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Innovation on Demand: New Product Development Using TRIZ
Victor R. Fey and Eugene I. Rivin. Cambridge, UK: Cambridge University Press, 2005. 239 + xi pages. US$24.95.

TRIZ, pronounced treez, is the Russian acronym for Teoriya Resheniya Izobretatelskikh Zadach, the Theory of Inventive Problem Solving. Author Victor Fey is a TRIZ Master personally certified by Genikh Altshuller, the creator of TRIZ. Both Fey and Eugene I. Rivin are professors at Wayne State University.

Many potential readers may be enticed by the word *innovation* in the title and *new product development* in the subtitle. Fey and Rivin focus their insights on engineering methodology and do not address contributions from other functional areas such as marketing, operations, or packaging innovations. Likewise, the use of the phrase *on demand* in the title should not be interpreted as a promise of timely results. It implies a systematic approach to achieving better engineering solutions.

The stated audience for *Innovation on Demand* is "practicing engineers" (p. ix). This book is true to the first principles of TRIZ. It covers the most formalized tools of contemporary TRIZ. Even the section on the formulation of functions advocates a disciplined approach. For example the common formulation "hot air dries hair" is replaced with the correct formulation "hot air evaporates water" (p. 15).

The goal of Chapter 1 is to show "the principal shortcoming of *random innovation*, and the need to replace it with a method of *systematic innovation*" (p. 1). TRIZ provides systematic innovation by employing numerous methods for overcoming system conflicts instead of making trade-offs. These break down into "two major subsystems based on the laws of technological system evolution: a set of methods for developing conceptual system designs, and a set of tools for the identification and development of next-generation technologies" (p. 8).

Chapters 2 and 3 provide examples of ideal systems, physical contradiction, and sufield (solution plus field) analysis. Chapter 4 introduces ARIZ, the algorithm for inventive problem solving, which is the most powerful tool for problem analysis and solution in modern TRIZ (p. 83). The major objectives of ARIZ are problem formulation, breaking psychological inertia, and combining various tools of TRIZ.

Chapter 4 explores nine laws of technological system evolution. "These laws can also be used to efficiently develop novel technologies and products, to objectively assess those systems' business potential, and to predict what competitors may come up with" (p. 112). Fey and Rivin caution that one could develop a perception that the laws act independently, but that the "real picture is much more complex, because the historical development of any technological system is guided by intertwined interactions of several laws and lines of evolution" (p. 162).

Chapter 6 provides an "outline of TechNav – a comprehensive process for the conceptual development of next-generation technologies and products based on the laws and lines of technological system evolution and business analysis" (p. 167). The four phases are (1) analysis, (2) determination of high-potential innovations, (3) concept development, and (4) concept selection and technology plan. This chapter presents a five-level distribution of inventions by novelty level. In this system, new and pioneering inventions account for less than five percent of the relative share of inventions.

In only four pages, Appendix 2 introduces the system conflict matrix and inventive principles, which have been presented extensively in the literature and incorporated into some TRIZ-based software products. Fey and Rivin state, "Although using these tools is straightforward, their effectiveness is relatively low" (p. 195) because of (1) problems with the formulation or selection of system conflicts, (2) limitations using predefined, typical attributes, (3) absence of tactics, and (4) detachment from the concept of physical contradiction. Fey and Rivin recommend using the analytical approach of ARIZ to overcome these limitations. *Innovation on Demand* is not a textbook that employs oversimplified templates.

Appendix 3 lists 76 standard approaches to solving inventive problems. For example, Standard

4.5.2 from the group that describes the evolution of measurement sufields states, "The effectiveness of a measurement system at every phase of its evolution can be enhanced by transition to a bi- or poly-system" (p. 217).

Innovation on Demand explores the improvement of existing technologies and technological forecasting. It is for product engineers who demand more than problem-solving analogies. The authors have produced a textbook that includes rigorous topics such as a substance-field language, a sequence of logical procedures to analyze problems, and procedures to develop compromise-free design solutions.

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