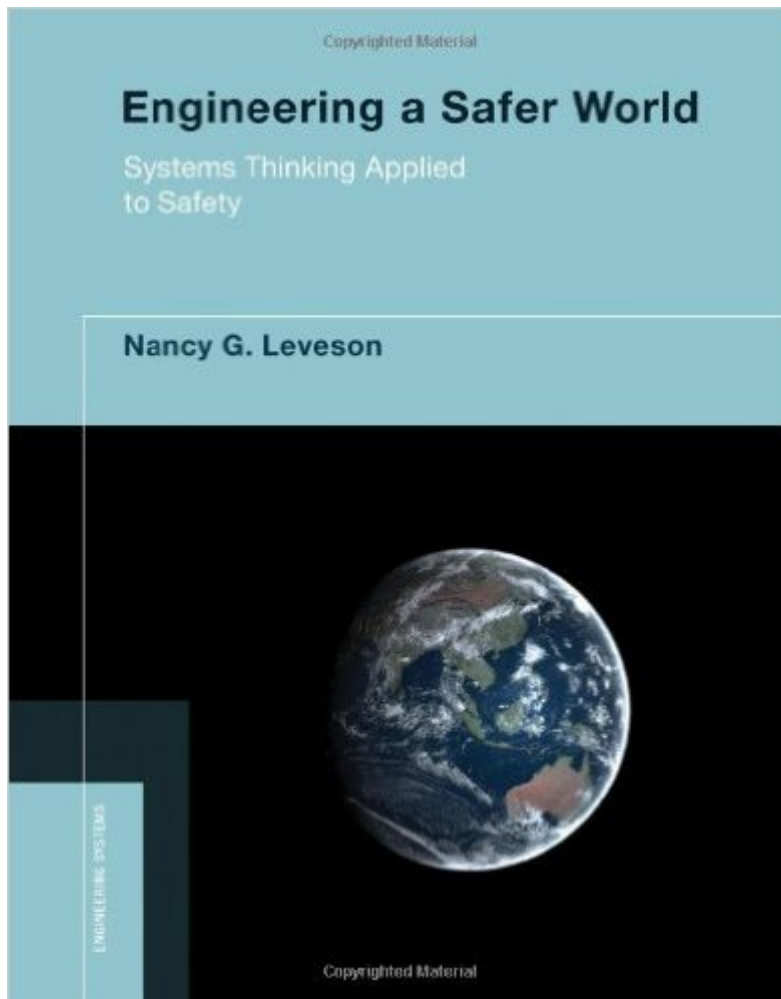


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# Engineering A Safer World: Systems Thinking Applied To Safety (Engineering Systems)



## Synopsis

Engineering has experienced a technological revolution, but the basic engineering techniques applied in safety and reliability engineering, created in a simpler, analog world, have changed very little over the years. In this groundbreaking book, Nancy Leveson proposes a new approach to safety -- more suited to today's complex, sociotechnical, software-intensive world -- based on modern systems thinking and systems theory. Revisiting and updating ideas pioneered by 1950s aerospace engineers in their System Safety concept, and testing her new model extensively on real-world examples, Leveson has created a new approach to safety that is more effective, less expensive, and easier to use than current techniques. Arguing that traditional models of causality are inadequate, Leveson presents a new, extended model of causation (Systems-Theoretic Accident Model and Processes, or STAMP), then shows how the new model can be used to create techniques for system safety engineering, including accident analysis, hazard analysis, system design, safety in operations, and management of safety-critical systems. She applies the new techniques to real-world events including the friendly-fire loss of a U.S. Blackhawk helicopter in the first Gulf War; the Vioxx recall; the U.S. Navy SUBSAFE program; and the bacterial contamination of a public water supply in a Canadian town. Leveson's approach is relevant even beyond safety engineering, offering techniques for "reengineering" any large sociotechnical system to improve safety and manage risk.

## Book Information

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## Customer Reviews

As a system safety professional I have been following Dr. Leveson's work for a while now. I'm absolutely thrilled this book is finally being published, it is definitely the best system safety book available. The draft PDF on her website has changed over the last few years so if you read an old version you may want to take another look at this final version. A whole chapter (Ch 5) is dedicated to demonstrating the new accident analysis method on a real complex system. Other chapters explain the new hazard analysis method (STPA) including an example with a power interlock. There is also a new safety-guided design process demonstrated by example with an industrial robot. Readers interested in more complex examples can find them on her website [sunnyday.mit.edu](http://sunnyday.mit.edu). A word of caution though: this book is not about decades-old reliability or hazard analysis methods (e.g. FMEA, FTA, PRA). This book is about the emerging paradigm shift in system safety and a new approach that has been developed over the last ~10 years to handle today's complex systems and the new kinds of problems they introduce.

I agree with reviewer #1 that this isn't a "how to" book. That said, this book should be mandatory reading for all engineers and patient safety experts in healthcare (design, IT, clinical, standards, regulatory, etc.). In addition to the outstanding content, one of the things I liked best about it is that it's digestible for non-engineers. Bravo!

Dr. Nancy Leveson is a recognized expert in system safety and software safety, and her lectures on the subjects are always fascinating. Now Dr. Leveson has a new book which brings together many of the ideas and approaches she has been advocating for years. *Engineering a Safer World* describes important concepts in systems engineering and system safety, pointing out the limitations of many of the tools and techniques we use. For example, Dr. Leveson states that many of the tools (fault trees, event trees, and so on) were developed in an age when software and computing systems were not widely used, and when organizational considerations were not studied. Therefore, these tools can be difficult to use in complex systems, and as a result software and organizational factors may be ignored or treated poorly in some analyses. Dr. Leveson presents a new approach which more easily takes these factors into account. This approach, *Systems-Theoretic Accident Model and Processes*, or STAMP, uses systems thinking and systems theory to try to improve the analysis of hazards and risk. The book shows how the approach can be used for analyzing hazards during development and for accident analysis in operation. Dr. Leveson applies STAMP to real-world examples, illustrating the usefulness of the approach. However, the book is much more

than a description of this modeling technique. Dr. Leveson discusses common failings in the system safety process, and has an excellent chapter on safety culture. This is an important book illustrating why we need a change in our thinking to improve the safety of complex systems. Note however that this book is not a "how to" on STAMP - readers looking for such information are advised to search elsewhere.

This is the best safety book out there! This book is a MUST READ for anyone thinking about the challenges posed by the modern complex sociotechnical systems. I ask all of my graduate students to read it. The STAMP model suggested in the book is a real paradigm shift on how we should think about safety and other emergent behaviors of complex sociotechnical systems, unlike the reductionist approach that most of the traditional safety engineering approaches have taken (FMEA, PRA, FTA), the STAMP model is based on System Theory. This book has provided the answer to many challenges in engineering design that I have experienced both in my industry and academic experiences. My view of the world, my thinking, my research directions are forever changed because of this work by Professor Leveson!

Leveson's treatment of the accident system as an integrated human process is brilliant. This book should be required reading for everyone in leadership for risky processes and everyone in technical/process safety positions.

Average approach to problem-solving; nothing new here, but Leveson thinks it is better than all other approaches. Rigorous failure tree analysis combined with brainstorming in a diverse team environment works better.

Agree with previous reviewers, hence I do not want to repeat the same thing over again. This is an excellent book for postgraduate and safety professional people- HIGHLY RECOMMENDED. The book is well presented based on a "systems approach" to safety- a paradigm shift for safety professional to consider. The book provides a solid ground for the development of "safety cases".

I manage technical safety engineering for a large, international company. I've followed Nancy Leveson's papers online for quite some time and felt she was on to something with her systems approach and STAMP model. The examples she had published were complex but, if you took the time to work through them, you could see this approach had promise. What was missing was a easy

to understand guide to show how the STAMP model was built and how to apply it to improve safety. Unfortunately, this book isn't it. Recognition to her for making a draft copy of this available on her web site in pdf format. This is a text book, not a how-to manual. It appears this is still a theory, not a tool. Don't look to this as something you can use to try to raise the game in your company. The techniques are still being matured.

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