

# Systems Engineering and Analysis

(Fourth edition) by Benjamin S. Blanchard and Wolter J. Fabrycky, Pearson Prentice Hall, XII+804p,

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This is the fourth edition of a book which has inspired lots of scientists and engineers which deal with System Engineering and related activities.

Both authors, Benjamin Blanchard and Wolter Fabrycky are at present Emeritus Professors of “Industrial and Systems Engineering” at Virginia Polytechnic Institute and State University. They are well known as skilled practitioners, gifted teachers, productive authors and enthusiastic promoters of the System Engineering knowledge, practical activities and institutions.

The book is about system engineering which is viewed as a process of bringing into life the human made (technical) systems, starting from the identification of a human or societal need and ending with system disposal. The book is also about system analysis, which is viewed as a set of activities meant to improve existing systems.

The stated main objective of the book “is to provide system engineers, system analysts and technical managers with the essential system thinking, concepts, methodologies, models, and tools needed to understand and apply system engineering to many types of human made systems”.

The authors view system engineering both as an interdisciplinary process to bring technical entities such as systems, products and structures into being and as a means for setting a sound strategy for the competitive enterprise of the present day.

The book is composed of six parts. While the first four parts are of a technical nature, the fifth part presents management aspects and the sixth part is made up of eight appendices containing complementary material. Each of the first six parts starts with a brief presentation of the main ideas and the context for the chapters that made up the part. In their turn, each chapter starts with an expanded introduction, which presents the scope and objectives of the chapter and ends with a “Summary and extension” section which is meant for ideas reviewing and further study guiding.

Part I, entitled, “Introduction to Systems” is made up of two chapters which review the main concepts in system science and engineering (chapter 1) and the traditional and new concept and steps of the system engineering “process (chapter 2). Authors stress that “System life cycle must simultaneously embrace the life cycle of the manufacturing process, the life cycle of the maintenance and support capability, and the life cycle of the phase-out and disposal process”.

Part II, is entitled. “The System Design Process”. The authors view system design as “the engine that drives the system engineering process”. The four chapters of Part II present the major phases of system design and development process such as conceptual design (chapter 3), preliminary design (chapter 4), detail design and development (chapter 5) and test and evaluation (chapter 6).

Part III, entitled “System Analysis and Design Evaluation”, contains a series of rather well established operations research methods which were selected, altered and adapted to be utilised in the evaluation of existing systems. There are five chapters in this part and they address topics such as: alternative and models for decision making (chapter 7), models for economic evaluation (chapter 8), optimization in design and operations (chapter 9), queuing theory and analysis chapter 10), and control concepts and methods (chapter 11).

Part IV, is entitled “Design for Operational Feasibility”. Authors state that the operational feasibility is achieved when “the system performs as intended in an effective and efficient manner in response to a given customer need”. The authors explain that the traditional technical system characteristics derived from classical engineering disciplines “are not any longer sufficient by themselves”. Consequently it is essential that several “design for X” parameters. Six chapters which compose Part IV give very

interesting parallel presentations of various well established or new aspects of the consideration of “design for X” parameters such as reliability, maintainability, supportability, usability, productibility, disposability, effectiveness and affordability be considered.

Part V, entitled “System Engineering Management”, is composed of two chapters. It contains recommendations regarding system engineering planning and organization (chapter 18) and programme management, control and evaluation (chapter 19).

Part V contains appendices which give complementary material on various topics such as; functional analysis, checklists for reviewing the design and the management activities, probability theory and analysis (including Monte Carlo analysis) probability and statistical tables (including Person and Normal distributions), tables of interest factors, finite queuing tables and a bibliography organized in eleven sections.

This is a “n in one” book containing an immense body of information to help introduce the reader into system engineering and analysis. The extensions and web addresses recommended at the end of each chapter are very valuable for further study in an effective and guided manner.

The authors of the book are convinced that “the concepts and methods presented are applicable to almost any type of system, and the topics discussed may be “tailored” for both large and small-scaly systems”. The references to IT aspects or to software products to support various methodological elements presented in this book are not too abundant. However, the author of this review believes that the book would also be very useful for the audience of this journal. The book can assist IT and automatic control professionals in acquiring a broader view of their information and automation systems by drawing their attention to certain aspects which are not treated in the IT literature to a satisfactory extent.

F.G. Filip