineering management and systems engineering education Information technology business transformation and infrastructure engineering Cooperative framework for and cost management in the construction industry Supply chain modeling and decision analysis in distribution centers and logistics International development assistance in a foreign culture of education Value analysis in generating electrical energy through wind power Systemic risk and reliability assessment in banking Assessing emergencies and reducing errors in hospitals and health care systems Information fusion and operational resilience in disaster response systems Strategy and investment for capability developments in defense acquisition Layered, flexible, and decentralized enterprise architectures in military systems Enterprise transformation of the air traffic management and transport network Supplying you with a better understanding of SoSE, ESE, and CSE concepts and principles, the book highlights best practices and lessons learned as benchmarks that are applicable to other cases. If adopted correctly, the approaches outlined can facilitate significant progress in human affairs. The study of complex systems is still in its infancy, and it is likely to evolve for decades to come. While this book does not provide all the answers, it does establish a platform, through which analysis and knowledge application can take place and conclusions can be made in order to educate the next generation of systems engineers.

Software Systems Engineering-Andrew P. Sage 1990-03-29 This introduction to software systems engineering shows how to integrate efficient tools for software engineering into a complete systems-design methodology. The theme is improvement of software productivity via the methods, design methodologies, and management approaches of systems engineering. Covered are rapid prototyping, reusability constructs, knowledge-based systems for software development, interactive support-system environments, and systems management.

Computer Information Systems and Industrial Management-Khalid Saeed 2019-10-07 This book constitutes the proceedings of the 18th International Conference on Computer Information Systems and Industrial Management Applications, CISIM 2019, held in Belgrade, Serbia, in September 2019. The 43 full papers presented together with 3 abstracts of keynotes were carefully reviewed and selected from 70 submissions. The main topics covered by the chapters in this book are biometrics, security systems, multimedia, classification and clustering, industrial management. Besides these, the reader will find interesting papers on computer information systems as applied to wireless networks, computer graphics, and intelligent systems. The papers are organized in the following topical sections: biometrics and pattern recognition applications; computer information systems; industrial management and other applications; machine learning and high performance computing; modelling and optimization; various aspects of computer security.

IoT Automation-Jerker Delsing 2017-02-17 This book presents an in-depth description of the Arrowhead Framework and how it fosters interoperability between IoT devices at service level, specifically addressing application. The Arrowhead Framework utilizes SOA technology and the concepts of local clouds to provide required automation capabilities such as: real time control, security, scalability, and engineering simplicity. Arrowhead Framework supports the realization of collaborative automation; it is the only IoT Framework that addresses global interoperability across multiplet SOA technologies. With these features, the Arrowhead Framework enables the design, engineering, and operation of large automation systems for a wide range of applications utilizing IoT and CPS technologies. The book provides application examples from a wide number of industrial fields e.g. airline maintenance, mining maintenance, smart production, electro-mobility, automative test, smart cities—all in response to EU societal challenges. Features Covers the design and implementation of IoT based automation systems. Industrial usage of Internet of Things and Cyber Physical Systems made feasible through Arrowhead Framework. Functions as a design cookbook for building automation systems using IoT/CPS and Arrowhead Framework. Tools, templates, code etc. described in the book will be accessible through open sources project Arrowhead Framework Wiki at forge.soa4d.org/ Written by the leading experts in the European Union and around the globe.

Engineering Modeling and Design-WilliamL. Chapman 2018-02-06 Engineering Modeling and Design is a comprehensive systems engineering text that focuses on systematic principles for designing systems. Concurrent engineering, which requires that from the very start of a project all players (e.g., engineering, maintenance, marketing, customers) are involved as all facets of the system life cycle are considered, is skillfully illustrated through the use of two major case studies. The text describes how a product design proceeds parallel to the process design, explains key duties of systems engineers throughout the product life cycle, and examines the process of system design in terms of life cycle requirements. Projects and problems are presented throughout the text. A homework solutions/instructor's manual is available from the publisher upon request. Engineering Modeling and Design is an excellent text for engineering design courses in industry and upper division courses on concurrent engineering or total quality management.

Visualizing Project Management-Kevin Forsberg 2005-11-11 THE PROJECT MANAGEMENT CLASSIC-REVISED AND EXPANDED Now Includes Downloadable Forms and Worksheets Projects are becoming the heart of business. This comprehensive revision of the bestselling guide to project management explains the processes, practices, and management techniques you need to implement a successful project culture within your team and enterprise. Visualizing Project Management simplifies the challenge of managing complex projects with powerful, visual models that have been adopted by more than 100 leading government and private organizations. In this new Third Edition, the authors-leading thinkers and practitioners in the field-keep you on the cutting edge with a sophisticated approach that integrates project management, systems engineering, and process improvement. This advanced content can help take your career and your organization well beyond the fundamentals. New, downloadable forms, templates, and worksheets make it easy to implement powerful project techniques and tools. Includes references to the Project Management Institute Body of Knowledge and the INCOSE Handbook to help you pass: The Project Management Professional Certification Exam The INCOSE Systems Engineer Certification Exam (CSEP) "I recommend this book to all those who aspire to project management [and] those who must supervise it." —Norman R. Augustine, former chairman and CEO Lockheed Martin Corporation "The importance of this excellent book, able to encompass these two key disciplines [systems engineering and project management], cannot be overemphasized." —Heinz Stoewer, President, INCOSE

Integrating Program Management and Systems Engineering-Eric Rebentisch 2017-02-21 Integrate critical roles to improve overall performance in complex engineering projects Integrating Program Management and Systems Engineering shows how organizations can become more effective, more efficient, and more responsive, and enjoy better performance outcomes. The discussion begins with an overview of key concepts, and details the challenges faced by System Engineering and Program Management practitioners every day. The practical framework that follows describes how the roles can be integrated successfully to streamline project workflow, with a catalog of tools for assessing and deploying best practices. Case studies detail how real-world companies have successfully implemented the framework to improve cost, schedule, and technical performance, and coverage of risk management throughout helps you ensure the success of your organization's own integration strategy. Available course outlines and PowerPoint slides bring this book directly into the academic or corporate classroom, and the discussion's practical emphasis provides a direct path to implementation. The integration of management and technical work paves the way for smoother projects and more positive outcomes. This book describes the integrated goal, and provides a clear framework for successful transition. Overcome challenges and improve cost, schedule, and technical performance Assess current capabilities and build to the level your organization needs Manage risk throughout all stages of integration and performance improvement Deploy best practices for teams and systems using the most effective tools Complex engineering systems are prone to budget slips, scheduling errors, and a variety of challenges that affect the final outcome. These challenges are a sign of failure on the part of both management and technical, but can be overcome by integrating the roles into a cohesive unit focused on delivering a high-value product. Integrating Program Management with Systems Engineering provides a practical route to better performance for your organization as a whole.

Software Engineering Economics-Barry W. Boehm 1981 Software Engineering Economics is an invaluable guide to determining software costs, applying the fundamental concepts of microeconomics to software engineering, and utilizing economic analysis in software engineering decision making.

Software Technologies for Embedded and Ubiquitous Systems-Sang Lyul Min 2010-10-05 The 8th IFIP Workshop on Software Technologies for Embedded and Ubiquitous Systems (SEUS 2010) in Waidhofen/Ybbs, Austria, October 13-15, 2010, succeeded the seven previous workshops in Newport Beach, USA (2009); Capri, Italy (2008); Santorini, Greece (2007); Gyeongju, Korea (2006); Seattle, USA (2005); Vienna, Austria (2004); and Hokodate, Japan (2003); installing SEUS as a successfully established workshop in the field of embedded and ubiquitous systems. SEUS 2010 continued the tradition of fostering cross-community scientific excellence and establishing strong links between research and industry. SEUS 2010 provided a forum where researchers and practitioners with substantial experiences and serious interests in advancing the state of the art and the state of practice in the field of embedded and ubiquitous computing systems gathered with the goal of fostering new ideas, collaborations, and technologies. The contributions in this volume present advances in integrating the fields of embedded computing and ubiquitous systems. The call for papers attracted 30 submissions from all around the world. Each submission was assigned to at least four members of the Program Committee for review. The Program Committee decided to accept 21 papers, which were arranged in eight sessions. The accepted papers are from Austria, Denmark, France, Germany, Italy, Japan, Korea, Portugal, Taiwan, UK, and USA. Two keynotes complemented the strong technical program.

Systems Engineering and Analysis-Benjamin S. Blanchard 1990 A textbook for graduate or undergraduate level; also of possible interest to practicing

engineers. Presents concepts and techniques for creating any type of large or small system, and for analyzing and existing man-made system. Guides the reader through the entire system life cycle. Appendices provi

Response Ability-Rick Dove 2002-03-14 A clear, practical approach to making your organization more responsive to change Response Ability: The Language, Structure, and Culture of the Agile Enterprise helps companies keep up with an ever-changing business environment driven by the explosion and rapid application of new knowledge and increasing connectivity and communication. This twenty-first-century business primer identifies corporate characteristics that facilitate change and shows managers how to instill these competencies in every part of any organization. This user's manual for the new economy shows companies how to reconfigure themselves to respond quickly when a business situation demands rapid changes in organization, distribution logistics, production capability, innovation capability, resource procurement, product design, service strategy, or any other activity or competency. It provides a strategic context for lean operating practices, puts knowledge management and the learning organization in perspective, and offers a framework within which to apply today's best advice on new business practices and strategic focus. This timely guide is the ultimate resource for enterprises struggling to adjust to rapidly changing economic conditions and for managers at any level who must introduce agility into a department, division, or entire organization. It is also an excellent supporting reference and tutorial for all others who will take part in the transformation.

Systems Engineering in Research and Industrial Practice-Josip Stjepandić 2019-10-31 This book details the foundations, new developments and methods, applications, and current challenges of systems engineering (SE). It provides key insights into SE as a concept and as an approach based on the holistic view on the entire lifecycle (requirements, design, production, and exploitation) of complex engineering systems, such as spacecraft, aircraft, power plants, and ships. Written by leading international experts, the book describes the achievements of the holistic, transdisciplinary approach of SE as state of the art both in research and practice using case study examples from originating at universities and companies such as Airbus, BAE Systems, BMW, Boeing, and COMAC. The reader obtains a comprehensive insight into the still existing challenges of the concept of SE today and the various forms in which SE is applied in a variety of areas.

Methods and Concepts for Designing and Validating Smart Grid Systems-Thomas I. Strasser 2019-11-20 Energy efficiency and low-carbon technologies are key contributors to curtailing the emission of greenhouse gases that continue to cause global warming. The efforts to reduce greenhouse gas emissions also strongly affect electrical power systems. Renewable sources, storage systems, and flexible loads provide new system controls, but power system operators and utilities have to deal with their fluctuating nature, limited storage capabilities, and typically higher infrastructure complexity with a growing number of heterogeneous components. In addition to the technological change of new components, the liberalization of energy markets and new regulatory rules bring contextual change that necessitates the restructuring of the design and operation of future energy systems. Sophisticated component design methods, intelligent information and communication architectures, automation and control concepts, new and advanced markets, as well as proper standards are necessary in order to manage the higher complexity of such intelligent power systems that form smart grids. Due to the considerably higher complexity of such cyber-physical energy systems, constituting the power system, automation, protection, information and communication technology (ICT), and system services, it is expected that the design and validation of smart-grid configurations will play a major role in future technology and system developments. However, an integrated approach for the design and evaluation of smart-grid configurations incorporating these diverse constituent parts remains evasive. The currently available validation approaches focus mainly on component-oriented methods. In order to guarantee a sustainable, affordable, and secure supply of electricity through the transition to a future smart grid with considerably higher complexity and innovation, new design, validation, and testing methods appropriate for cyber-physical systems are required. Therefore, this book summarizes recent research results and developments related to the design and validation of smart grid systems.

Developments and Advances in Defense and Security-Álvaro Rocha 2019-06-13 This book gathers the proceedings of the Multidisciplinary International Conference of Research Applied to Defense and Security (MICRADS), held at the Military Engineering Institute, Rio de Janeiro, Brazil, from 8 to 10th May 2019. It covers a variety of topics in systems, communication and defense; strategy and political-administrative vision in defense; and engineering and technologies applied to defense. Given its scope, it offers a valuable resource for practitioners, researchers, and students alike.

Aircraft Engine Design-Jack D. Mattingly 2002 Annotation A design textbook attempting to bridge the gap between traditional academic textbooks, which emphasize individual concepts and principles; and design handbooks, which provide collections of known solutions. The airbreathing gas turbine engine is the example used to teach principles and methods. The first edition appeared in 1987. The disk contains supplemental material. Annotation c. Book News, Inc., Portland, OR (booknews.com).

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