INFORMATION RESOURCES ∞

New Books and Reports For Managers of Research and Technology

Strategic Technology Management; *Frederick Betz; McGraw-Hill, Inc., New York, NY, 1993; 476 pp., $49.*

This book focuses on the need for companies to anticipate developments and create technology strategies by successfully and effectively forecasting technological change. Asserting that there is no longer permanent technology advantage for any firm but only temporary lead times, the author (a program manager in the engineering department at the National Science Foundation) addresses such problems as:

- How to identify the next breakthroughs in rapidly changing technologies.
- How to manage innovation in the product-development cycle for rapid responsiveness.
- How to focus technology strategy in a company that makes different kinds of products for different markets.
- How to link R&D with corporate strategy.
- How to acquire externally developed technology from universities, suppliers and other partners.

Observing that some corporations have used technology forecasting and planning techniques "but only in a naive and unsophisticated manner," Betz calls his book unusual for having included tools for forecasting, planning and technology transfer all in one place, and for examining "the essence of technological change in invention and engineering design" so that managers can apply general management principles to their technical activities.

Intended also as a text for courses in the management of technology and in engineering management, the book is organized for a semester course of 15 sessions as follows:

- Planning technological change in diversified corporations (Chaps. 1–4).
- Understanding invention—the heart of technological change (Chap. 5).
- Implementing new technology in new products, services or manufacturing (Chaps. 6 and 7).
- Forecasting the economic impacts of technological change (Chaps. 8–10).
- Forecasting technological change and planning research (Chaps. 11–15).

Strategic Technology Management is part of McGraw-Hill's Engineering and Technology Management series.

Corporate Venturing: Creating New Businesses within the Firm; Zenas Block and Ian C. MacMillan; Harvard Business School Press, Boston, MA, 1993; 371 pp., $35.

The objective of this book, its authors explain, "is to provide information, guidance, and decision alternatives that will enable venture managers and senior managers to reconcile the needs of a new venture with those of its parent organization, in such a way as to prevent damage to either and contribute to the continuing success of both."

To this end, they have drawn together knowledge from many sources: their own experience in starting new businesses, both within and outside of existing organizations; the published research of many others; case research on venturing by their students; their own research; and their work with large, medium and small companies seeking to become more effectively innovative and entrepreneurial. The result is a road map through the venturing process, with emphasis on the skills, knowledge and management methods needed to manage individual ventures as well as an entrepreneurial corporation.

Six premises form the book's cornerstone:

1. Entrepreneurship is a process, not a single act.

2. Entrepreneurs are made, not born. They vary considerably in their capabilities, which can be improved significantly through experience and training.

3. Existing organizations provide an environment that has a major impact—positive or negative—on the creative and entrepreneurial drive of their members.

4. Entrepreneurs are *not* risk seekers; they are risk managers.

5. The entrepreneurial process can and must be managed as a component of the management of organizations.

6. Most large organizations, driven by the need to protect and optimize the use of existing resources, discourage the pursuit of opportunity.

These premises underlie a model of the venturing process that defines the book's organization as follows: setting the stage (Chaps. 1–3); choosing ventures (Chaps. 4–5); planning, organizing and starting the venture (Chaps. 6–8); monitoring and controlling the venture (Chaps. 10 and 11); learning from experience (Chap. 12). Among the practical insights that emerge from the discussion of this model:

- How to anticipate and manage collisions between firm needs and venture needs.
- How to plan for changing management requirements as ventures grow.
- Ways to get around control mechanisms that can kill a venture.
- Methods for transferring know-how from firm to venture.
- How to keep a venture's intrusions from damaging the parent firm.
- When to use an executive champion.
- The benefits of failed ventures.
- Ten survival principals for venture managers.

Inventivity: The Art and Science of Research Management; John J. Gilman; Van Nostrand Reinhold, New York, NY, 1992; 187 pp., $29.95 (paper).

Analyzing a list of the number of patents produced in 1977 by various companies, John Gilman was surprised to find that small companies produced more patents than large ones, for a given amount of sales. This led Gilman (now a senior scientist at the Lawrence Berkeley Laboratory) to coin the term inventivity for the number of man-hours, or dollars, needed to produce an average invention.

Recognizing that inventivity varies markedly among companies, Gilman concluded that management factors related to or affected by company size must have some effect. These factors are the subject of this book, which discusses research management from the standpoint of maximizing the number of important inventions per unit of cost. Asserting that it is this that marks good management, Gilman analyzes the operational needs of research and the influence of financial policies on research models by posing questions that encourage a thorough reexamination of the R&D process, such as:

- Why is research worth doing?
- What is worth working on?
- Who can do it successfully?
- How should the work be approached?
- What is the role of finance?
- What is the effect of organizational size?
- What is the relationship between market share and research?
- How much time is needed to penetrate a market?

Warning that organizations lose their competitiveness when inventivity becomes too low, Gilman concludes that such companies are likely to practice obsolete technology and eventually become bankrupt. Thus, inventivity is a critical parameter for companies, governments and societies, he says.

Survival of the Fittest: New Product Development During the 90's;
Philip A. Himmelfarb;
Prentice Hall, Englewood Cliffs, NJ, 1992;
241 pp., $19.95.

Tools and techniques to "dramatically speed up" new product development are the core of this book by a consultant in the management of new product development. Himmelfarb compares the slow, phased approach that is so widely practiced with the faster and more effective multifunctional, parallel team approach. He offers techniques for managing teams and for improving the flow of creative ideas, and addresses the cultural and other barriers that get in the way. His book deals with the different stages of the product development cycle; the interrelationship of time, quality and product features; and the need to freeze product features and design specifications early. It also provides specific guidance for senior management.

Other issues that are addressed include estimating project costs, controlling projects with critical path management, examining lessons from the Japanese, knowing when to kill a development project, and uncovering market-place needs.

Checklists are intended to make the transition to fast new product development easier. They include:

- A 95-question audit to test a company's readiness for new product development.
- Criteria for selecting and prioritizing projects to improve the odds of success.
- Steps for starting a development project.
- Characteristics of creative organizations.
- Ground rules for team operation.
- Stumbling blocks you can avoid once you identify them.
- Questions to ask at each stage of the development cycle.

Discussions of over 100 companies that have achieved fast new product development include AT&T, Motorola, W.H. Brady, John Deere, Ingersoll-Rand, Honda, Toyota, Matsushita, Sony, 3M, Eaton, and NCR.

Science, Technology and the Federal Government;
National Academy of Sciences, Committee on Science, Engineering and Public Policy, 2101 Constitution Ave., N.W. Washington, DC 20418; Single copies available without charge.

Federal funding and other policies should focus on U.S. scientific and technological performance relative to that of other nations, says this report by a joint committee of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. For all major fields of science—and designated fields of technology—the United States should adopt the goal of staying on a par with the best-performing countries, the report says. The U.S. should seek clear leadership in scientific fields that meet certain criteria, including the fields' contributions to U.S. social, economic and cultural objectives. The committee observed that a panel of experts from within and outside a field could determine whether that field is meeting its goal. If it isn't, the panel might suggest changes in funding and other resources to correct the deficiency.

For example, if the U.S. lead in molecular biology should slip, the panel responsible for evaluating that field might recommend upgrading laboratory facilities or increasing support for graduate students. But if the nation was found to be clearly ahead in a field not marked for U.S. leadership, the panel might recommend reducing funds and transferring them to areas needing more support.

Although the federal government has long supported basic research in science and engineering, it has regarded development and adoption of technology as largely responsibilities of the private sector. The committee said current conditions of the global economy warrant a reexamination of the government's role.

The report continues, "The federal government should cooperate with the private sector to ensure that the United States maintains a position of technological leadership in those technologies that promise to have a major and continuing impact on broad areas of industrial and economic performance." These technologies should be in areas that could lead to major new industries, as well as areas in which U.S. firms have demonstrated their ability to convert technology into marketable products.

The report calls on industry and government to form a new kind of partnership to pursue new technologies. Such partnerships would be responsive to market signals, because the private sector would initiate proposals and share costs. The committee said these partnerships should provide stable, long-term support. They should recognize the growing role of the states. And they should go beyond the development stage, helping companies adopt the new technologies.

As examples of technologies suitable for this kind of partnership, the report cites: fiber-optic and other broadband communication networks; biotechnology, especially the applications to agriculture, bioprocessing and environmental