New Products Management

TWELFTH EDITION

C. Merle Crawford • C. Anthony Di Benedetto

Mc Graw Hill

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Twelfth Edition

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About the Authors

Merle Crawford was Professor of Marketing (Emeritus) at the University of Michigan, where he taught from 1965 until his retirement in 1992. Prior to his appointment at Michigan, he was marketing director at Mead Johnson & Co. Professor Crawford was an original member of the Product Development & Management Association from its founding in 1976, and he served as the charter president from 1977 to 1978 and on the Board of Directors until 1994. He authored the first edition of the groundbreaking textbook *New Products Management*, published in 1983 and still widely used by managers, executives, and business students.

Anthony Di Benedetto is Professor of Marketing and Supply Chain Management and Senior Washburn Research Fellow at Temple University, Philadelphia. He held the Fulbright-Hall Chair in Entrepreneurship, Wirtschaftsuniversität Wien, Vienna, Austria, during 2010–2011. He has lectured worldwide on product development and marketing management. He was named one of the 50 leading research scholars worldwide in Innovation and Technology Management by the International Association of Management of Technology. Professor Di Benedetto served as editor-in-chief of the *Journal of Product Innovation Management* for nine years and is currently co-editor-in-chief of *Industrial Marketing Management*.

Preface

New products have always been of interest to both academics and practitioners, and organized, college-level instruction on the subject of new products management traces to the 1950s. By the 1990s, a new products management discipline had evolved. The Product Development & Management Association (PDMA) has flowered to close to 3,000 members in some 50 countries around the world, and there are over 20 local chapters in the United States alone, plus international affiliates in a dozen countries. Over 300 colleges have courses on the subject of new products, and the field's journal, the *Journal of Product Innovation Management,* has a track record of publication of over three decades. The job title of new products manager or director is becoming much more common and is offering much earlier entry than 20 or 25 years ago; we also see the emergence of higher level positions for careers to build to. The PDMA now offers a practitioner certification (New Product Development Professional, or NPDP), recognizes the best product developing firms (with its Outstanding Corporate Innovator award), and has been able to do what those in many fields have not, that is, merge the thinking and activity of professors and practitioners. Information on the PDMA can be found at www.pdma.org.

How This Book Views the Field of New Products Management

Such exploding growth means that we still take a variety of approaches to the teaching of the new products subject—marketing, technical, creative, design, and so on. This book provides the management approach with the perspective of marketing. In every organization (industry, retailing, government, non-profits, and any other kind of institution) there is a person or group of persons who, knowingly or unknowingly, are charged with getting new goods and services onto the market. More and more today, those people are new products managers, or project managers, or team leaders. They lead a multifunctional group of people, with the perspective of a general manager, operating as a company within a company. They must deal with the total task—strategy, organization, concept generation, evaluation, technical development, marketing, and so on. They are not finished with their work until the new product has achieved the goals assigned to the team—this usually means some form of sales or profit, and certainly means the task is not finished when the new product is put onto the shipping dock.

We try to avoid a functional myopia, and it is rare today to hear that "Marketing tells everyone what to do" or "R&D runs our new products activity." When a functional specialist is assigned leadership of a new products team, that person must learn the general manager viewpoint, but one usually has to succeed as a functional member of new products teams before getting a shot at being a team leader. Marketing people, working as team members or as team leaders, need the types of information in this book.

Some Basic Beliefs That Guided the Writing

People who have used the first 11 editions of this book know its unique viewpoints on the subject. But for newcomers, and of course all students are newcomers, here are some of them.

1. Product innovation is one single operation in an organization. It has parts (strategy, teams, plans, etc.), but they are all just parts. Any operation that runs as separate pieces misses the strength of the whole.
2. The field is still new enough that it lacks a systematic language. This makes it very difficult for students, who are accustomed to studying subjects where a term means one thing, and only that one thing. We use all product terms consistently throughout the book, and we urge students to use them. Naturally, new terms come and go; some survive and some don't.

   Because of the terminology problem in a rapidly growing field, every term that might require definition has been made bold the first time it is used, and the index directs the reader to that section. We don't include a glossary, but a useful one is available at the Product Development & Management Association Web site.
3. Ideas learned without application are only temporary residents in your mind. To become yours, a concept must be applied, in little ways or in big ones. Thus, we provide numerous short illustrative cases, which are opportunities for using the concepts studied. There are many examples from the business world, and up-to-date references on all important topics.
4. As much as we would like them and have diligently tried to find them, we believe there is no standard set of procedures for product innovators, nor particular sets for makers of consumer packaged goods, or of consumer durables, industrial goods, services, and so on. Like a marketing plan, there is a best plan for any particular situation. A manager must look at a situation and then compile a set of tools and other operations appropriate to that situation. All large firms use scores of different approaches, not one.
5. Next, there is the halo effect, which is a problem in the field of new products. The halo effect shows in the statement, "It must be a good thing for us to do—Apple does it, or Google does it, or Honda does it." Those are excellent companies, but one reason they're good is they spend lots of time and money studying, learning from others. They have huge training programs in product innovation and bring in every expert who appears on the scene with what looks like a good new products management idea. They assume everything they do is wrong and can be improved. You should too. This book does. Citations of their actions are given as examples, not recommendations. These well-known firms have many divisions and hundreds of new products under development at any one time. Managers there can't know what other managers are doing, nor do they care, in the prescriptive sense. Each group aims to optimize its situation, so they look around, see what others in comparable situations are doing (inside and outside their firm), and pick and choose to fit the situation. To the extent there are

generalizations (e.g., there should be some form of strategy), these will stand out as you work your way through the course. But what strategy, and exactly how should one determine it—that is situational.

6. An example of this lies in rejection of the belief that new products strategy should rest on the base of either technology or market. This choice has been argued for many years. But most firms seek to optimize on both, a dual-drive strategy. Of course, true to the previous point, firms will build on one or the other if the situation seems to fit.
7. We believe that students should be challenged to think about concepts they have been introduced to. This book contains lists of things from time to time, but such lists are just a resource for thinking. The above belief about the best approach being situational is based on the need to analyze, consider, discuss, apply. The great variety in approaches used by businesspeople is not a testimony to ignorance, but to thinking. On a majority of the issues facing us today, intelligent people can come down with different views. Decisions are the same—they are not necessarily right or wrong at the time they are made. Instead, the manager who makes a decision then has to work hard to make that decision turn out right. The quality of the work is more important than the quality of the decision.
8. Last, we have tried to implement more clearly the view that two things are being developed—the product and the marketing plan. There are two development processes going on in tandem. Marketing strategy begins at the very start and runs alongside the technical work and beyond it.

Changes in the Twelfth Edition

Past adopters of *New Products Management* will notice major changes in this edition. While there are some changes in virtually every chapter, some of the most substantial changes are as follows:

1. We have made major additions and updates to the cases to provide more plentiful and more current examples. We retired several cases from the previous edition, wrote many new cases, and thoroughly updated many others. New cases for this edition include: Oculus Rift, Adidas Parley sustainable running shoes, Google Glass, Indiegogo, Tesla, Chipotle, Chick-fil-A, Corporate Social Responsibility at Starbucks, and many others. As always, we aim to offer a mix of high-tech products and consumer products and services in the set of cases.
2. In addition, we have substantially updated examples throughout the text wherever possible. We try to make use of illustrative examples that will resonate with today's students wherever possible. Of course, we welcome the reader's comments and suggestions for improvement.
3. There continues to be much new research in new products, and we have tried to stay current on all of these topics. Readers will notice new or expanded coverage of portfolio management, value curve creation, the TRIZ method, crowdsourcing, crowdfunding, observational research, open innovation, organizational

structure, 3D modeling, beta testing, sustainable product development, and frugal innovation, among other topics.

4. We continue the practice of referencing Web sites of interest throughout the text, and we have added the web addresses for several useful Youtube videos and other resources.

Adopters of previous editions will notice that the format is slimmed down to 18 chapters. We have tried to streamline presentation and focus on the topics that will be of most importance and interest to new product managers. We still use analytical models to integrate the stages of the new products process. As in previous editions, perceptual mapping is introduced early in the new products process, during concept generation, but its output may guide selection of attributes in a conjoint analysis task, and may later be used in benefit segmentation and product positioning. Conjoint analysis results may be used in concept generation or evaluation and may provide a set of desired customer attributes for house-of-quality development. The sequence of three smartphone end-of-chapter cases illustrates how the analytical models bind the new products process together. As in previous editions, many other concepts—Product Innovation Charter, A-T-A-R models, evaluation techniques, the multifunctional nature of new products management—are also used to integrate topics horizontally throughout the text.

Because this book takes a managerial focus and is updated extensively, it is useful to the practicing new products manager. It has been used in many executive education programs. Great pains have been taken to present the "best practices" of industry and offer footnote references to business literature.

As always, effort has been aimed at making the book increasingly relevant to its users. We consider a text revision to be a "new product," and thus an opportunity for us to become even more customer-oriented. Academic colleagues have made many thoughtful suggestions based on their experiences with previous editions and have provided much of the driving force behind the changes you see in this edition. We gratefully acknowledge all the reviewers who provided extensive comments and suggestions that were extremely helpful in this revision, as well as all the instructors and students who contacted us to make suggestions and correct errors. In particular, Matt Bokovitz and Jacob Cheesebrough, both Temple University students, did a phenomenal job providing research support and case studies that allowed us to make the substantial improvements and updates you will see in this book. Sincere thanks to both of you!

We are thrilled about this new edition. It has been greatly updated and streamlined, and over half the cases are brand-new. We are really proud of all the changes in this edition, and sincerely hope this new version meets your instructional needs!

Online Resources

The instructor will find plenty of online support for this text at the companion Web site, **www.mhhe.com/crawford12e**. Available on the Web site are an online Instructor's Manual, a set of PowerPoint slides, a test bank, and exercises and cases that can be

used to accompany the text materials. Some of these materials are also available to the students where appropriate.

Dedication

This edition is dedicated to Merle Crawford (1924–2012), Professor Emeritus (University of Michigan), sole author of the first five editions of this textbook, and co-founder of the Product Development & Management Association. I have tried to remain true to Professor Crawford's vision when he wrote the first edition of this book years ago. He continues to be an inspiration to all of us who teach and practice new products management.

A.D.B.

Contents in Brief

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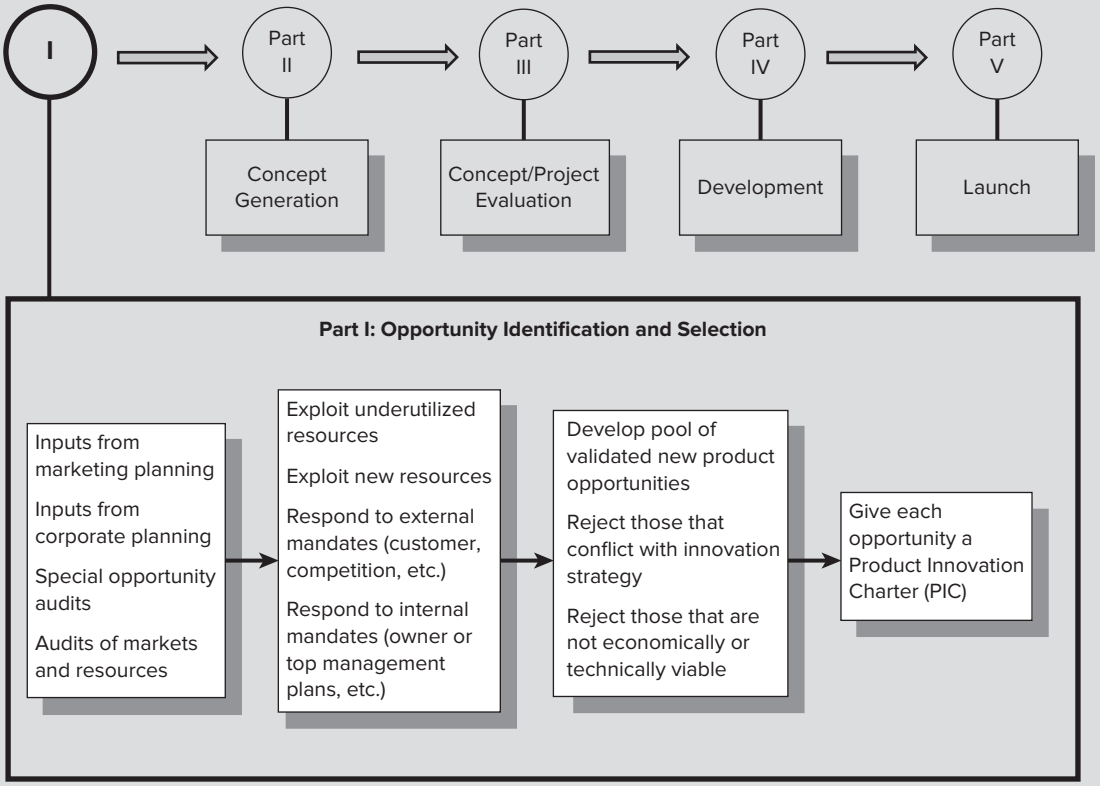
New Products Management

FIGURE I.1

Opportunity Identification and Selection



PART ONE

Opportunity Identification and Selection

This book is divided into parts. They are (1) Opportunity Identification and Selection, (2) Concept Generation, (3) Concept/Project Evaluation, (4) Development, and (5) Launch. They follow the general flow of the new products process, which we will present in Chapter 1, Figure 1.5. We will see later, however, that the phases are not sequential, compartmentalized steps. They are quite fluid and overlap each other.

At the beginning of each part is a short Part Introduction (noted with a Roman numeral) and a figure (see Figure I.1). The introduction describes briefly what aspects of the new products process will be covered in the upcoming chapters. The figure provides detailed information about what goes on at that phase in the new products process and shows what phases come immediately before and after. Figure I.1, for example, details the opportunity identification and selection process, ending with the product innovation charter, a key topic of Chapter 3. Hence, the five part figures (Figures I.1, II.1, III.1, IV.1, and V.1) actually make up one long, detailed new products process, the essence of which is presented briefly in Figure 1.5.

Before getting to opportunity identification and selection, we begin Part I with two introductory chapters. The first introduces the three *strategic elements of product development:* the new products process, the product innovation charter, and the product portfolio. It presents the first of these, the new products process, in relatively simplified form, as a kind of introduction to the rest of the book. Chapter 1 also attempts to answer the questions most often asked about such a course and helps to define some of the concepts we will be returning to throughout the text (such as, what exactly is a new product, how many new products really do succeed, and how do firms achieve globalization in product development). Chapter 2 goes much deeper into the new products process. Chapter 2 also introduces the key concepts of radical innovation, new service development, and speed to market and how each of these may have an impact on the new products process as presented in the chapter.

Chapter 3 completes the introductory part of the book, as it presents the second and third strategic elements. First, opportunity identification and selection are presented, which deal with the strategic planning lying at the very base of new products work that guides a new products team, just as corporate or strategic business unit strategy guides the unit as a whole. Figure I.1 provides a flow model that describes the process of opportunity identification. Chapter 3 then discusses the product innovation charter (PIC). This can be thought of as a statement of strategy that will guide the new product development team: the arena in which they will operate, their goals and objectives, and other considerations. The last part of Chapter 3 discusses the product portfolio. Innovative ideas that can be converted into high-potential new product opportunities can come from many sources; but however the new product idea is arrived at, its fit with the firm's product innovation strategies needs to be assessed. This is a portfolio issue: When assessing any potential new product, the firm needs to consider its technical viability (can we make it?) and its market viability (will customers buy it?). Most firms will have many other criteria, both financial and strategic, that they consider at this important step.

As seen in Figure I.1, once the PIC has been determined, the next step is to generate product concepts. This will be taken up in Part II of this book.

CHAPTER ONE

The Strategic Elements of Product Development

Setting

Mention new products and people think about technology—iPhones, online shopping, smart watches, self-driving cars, virtual realities, and the like. But most new products are far simpler—low-carb colas, new movies, new singing stars, fast foods, and new flavors of frozen yogurt. New products run the gamut from the cutting edge of technology to the latest version of the ballpoint pen. New products can be tangible goods or services. New products can be destined for the consumer market, the business-to-business market, or both.

You have chosen to study how new products are developed and managed, so it would be nice to say they come from an orderly process, managed by experienced persons well versed in product innovation. Some do, but some don't. Years ago, Art Fry became famous for an idea that became Post-it notes, when his hymnal page-marking slips kept falling out. He had a rough time persuading others at 3M that the idea was worth marketing, even though it soon became one of the highest volume supply items in the office supply industry! Or consider James Dyson, an industrial designer by training who was dissatisfied with the performance of commercially available vacuum cleaners and set out to create a better one. After five years and about 5,000 prototypes, he created the Dual Cyclone bagless vacuum cleaner. Over the next eight years, he was unable to interest vacuum cleaner manufacturers or venture capitalists in the new product, frequently hearing that since he was a designer, he couldn't possibly know anything about manufacturing or marketing! In 1985 and on the verge of bankruptcy, Dyson found an interested Japanese investor, and by 1993 he had set up Dyson Appliances in the United Kingdom (his home country). Since that time, Dyson Appliances has sold over $2 billion worth of vacuums worldwide.[1]

So you may be confused by the uncertainty you meet in this book. If so, welcome to the land of creative exploration. The activity we study in this book is sometimes called

[1]Anonymous, "Dyson Fills a Vacuum," *@ Issue*, 8(1), 2003.

product innovation management; some call it **product planning,** and some (from a very biased perspective) call it *research and development* (R&D) or *marketing*. In this book, we use the most descriptive term we have—**new products management**—and we adopt the viewpoint of the marketing manager; that is, we are primarily concerned about the specific role for marketing in the overall task.

The Importance of New Products

New products are *big business.* Over a $100 billion are spent yearly on the technical development phase alone. Untold thousands of new products are marketed every year, perhaps millions if we call each new Web site a new product. Hundreds of thousands of people make their living producing and marketing new products. Many managers realize that *radical innovation* is critical to future growth and even the survival of the firm. Here, we are defining radical innovation as innovation that displaces or makes obsolete current products and/or creates totally new product categories.[2] The Industrial Research Institute identified "accelerating innovation" and "business growth through innovation" as the top challenges faced by technology leaders, and business writer Gary Hamel has described the creation of radical innovation as "the most important business issue of our time."[3]

The reason firms invest this much in new products is that they *hold the answer to most firms' biggest problems.* Competitors do the most damage when (1) there is so little product differentiation that price-cutting takes everyone's margins away or (2) when they have a desirable new item that we don't. The fact is: *A successful new product does more good for a firm than anything else.* The very reason for a firm's existence is the value its operations provide to others, and for which they pay. And in a competitive world this means that what we offer—be it a physical good or a service—must be better than what someone else offers, at least part of the time. This is true in all organizations, including hospitals, churches, colleges, and political parties. Look at the winners in those arenas and ask yourself which ones are popular and growing.

Another reason for studying about new products is that *the new products process is exceedingly difficult*. Hundreds of individuals are involved in the creation of a single product, but all are from separate departments (sales, engineering, manufacturing, and so on) where they may have their own agendas. When a product flops miserably, it often generates huge publicity, much to the chagrin of the producers: think of New Coke, Google Glass, the Amazon Fire Phone, recent movie duds, or countless others. Perhaps, as a result, we think failure rates are higher than they really are. New products do fail, of course, but at around a 40 percent rate, not the

[2]M. Rice, R. Liefer, and G. O'Connor, "Assessing Transition Readiness for Radical Innovations," *Research-Technology Management,* 45(6), 2002, pp. 50–56; and Gina O'Connor, Joanne Hyland, and Mark P. Rice, "Bringing Radical and Other Innovations Successfully to Market: Bridging the Transition from R&D to Operations," in *The PDMA Toolbook 2 for New Product Development,* ed. P. Belliveau, A. Griffin, and S. M. Somermeyer (Hoboken, NJ: Wiley, 2004), pp. 33–70.

[3]Industrial Research Institute 2001/2002 Annual Reports, Washington, DC, Industrial Research Institute; and Gary Hamel, "Innovation Now! (It's the Only Way to Win Today)," *Fast Company,* December 2002, pp. 114–124.

90 percent rate you often hear, and this percentage holds for both goods and services. The best product-developing firms can improve their odds further: They require only about four ideas to generate one winning product, as compared to over nine ideas for other firms. This is probably because the best firms are better at screening out bad ideas earlier.[4] And after many years of research, we know many of the most important reasons why products fail. The firm doesn't understand the customer, or underfunds the required R&D, or doesn't do the required homework before beginning development (sometimes called the *ready–fire–aim approach*), or doesn't pay enough attention to quality, or lacks senior management support, or chases a moving target (we will see moving-target issues such as unstable specifications and scope creep in Chapter 3).[5]

The goal at most firms is not necessarily to reduce failure rates to zero. Having too low a failure rate might mean that the firm is playing it too safe with close-to-home innovations, while missing out on the (risky) breakthroughs. The definition of "too low" probably depends on the industry and on how inherently risky product development is. The goal here is to minimize the dollar losses on the failures (don't bankrupt the company!) and to learn from them. Regardless of the actual failure rate you encounter, the amount at stake and the risk of failure are high in new product development.

Success rates have remained remarkably consistent over the years. The Comparative Performance Assessment Study (CPAS) is periodically conducted by the Product Development & Management Association (PDMA), most recently in 2012.[6] In these studies, for every 100 ideas, a little under 70 make it through the initial screen; fewer than 50 pass concept evaluation and testing and are moved to the development phase; a little more than 30 make it through development; about 30 make it through testing; about 25 of them are commercialized; and about 15 are considered to be successes (about 60 percent of those that were commercialized). Interestingly, the percent success rate does not vary too much from one category to the next. The percent success rate ranges from 51 percent (frequently purchased consumer goods) to 65 percent (health care). If one splits the CPAS sample into two groups, the "Best" (the top-performing 25 percent of firms) and the "Rest," a slightly different pattern emerges: In 2012, the Best firms attained a success rate of over 80 percent, while the Rest's success

[4]Marjorie Adams, *Competitive Performance Assessment Study (CPAS) Results,* PDMA Foundation, 2004; and Stephen K. Markham and Hyunjung Lee, "Product Development and Management Association's 2012 Comparative Performance Assessment Study," *Journal of Product Innovation Management,* 30(3), 2013, pp. 408–429. Success rate has held steady at around 60 percent of products marketed since the 1995 CPAS study; the 2012 study suggests the success rates are slightly lower in Europe and Asia.

[5]Robert Cooper, *Winning at New Products: Accelerating the Process from Idea to Launch,* 3rd ed. (New York: Perseus Books, 2001).

[6]2003 CPAS results are found in Doug Boike and Marjorie Adams, "PDMA Foundation CPAS Study Reveals New Trends—While the 'Best-Rest' Gap in NPD Widens," *Visions,* 28(3), July 2004, pp. 26–29; and Gloria Barczak, Abbie Griffin, and Kenneth B. Kahn, "Perspective: Trends and Drivers of Success in NPD Practices: Results of the 2003 PDMA Best Practices Study," *Journal of Product Innovation Management,* 26(1), January 2009, pp. 3–23. The 2012 results are summarized in Markham and Lee (2012), op. cit.

FIGURE 1.1
The Best Firms Achieve Superior NPD Results

	The Best (top 25% of firms)	The Rest (bottom 75% of firms)
Percent Successes	82.2	52.9
Percent of Sales from New Products	47.9	25.4
Percent of Profits from New Products	48.5	25.0
Number of Ideas Per Successful New Product	4.5	11.4

Source: Adapted from Stephen K. Markham and Hyunjung Lee, "Product Development and Management Association's 2012 Comparative Performance Assessment Study," *Journal of Product Innovation Management,* 30(3), 2013, pp. 408–429.

rate was much lower at about 50 percent. The Best, therefore, have greater success with new product development![7]

Figure 1.1 shows that the Best firms not only have a higher percentage rate of successes but also derive almost twice as many sales and profits from new products (defined as five years old or younger) than do the Rest. Best firms are also more efficient in developing successful products: they require about 4.5 ideas to generate one success, while the Rest firms require almost three times as many ideas per success. In addition, the development cost per successful project for Best firms is roughly half the cost per successful project for the Rest.[8]

The 2012 CPAS study also reveals that the Best companies at product development manage their new products process differently than do the Rest. In sum, the Best companies are better at implementing many of the new products process concepts and principles that we discuss in upcoming chapters of this book. Relative to the Rest, the Best:

- Have an effective new products process, which allows them to spend more time per project but on fewer projects (which we explore in Chapter 2).
- Are more likely to use market research tools such as creativity sessions (Chapter 5), trade-off analyses (Chapter 6), concept tests (Chapter 7), voice of the customer (Chapter 10), alpha and beta testing (Chapter 13), and test markets (Chapter 16).
- Rely more on portfolio analysis for product selection (Chapter 3).
- Are more likely to have global market and operations strategies (Chapters 3 and 12).
- Tend to use social media and online communities more for information gathering (Chapter 5).
- Employ formal processes for idea generation (Chapter 5) and concept development (Chapter 8).
- Adopt an open-innovation approach (Chapter 5).
- Involve senior management in decision making (Chapters 10 and 12).
- Use design and engineering tools (Chapter 11).

[7]The "Best" are defined in the CPAS study as those firms that are in the top 25 percent in their industry and above the mean in both program success and sales and profit success from new product development.

[8]Stephen K. Markham and Hyunjung Lee, op. cit.

- Use cross-functional teams effectively (Chapter 12).
- Are better at using team support tools and team incentives (Chapter 12).[9]

In sum, the concepts of new products management as presented throughout this book are used extensively, and well, by the top innovating companies, who achieve superior results from their new products!

Globalization and New Product Development

Like all aspects of modern business, product development has become more challenging due to increased **globalization**. To a greater extent than ever before, firms are seeing new product development as a global process in order to take advantage of worldwide opportunities and increase their efficiency and effectiveness of innovation. According to a 2007 study by consultants Booz & Company, the top global firms in terms of R&D spending deployed about 55 percent of their R&D spending in foreign countries. Among the 80 top U.S. R&D firms, $80.1 billion out of $146 billion was spent overseas, and similar percentages were found for top European and Japanese R&D firms.[10] The Booz & Company study also showed that the firms with higher percentages of R&D spending deployed elsewhere did better than average on many important performance measures, such as return on investment and total shareholder return.

This study found that firms have multiple reasons for increasing their global R&D efforts. In many foreign countries, R&D engineers are lower paid than in the United States, Western Europe, or Japan—but the salary gap is narrowing, especially for the most skilled engineers and scientists. Now, many firms look overseas not just to access a cheaper labor force but to access the talent residing in these markets and the ideas generated by these skilled personnel. Huge markets such as India and China are obvious sources of talented engineers, and there is some evidence of specialization: India boasts strengths in automotive engineering, China in electronics.

Another reason for increased global R&D is the increasing globalization of the innovating firms themselves. For example, as automakers seek to penetrate new markets such as China or India, it makes sense to conduct more of their design work in or near these markets than back in the home office located in Michigan or Bavaria. In addition, firms are under increased pressure to reduce product development times, or may be competing in increasingly turbulent market environments. These factors lead firms to leverage all the global resources they have at their disposal for product development.[11]

[9]Stephen K. Markham and Hyunjung Lee, op. cit.

[10]For a summary of the Booz & Company findings, see Barry Jaruzelski and Kevin Dehoff, "'Beyond Borders: The Global Innovation 1000' Study Reveals a Global Shift in R&D Spending," *Visions*, 33(3), October 2009, pp. 27–30.

[11]Elko J. Kleinschmidt, Ulrike de Brentani, and Sören Salomo, "Performance of Global New Product Development Programs: A Resource-Based View," *Journal of Product Innovation Management*, 24(5), September 2007, pp. 419–441; see summary in K. Sivakumar, "Global Product Development," in Jagdish N. Sheth and Naresh K. Malhotra, *Wiley International Encyclopedia of Marketing*, Volume 5, Product Innovation and Management (West Sussex, UK: John Wiley, 2011), pp. 68–74.

Many multinational firms seek to leverage their product development skills across their subsidiaries and gain competitive advantage by setting up *global new product teams*.[12] A large firm may have R&D skills in its German subsidiary, its manufacturing in Asia, and its suppliers somewhere else again. A firm's global presence, however, is no guarantee that it will automatically know how to efficiently manage its global operations. Effectively coordinating and marshaling the efforts across multiple countries to develop and to launch successful new products is a major challenge. There are many decisions to make that impact global product development effectiveness: how much autonomy should the subsidiaries have, how should they be rewarded, what work conditions should be imposed such that teamwork within and between subsidiaries is encouraged, and so forth. There is also the possibility of outsourcing some of the required new product capabilities, for example, through strategic alliances with global partners. Similarly, the global network of suppliers and distributors needs to be managed and coordinated so as to improve global product development as well as global launch. Selecting the best organizational structure for the global product team is more difficult than if only one culture is involved, as differences among team individuals as well as linguistic barriers and national culture differences must be taken into account. At the time of launch, even more decisions arise: Should a product be positioned the same way throughout the world, or should positioning, branding, or packaging decisions be localized? Many firms react to these challenges with well-defined, formal processes, while others leave the new products process relatively unstructured and adaptable to product or environmental considerations.

The best research available on this topic finds that firms with a *global innovation culture* have the most effective global new product programs.[13] Having a global innovation culture means that a firm is open to global markets, mindful of differences in customer needs and preferences, and respectful of different national cultural and business environments. Firms with such a corporate culture are able to recognize the specialized skills, resources, and ideas they possess in different subsidiaries around the world. In fact, at these firms, all operations and strategies (not just new product development) are defined in terms of the realities of the international market. A firm with a global innovation culture is better at integrating its global knowledge, can better manage the R&D tasks associated with the new products process, and has an advantage in implementing global launches.[14] All of these factors contribute to improved global new product performance. Throughout this book, you will see examples of firms that practice innovation on a global basis, which includes managing virtual and highly diverse global product development teams—no easy task! Figure 1.2 provides several samples of firms that take the global aspect of product development very seriously.

[12]Good references are Roger J. Calantone and David A. Griffith, "From the Special Issue Editors: Challenges and Opportunities in the Field of Global Product Launch," *Journal of Product Innovation Management,* 24(5), September 2007, pp. 414–418; and Ram Mudambi, Susan Mudambi, and Pietro Navarra, "Global Innovation in MNCs: The Effects of Subsidiary Self-Determination and Teamwork," *Journal of Product Innovation Management,* 24(5), September 2007, pp. 442–455.

[13]Elko J. Kleinschmidt, Ulrike de Brentani, and Sören Salomo, op. cit.

[14]Roger J. Calantone, S. T. Cavusgil, J. B. Schmidt, and G.-C. Shin, "Internationalization and the Dynamics of Product Adaptation: An Empirical Investigation," *Journal of Product Innovation Management,* 22(2), March 2004, pp. 185–198.

FIGURE 1.2 **Product Development as a Global Process**

Procter & Gamble: According to the P&G Web site, P&G products are developed as global R&D projects. P&G has 22 research centers in 13 countries from which they can draw expertise. As a good example of a global product, consider the Swiffer mop. P&G made use of its research centers in the United States and France to conduct market research and testing in support of this new product.

Apple: In the development of the iPod, Apple worked with about ten different firms and independent contractors throughout the world, and did product design and customer requirement definition in both the United States and Japan.

Ikea: The Swedish furniture retailer knows that its target market (middle-class strivers) crosses international and intercontinental lines, so it operates globally in a streamlined fashion. It identifies an unmet customer need (say a certain style of table at a given price point), commissions in-house and outsourced designers to compete for the best design, then its manufacturing partners worldwide compete for the rights to manufacture it. Excellent global logistics complete the value delivery to customers.

Ford: The carmaker has moved to a Global Product Development System, in which different groups are assigned the engineering task for one car system, and this is shared globally. One group does the exhaust system for all cars sold globally, one does the steering system, and so on. This efficient method has slashed time to market by 25 to 40 percent and cut engineering costs by 60 percent in the first few years of operation. The fact that car customers have similar wants around the world (fuel economy, safety, sustainability, attractive design, and a good entertainment system) makes the Global Product Development System feasible.

Source: Some examples are from Loida Rosario, "Borderless Innovation: The Impact of Globalization on NPD Planning in Three Industries," Visions, June 2006.

Global new product teams are a way of life now for many firms, and we will see more about the challenges facing such teams in Chapter 12. There, we will focus on the issues facing the global new product development team, and how firms overcome these hurdles to take advantage of product knowledge residing in many corners of the world. We touch on some of the issues regarding global positioning and branding decisions in Chapter 14.

How Product Development Is Different

It is likely that this course is located in your university's business school, within the marketing department. Or it might be part of your engineering training, or part of a specialized program in technology innovation management. In any case, this is a good time to note an underlying principle of product development: It's all about teamwork. The *new products team* ideally is cross-functional, comprising personnel from marketing, R&D, engineering, manufacturing, production, design, and other functional areas as well. Unlike other courses you may be taking, we spend much time in this text on *how you interact with people from other fields of study*: discussing how team members work together, how they can improve communication, what they need to achieve when working together, and so on. So, whatever your background, and whatever course of study you are pursuing, remember that in product development you will spend a lot of your time coordinating and working closely with people from other functional areas. Above all else, product development is a joint effort.

All members of a new products team make an important contribution to product development, so we must be aware of, and try to avoid, narrow functional viewpoints. Marketers have to learn to work with scientists, engineers, lawyers, production managers, and so on. We may come from marketing, and we will often return there when the project is finished, but, for now, we are all *new products people,* working with all functions, being biased to no one. A marketing type may not appreciate the thoroughness of a research scientist. And that scientist may not appreciate the marketer's enthusiasm, which sometimes leads to what the scientist thinks are rash and unwarranted conclusions. Now is a good time to begin thinking like a general manager.

This course of study calls for a *strong creative contribution*. Not only do we create new product concepts; in many firms, that's easy. The tough part is *how best to develop and market them*—devising a concept-testing method that works, screening a totally new idea the firm has never faced, and figuring out how to integrate engineers into a trade show booth effectively, how to position a product that creates its own new category, how to produce it on present equipment, how to name it in a way that communicates and is not confusing, and so on. No answers are found in the back of this book. We never will know whether any one decision was right, just whether the total package of decisions worked out.

Being creative means we *travel on unmarked roads*. Most of our decisions are made on grossly inadequate facts. Not that we don't know what facts we need or how to get good estimates of them—we usually do. But there's never enough time or money. Worst of all, *what seems to be a fact in January may not be a fact come June, when we actually introduce the new item.* As a result, we often do things that make others nervous. For example, we use **heuristics**—rules of thumb that firms have found work for them: "On items such as this, about 30 percent of the people who hear of a new brand, try it," or "When the product engineer from R&D disagrees with the process engineer from manufacturing, it's better to go with manufacturing." Heuristics sometimes leave us holding an empty bag; but without them, projects just won't move forward fast enough. Another technique is to use *simple intuition:* hunch, or gut feel. This explains why most managers want new products people to have spent time in ongoing operations before moving on to new products work.

This suggests another key difference between this course and many of your others. This course is about the activities of *people working under intense pressure*, making tough decisions under impossible conditions. Consider the development and launch of the Amazon Fire Phone. Strategically, the phone was supposed to grab a share of the smartphone market and also drive shoppers to Amazon's online store. From a technology viewpoint, the phone was actually quite adequate compared to competitors, in terms of important attributes such as screen size and memory. But it needed to be better than adequate in order to gain traction in a market dominated by Apple and Android phones. Despite the best efforts of the company and the huge investment in human and financial resources, the phone was declared a failure soon after launch.[15] When studying how strategy guides teams throughout a project, or how firms telescope their market testing into simultaneous regional rollouts, remember that pressure.

[15]J. P. Mangalindan, "Why Amazon's Fire Phone Failed," *Fortune*, September 29, 2014.

FIGURE 1.3 **Not All New Products Are Planned**

A Raytheon engineer working on experimental radar noticed that a chocolate bar in his shirt pocket melted. He then "cooked" some popcorn. The firm developed the first commercial microwave oven.

A chemist at G. D. Searle licked his finger to turn a page of a book and got a sweet taste. Remembering that he had spilled some experimental fluid, he checked it out and produced aspartame (NutraSweet).

A 3M researcher dropped a beaker of industrial compound and later noticed that where her sneakers had been splashed, they stayed clean. ScotchGard fabric protector resulted.

A DuPont chemist was bothered by an experimental refrigerant that didn't dissolve in conventional solvents or react to extreme temperatures. So the firm took the time to identify what later became Teflon.

Another scientist couldn't get plastic to mix evenly when cast into automobile parts. Disgusted, he threw a steel wool scouring pad into one batch as he quit for the night. Later, he noticed that the steel fibers conducted the heat out of the liquid quickly, letting it cool more evenly and stay mixed better. Bendix made many things from the new material, including brake linings.

Others? Gore-Tex, dynamite, puffed wheat, Dextro-Maltose, LSD, penicillin, Dramamine, X rays, pulsars, and many more. In each case, a prepared mind.

Sources: DuPont and Bendix cases, *The Innovators* (New York: Dow Jones, 1968); Raytheon, Searle, and 3M cases, Kenneth Labrich, "The Innovators," *Fortune*, June 6, 1988, p. 56.

You may also be taking a course that deals with innovation in manufacturing or operations, and you may wonder how *process* innovation differs from *product* innovation. The term *process innovation* usually applies to functions, especially the manufacturing or distribution process, and every new product benefits from this type of innovation. The term *product innovation* applies to the total operation by which a new product is created and marketed, and it includes innovation in all of the functional processes.

The last difference worth noting here is in *application*. Sometimes the new product process is accidental, or **serendipitous** (see Figure 1.3). But remember the old adage that chance favors the prepared mind. At least two dozen scientists had observed mold killing their bacteria colonies before Alexander Fleming pursued the phenomenon into the discovery of penicillin. More recently, Pfizer researchers noticed that several of the men in a test study of a new angina medication reported that it was ineffective at treating their angina, but it did have an unexpected alternative effect on the body. Soon, Pfizer was marketing Viagra, a leading product of theirs for several years.[16] So, we must practice. You cannot learn how to develop a new product concept by reading about attribute analysis or gap analysis. You must *do* them. The same goes for product use testing, positioning, contingency planning, and many more. There are opportunities at the end of every chapter to apply the chapter's material in one or more real-life short cases.

[16]Jenny Darroch and Morgan P. Miles, "Sources of Innovation," in V. K. Narayanan and Gina C. O'Connor (eds.), *Encyclopedia of Technology & Innovation Management* (Chichester, UK: John Wiley, 2010), Chapter 14.

What Is a New Product, and What Leads to Success?

The term **new product** can mean different things to different people. Figure 1.4 shows that new products can include **new-to-the-world** (sometimes called **really new**) products, as well as minor repositionings and cost reductions. The list in Figure 1.4 may include things you would exclude. For example, can we have a new item just by repositioning an old one (telling customers it is something else)? Arm & Hammer did, several times, by coming up with a new refrigerator deodorant, a new carpet freshener, a new drain deodorant, and more, all in the same package of baking soda, even with the same brand name. These may be considered just new uses, but the firm still went through a process of discovery and development. And a new use (particularly in industrial firms) may occur in a completely separate division. DuPont, for example, uses basic fibers in many different ways, from technical to consumer. Financial firms use their common databases for different markets. Similarly, brand names have long been used as platforms for launching line extensions. The Dove soap name, for example, has been extended to almost two dozen box soaps and almost as many liquid body washes, and more recently, to a very successful Dove Men+Care line.[17]

FIGURE 1.4 **What Is a New Product?**

New products can be categorized in terms of how new they really are to the world or to the firm. One common set of categories is as follows:

1. **New-to-the-world products, or really new products.** These products are inventions that create a whole new market. Examples: Polaroid camera, the smartphone and iPad, Hewlett-Packard's laser printer, Rollerblade brand inline skates, P&G's Tide Pods.
2. **New-to-the-firm products, or new product lines.** Products that take a firm into a category new to it. The products are not new to the world but are new to the firm. Examples: P&G's first shampoo or coffee, Hallmark gift items, Virgin Atlantic Airlines or Virgin Mobile phone service, Canon's laser printer.
3. **Additions to existing product lines.** These are "flanker" brands, or line extensions, designed to flesh out the product line as offered to the firm's current markets. Examples: Dove Men+Care, Tide Pods with Downy, Special K line extensions (drinks, snack bars, and crystals).
4. **Improvements and revisions to existing products.** Current products made better. Examples: P&G's Ivory Soap and Tide powder laundry detergent have been revised numerous times throughout their history; countless other examples.
5. **Repositionings.** Products that are retargeted for a new use or application. Example: Arm & Hammer baking soda repositioned as a drain or refrigerator deodorant; aspirin repositioned as a safeguard against heart attacks. Also includes products retargeted to new users or new target markets; Marlboro cigarettes were repositioned from a woman's cigarette to a man's cigarette years ago.
6. **Cost reductions.** New products that simply replace existing products in the line, providing the customer similar performance but at a lower cost. May be more of a "new product" in terms of design or production than marketing.

Sources: The categorization scheme was originally presented in Booz, Allen & Hamilton Inc., *New Product Management for the 1980s* (New York: Booz, Allen & Hamilton Inc., 1982) and is now standard in new product development. Some of the examples are from Robert G. Cooper, *Winning at New Products: Accelerating the Process from Idea to Launch,* 3rd ed. (Cambridge, MA: Perseus Publications, 2001).

[17]Deborah L. Vence, "Just a Variation on a Theme," *Marketing News*, February 2007, pp. 18–20.

All the categories in Figure 1.4 are considered new products, but it is plain to see that the risks and uncertainties differ, and the categories need to be managed differently. Generally, if a product is new to the world or new to the firm (the first two categories), the risks and uncertainties faced by the firm are higher, as are the associated costs of development and launch. It cost Gillette far more, for example, to launch its newest shaving system (the Fusion) than to do upgrades to the earlier Mach 3 system (such as developing the women's version, named Venus, which used the same blade technology). A greater commitment of human and financial resources is often required to bring the most innovative new products to market successfully.

Note also that not all the new product categories in Figure 1.4 are necessarily innovations. Line extensions, like the Dove soap bars and men's products mentioned earlier, or new flavors of Oreo cookies, may have resulted from the company's desire to increase display space and shelf space, or boost sales of the product category. Line extension shouldn't be confused with "true" innovation—and management must recognize that true innovation that provides enhanced value to customers is where their long-term competitive advantage may lie.[18]

New-to-the-world products revolutionize existing product categories or define wholly new ones. They are the most likely to require consumer learning and/or incorporate a very new technology. Desktop computers with word processing software defined a new product category that made electric and manual typewriters virtually obsolete, and consumer learning was required by those who type for a living. Hewlett-Packard LaserJet printers did much the same thing in the printer category. The launch of CDs required major differences at the retail level in terms of store layout and distribution of related components (such as CD players). Other familiar examples, such as Tesla and other electric cars, smart TVs, and wearable technology such as smart watches, illustrate the use of new technologies in new-to-the-world products. Manufacturers had to overcome perceived risks, perceived incompatibility with prior experience, or other barriers to customer adoption (more on this subject in Chapter 14).

Of course, launching new-to-the-world products means risk—and the encouragement to take on the risk must permeate the whole firm and must start at the highest levels of management. At highly innovative firms like Intel and Gillette (a division of Procter & Gamble), top management may even abandon the use of quarterly earnings estimates in order to keep the business units focused on innovation and other long-term strategic goals.[19]

The **new product line** category in Figure 1.4 raises the issue of the imitation product, a strictly "me-too." If a firm introduces a brand of light beer that is new to them but is identical to those already on the market, is it a new product? Yes, it is new to the firm, and it requires the new products process. Canon was not the first laser printer manufacturer, Coca-Cola was not the first orange-juice bottler, and P&G was not the first competitor in the coffee business. These were new products to these firms, however, managerially speaking, and they are managed as such by the companies.

[18]Deborah L. Vence, op. cit.

[19]Thomas D. Kuczmarski, "What Is Innovation? And Why Aren't Companies Doing More of It?" *Journal of Consumer Marketing,* 20(6), 2003, pp. 536–541.

Figure 1.4 shows that many new products can be considered additions to existing product lines or improvements and revisions to existing products. Many of these line extensions round out or add to existing product lines extremely well: Dove Men+Care, Bud Light, Special K snack bars or shakes. Nevertheless, studies suggest that the most innovative new product categories account for many more product successes. In one study, the two most innovative categories accounted for about 30 percent of new product launches, but about 60 percent of the most successful products. (Percentages, of course, will vary by industry: High-tech industries will produce proportionately more highly innovative new products.) In fact, a U shape between innovativeness and success was found: The most innovative new product categories and the least innovative categories (the repositionings and cost reductions) outperformed the middle categories in terms of meeting financial criteria, returns on investment, and resulting market shares![20] This is because new products in the "middle ground" are not new enough to really excite new customers, yet different enough from existing products that there are fewer synergies. The results suggest that many firms need to reconsider the importance and potential contribution of innovative new products when making project selection decisions. In Chapter 3, we shall look at building a strategic portfolio of products that strives for balance among the innovation categories.

We have already seen that, even among the best firms, there are some product failures, and this entire book is devoted to developing new successful products, so there can be no easy answer to the question "What leads to new product success?" Nevertheless, several studies over the years on this question have yielded a consistent answer: The number one reason for success is a *unique superior product.* Additionally, common causes of failure include "no need for the product" and "there was a need but the new product did not meet that need." In other words, it was not unique and superior.[21] It did not offer the user sufficient **value added** relative to the costs of purchasing and use. Value added is a key concept to keep in mind as you travel the new product highway.

Does This Field of Activity Have a Unique Vocabulary?

Yes, it does, for two reasons. One, it is an *expanding field,* taking on new tasks and performing them in new ways. Second, it is a *melting pot field,* bringing in the language of scientists, lawyers, marketing people, accountants, production people, corporate strategists, and many more. Because many of these people talk about the same event but using different terms, communication problems abound.

[20]Elko J. Kleinschmidt and Robert G. Cooper, "The Impact of Product Innovativeness on Performance," *Journal of Product Innovation Management,* 8(4), December 1991, pp. 240–251; see also Abbie Griffin, *Drivers of NPD Success: The 1997 PDMA Report* (Chicago: Product Development & Management Association, 1997).

[21]Discussions of product success and failure can be found in R. G. Cooper, "New Products: What Separates the Winners from the Losers?" in M. D. Rosenau, A. Griffin, G. Castellion, and N. Anscheutz (eds.), *The PDMA Handbook of New Product Development* (New York: John Wiley, 1996), pp. 3–18; and R.G. Cooper, "The Impact of Product Innovativeness on Performance," *Journal of Product Innovation Management,* 16(2), April 1999, pp. 115–133.

For example, there is sometimes confusion over the terms **invention** and **innovation**. To managers invention refers to the dimension of uniqueness—the form, formulation, function of something. It is usually patentable. Innovation refers to the overall process whereby an invention is transformed into a commercial product that can be sold profitably. The invention may take but a few moments. We have far more inventions than we do innovations. Similarly, the average person might think that a product idea, a product concept, a product prototype, and maybe even a product are all about the same thing. As you will see in the pages of this book, we have specific, distinct definitions for each of these terms, and they are not interchangeable.

The term **design** can be confusing as well. It can refer to industrial design or engineering (premanufacturing) design; creative design focused on appearance and aesthetics; or the entire technical creation function from initial specs to the shipping dock. Some might even use the term to refer to the entire product innovation function. In this text, we will adopt an *industrial design* perspective, considering the functionality and ergonomics of the product as well as its appearance, and we will explore how design can itself be a driver of innovation.

When in doubt, a complete glossary of new product terms is published online by the Product Development & Management Association (**www.pdma.org**; follow the link to the glossary).

Does the Field of New Products Offer Careers?

It does, though not many are entry positions for people right out of college. Generally, top managers want new products people to know the industry involved (for the customer understanding mentioned earlier) and the firm's various operations (that multidimensional, orchestration task also mentioned). So, most new products managers get assigned to new products work from a position in a functional department. For example, a scientist finds working with marketing and manufacturing people interesting, a market researcher specializes in benefit segmentation, or a salesperson earns a reputation for good new product concepts. Each of these people is a candidate for full-time work on new products.

The specific jobs in this field are three. First is **functional representative** on a team, sometimes full time, more often part time. An example is a marketing researcher or a production planner. These people may be representatives on several teams or just one. The second job is **project manager** or **team leader**. This role is leader of a team of people representing the functions that will be required. The third position is **new products process manager**, responsible for helping project managers develop and use good new product processes.

Some of the career tips we hear are:

1. Be multifunctional, not functionally parochial. Have experience in more than one function (marketing, manufacturing, and so on).
2. Be a risk taker, willing to do whatever is necessary to bring a product to market, including facing the wrath of coworkers.
3. Think like a general manager. Scientists and sales managers can lead new products teams, but they must cease being scientists and sales managers.

4. Be a combination of optimist and realist, aggressor and team player, leader and follower.
5. Develop your creative skills, both for new product concepts and for new ways of doing things.
6. Be comfortable in chaos and confusion. Learn to work with depressives, euphorics, and those with no emotion at all.

Fortunately, such managers do exist—and in increasing numbers. We hope you become one of them.

The Strategic Elements of Product Development

We cover a lot of product development material in this book, from opportunity identification right through to launch and postlaunch. Underlying all of this are three **strategic elements**, which will be a major focus in this book. These strategic elements provide a framework to guide management through product development and help them focus on what is most important. Top product development consultants, like Robert Cooper of the Product Development Institute, recommend a framework of this type to firms of all sizes to help guide product development.[22] A key point here is that *all three of the strategic elements must be in place*, and each is coordinated with, and supports, all the others. The three elements are a **new products process**, a **product innovation charter**, and a well-managed **product portfolio**.

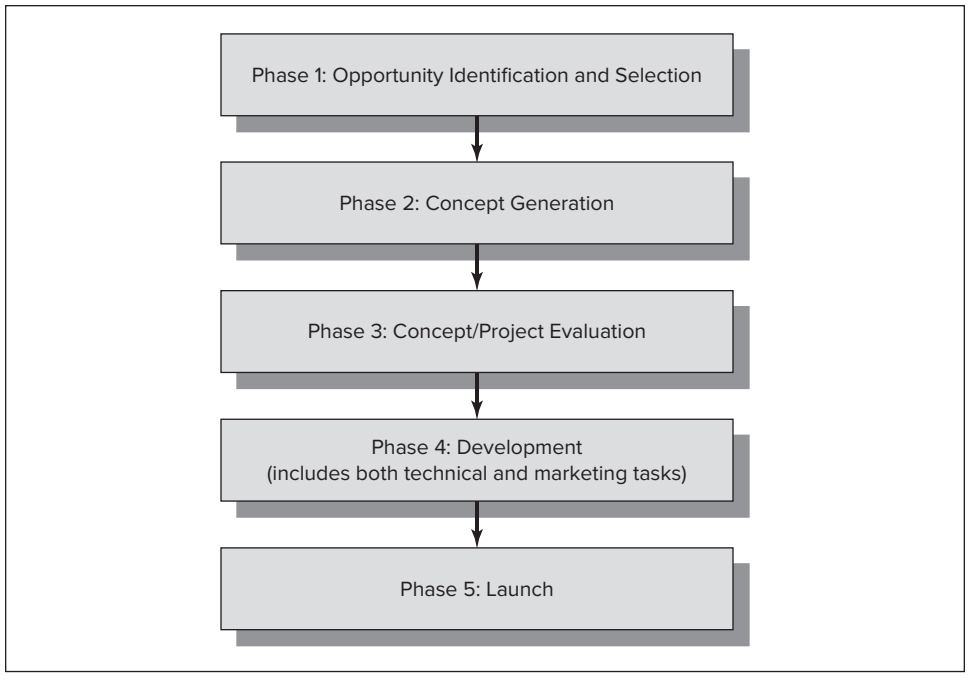
The *new products process* is the procedure that takes the new product idea through concept evaluation, product development, launch, and postlaunch. This procedure is usually depicted as a phased process with evaluative steps between the phases, but as you will see in upcoming chapters, it is rarely so straightforward. The *product innovation charter* is essentially a strategy for new products. It ensures that the new product team develops products that are in line with firm objectives and strategies and that address marketplace opportunities. *Product portfolio management* helps the firm assess which new products would be the best additions to the existing product line, given both financial and strategic objectives. In this chapter, we introduce the first strategic element, the new products process, as it serves as a framework for everything that follows in this book, and explore it more deeply in Chapter 2. In Chapter 3, we discuss the last two strategic elements, the product innovation charter and product portfolio management.

The Basic New Products Process

Figure 1.5 shows a simple new products process. Research has shown that about 70 percent of firms use some kind of formal, cross-functional, phased new products process, and about 47 percent use clearly defined evaluation criteria after each phase.

[22]Roger J. Calantone, S. T. Cavusgil, J. B. Schmidt, and G.-C. Shin, "Internationalization and the Dynamics of Product Adaptation: An Empirical Investigation," *Journal of Product Innovation Management*, 22(2), March 2004, pp. 185–198.

FIGURE 1.5
The Basic New Products Process



At least 40 percent of firms assign a process manager whose job is to manage the phased new products process.[23] The phased new products process is well established among firms involved in new product development.

The actual form of the phased new products process is by no means standardized. The number of phases can vary across companies. But the first component of the process is the pre-development period, sometimes called the front end of innovation, which encompasses identifying opportunities, generating and screening ideas, developing and refining concepts, evaluating the concepts for their financial and strategic potential, and then making a decision on which concepts to put into development. Predevelopment corresponds to the first three phases in Figure 1.5. Next comes the development phase, which includes both technical development and developing the marketing plans for the upcoming launch. The final phase, launch, starts at the time the product is launched but also includes management of the product post-launch to guide it toward successfully reaching its objective. In short, no matter how many phases, there is an underlying process of predevelopment, development, and launch.

The phases of the new products process represent *activities* that are conducted by the new product team; between the phases are *evaluation tasks*, or decision points.[24] It is at

[23]Markham and Lee (2012), op. cit.; Robert G. Cooper, Scott J. Edgett, and Elko J. Kleinschmidt, *Improving New Product Development Performance and Practices: Benchmarking Study* (Houston, TX: American Productivity and Quality Center, 2002); Marjorie Adams (2004), op. cit., and Kenneth B. Kahn, Gloria Barczak, and Roberta Moss (2002), op. cit.

[24]Robert G. Cooper, *Winning at New Products: Accelerating the Process from Idea to Launch,* 3rd ed. (Cambridge, MA: Perseus Publishing, 2001).

these points that the hard Go/No Go decisions need to be made (that is, whether the project looks promising enough to go on to the next phase). Throughout this book, we will be looking at the kinds of tests (from concept tests, to product use tests, to market tests) that are used to gather information for project evaluation.

The goal of a new products process is to manage down the amount of risk and uncertainty as one passes from idea generation to launch. There are periodic evaluations all the way through the process. A firm may have access to hundreds of ideas; weaker ones are immediately eliminated, and the better ones are refined into concepts. (For now, think of concepts as "more fully formed ideas." We will make the distinction between ideas and concepts clear in Chapter 4.) Later in the process, only the best concepts are approved and moved forward to the development phase. The product is continuously refined during the development phase and could still be halted before the launch phase if preliminary product use test results are not positive. By the time the product is launched, it has a much higher likelihood of succeeding (recall the roughly 60 percent success rate across many product categories cited earlier). Managing down the amount of uncertainty is important, because each additional phase means greater financial investment (possibly much greater), not to mention greater commitment of human resources. Firms using a new products process have reported improvements in product teamwork, less rework, greater success rates with new products, earlier identification of failures, improved launch, and up to 30 percent shorter cycle times.[25] This is not to say, however, that all firms implement the process well. Other studies show that many firms that claim to have a new products process either designed it or implemented it poorly; thus, there is much room for improvement.[26]

Note, however, that the neat, linear new products process shown in Figure 1.5 is not typical of product development in the real world. The reality is that the activities are not sequential, but overlapping. It is not implied that one phase must be completed before work can begin on the next one, like a pass-the-baton relay race. In fact, overlapping is encouraged. There is much pressure for firms to **accelerate time to market** for new products, and a certain amount of phase overlapping is an important tool in speeding new products to market. To do this right, of course, requires that the product team members from different functional areas (marketing, R&D, manufacturing, design, engineering) communicate very effectively.[27] Product development is truly **multifunctional**, where all functions (and, increasingly, the customer as well) work together on a **cross-functional team** to accomplish the required tasks. The whole of Chapter 12 investigates the organization and management of these cross-functional teams in depth. But even though we discuss teams later in the text, keep in mind that

[25]Robert G. Cooper, "New Products: What Separates the Winners From the Losers and What Drives Success," in K. B. Kahn, S. E. Kay, R. J. Slotegraaf, and S. Uban (eds.), *The PDMA Handbook of New Product Development* (Hoboken, NJ: Wiley, 2013), Ch. 1, pp. 3–34.

[26]Robert G. Cooper, Scott J. Edgett, and Elko J. Kleinschmidt, *Best Practices in Product Innovation: What Distinguishes the Top Performers,* Product Development Institute, 2003; Robert G. Cooper, "Perspective: The Stage-Gate® Idea-to-Launch Process—Update, What's New, and NexGen Systems," *Journal of Product Innovation Management,* 25(3), May 2008, pp. 213–232.

[27]Preston G. Smith and D. G. Reinertsen, *Developing Products in Half the Time* (New York: Van Nostrand Reinhold, 1991).

the team must become involved as early as possible in the new products process. It is the responsibility of the team leader to bring together the right individuals with the right skill sets, and to encourage communication within the team, between the team and top management, and between the team and communities of customers. The effective team leader knows how to deal with power conflicts as well as technical complexity.[28]

Another way that firms have been able to avoid delays and speed up time to market is to streamline the evaluation tasks. At Johnson & Johnson, the preparation for an evaluation task might have included preparing a 30- to 90-page review document. This was cut to a standardized presentation, with a one-page summary and a handful of slides—enough to inform senior management about the risks and commitments being decided upon. It was reported that weeks of preparation time were saved with the new format.[29]

Furthermore, Figure 1.5 implies that each phase is always followed by a Go/No Go decision. While this is often the case, it might be an oversimplification. If some key information is still missing or unavailable, a third option is possible, which we can call an "On decision." This means that the project will move forward (a conditional "Go," if you will), but the missing information must be gathered and the project could still be halted at a later phase. An evaluation task that includes conditional Go decisions is sometimes called a **fuzzy gate**. For example, a new packaged food product might do reasonably well at a concept test, but management might feel they don't really have a read on the market until some product use testing (letting the customer actually taste the product) is conducted. An On decision would mean that the product is approved to move to development, but the product use test must yield positive results, otherwise the project would be halted at that point. Fuzzy gates, therefore, speed up the process because time is not wasted in obtaining complete information before the decision is made. They are relatively common; in the CPAS study, about 50 percent of projects move forward with some conditional decisions along the way. Nevertheless, the team must indeed make a firm decision once the necessary information is obtained; in other words, fuzzy gates still have teeth. A related problem occurs when teams actually make a full "Go" decision, but fail to commit any resources to the project. This is known as a *hollow-gate* problem and results in too many projects underway and, inevitably, cost overruns and launch delays. Similarly, a poor project may never be critically evaluated because it is the CEO's pet project, or because a hidden personal or political agenda is influencing decision making. Gates without teeth, hollow gates, special treatment for executives, or hidden agendas can all hinder effectiveness of the new products process, but all are identifiable and avoidable.[30]

Another consideration is that the new products process might look very different for new-to-the-world, **breakthrough products** (more on these in Chapter 2) as

[28]Hans J. Thamhain, "Managing Product Development Project Teams," in Kenneth B. Kahn, George Castellion, and Abbie Griffin (eds.), *The PDMA Handbook of New Product Development* (New York: John Wiley & Sons, 2005), pp. 127–143.

[29]Robert G. Cooper, "What Leading Companies Are Doing to Reinvent Their NPD Processes," *Visions*, 32(3), September 2008, pp. 6–10.

[30]For more on all of these problem areas, see Cooper (2008), op. cit.

compared to more **incremental new products**. A firm like P&G might use a simplified process for a low-risk project (such as a new detergent) in which some phases and evaluation tasks are combined or may even be omitted. The CPAS study showed that only about 40 percent of radical projects have phases that overlap or are skipped, while for incremental new products, about 59 percent have overlapping phases or skip some phases entirely. For a new-to-the-world product, such as Febreze or Dryel, P&G faces greater risks and higher expenses, and the complete new products process in all its detail will probably be followed. Thus, it is helpful to think of the process in Figure 1.5 as a guideline or framework, but to recognize that the new products process is really quite flexible. In fact, these characteristics (overlapping phases, fuzzy gates, and flexibility) are features of what is called the **third-generation new products process**, which is the way most firms interpret the process depicted in Figure 1.5.[31]

There is something else significant in Figure 1.5. The phases do not refer to functions or departments. Technical people may *lead* the technical portion of the development, but others participate, some very actively, including market research, sales, design, and others. Launch sounds like a marketing activity, but much of the marketing is done back during earlier phases. We discuss what we call the "marketing ramp-up" in detail in Chapter 13. Also, during launch, the manufacturing people are busy setting up production capability. Legal people are clearing brand names, and lab people are running tests on early product output. It is clear that the new products process is a job for a well-organized, efficient cross-functional team.

Additionally, different firms group the new product activities differently. There is certainly no agreement on the exact number of steps. That is not a cause for concern. Rather than thinking of the process as some number of discrete phases, look for the bigger picture of a large, evolving, general-purpose process, which we break up into five phases partly for our benefit in presenting the story about new product activities. Different firms simply break up the same underlying process differently.

We will go much deeper into the new products process in Chapter 2.

The Other Strategic Elements

The process depicted in Figure 1.5 is part of a firm's new product strategy, but it leaves some questions unanswered. First, what is the firm's underlying strategy for new products? What market and/or technology opportunities is it seeking to exploit? What is the strategic arena within which the firm will compete? How innovative does management want to be? Lacking a new product strategy, the firm will approach new product development in an unfocused manner. Without a clear boundary defining what new market or technology opportunities to pursue, *any* idea would seem to be all right, which leads to too many underfunded products. We call this new product strategy a **product innovation charter**, or PIC. The PIC is developed by senior management and provides guidance to all functional areas involved in innovation. It

[31]See Robert G. Cooper, "Perspective: Third-Generation New Product Processes," *Journal of Product Innovation Management*, 11(1), 1994, pp. 3–14; also Cooper (2008), op. cit.; also Robert G. Cooper, "Effective Gating," *Marketing Management*, 18(2), 2009, pp. 12–17.

defines a scope of activity for new product development, helping the product team identify what opportunities lie within the boundaries and where they should focus their efforts. That way, perhaps fewer projects may be pursued, but they will generally be of higher value to the firm. And the advantages of establishing a PIC are obvious. In Robert Cooper's research, a clear new product strategy (well-stated goals, match between product innovation and overall business goals, identifiable strategic focus, product roadmap in place) is closely related to new product performance.[32]

Additionally, many new product concepts may seem to be technically feasible and marketable. Before committing scarce financial and human resources, top management must also consider whether the new product, if developed, would fit the firm's overall business strategy: whether it adds strategically to the products already being offered, or whether it throws the firm's product line off balance. This is an issue of product portfolio management. While almost every firm will consider financial criteria such as expected sales revenues or profits when approving a new product development project, the best performing firms balance financial criteria with strategic considerations, such that the firm's long-term objectives will be met and there will be a dependable flow of new products into the future.[33]

The product innovation charter, product portfolio management, and related issues are covered more deeply in Chapter 3.

Product Development in Action

To see the ongoing efforts of the best product developers in the business, check the Web site for the Product Development & Management Association (**www.pdma.org**). Among other things, the PDMA sponsors an Outstanding Corporate Innovator award. This award is not for a single great new product, but rather for a sustained program of new product success over at least five years. And award winners must tell attendees at the association's annual conference how they did it. As we noted before, innovation can be taught—and managers from the best innovating firms serve as the teachers in these conference sessions. In most of these cases, one could take their systems right from this book. Winners have included Corning, Royal DSM, Merck, Hewlett-Packard, Sherwin-Williams, Maytag, Becton-Dickinson, Novozymes, Harley-Davidson, and many others (the full list is on the PDMA Web site).

The PDMA Web site also provides links to their academic journal, the *Journal of Product Innovation Management*, and their practitioner-oriented newsletter, *Visions,* as well as to the glossary mentioned earlier. As you take this course, you may want to check these publications for the most recent and timely articles on many aspects of new product development and innovation, and for the current hot topics among new product development professionals.

[32]Robert Cooper, "Best Practices and Success Drivers in New Product Development," in Peter N. Golder and Debanjan Mitra (eds.), *Handbook of Research on New Product Development*, Cheltenham, UK: Edward Elgar, 2018, pp. 410–434.

[33]Gary E. Blau, Joseph F. Pekny, Vishal A. Varma, and Paul R. Bunch, "Managing a Portfolio of Interdependent New Product Candidates in the Pharmaceutical Industry," *Journal of Product Innovation Management,* 21(4), July 2004, pp. 227–245.

Summary

This chapter has introduced you to the general field of new products management. You read how the activity is (or should be) found in all organizations, not just business. You read how this course of study relates to others, what a new product actually is, and that services and business products are covered, not just cake mixes, cell phones, and cars. You learned about where the field stands today, the hallmarks of our activity, our problems with vocabulary, and possible careers. Chapter 2 will take us directly into the new product process.

CHAPTER TWO

The New Products Process

Setting

Chapter 1 provided a view of the *overall new products process*—the phases and evaluative tasks that, if performed well, will churn out the new products the organization needs. This process appeared in Figure 1.5, which serves as a framework for the rest of this book. As noted in the introduction to Part I, the five figures that introduce each part of this book (Figures I.1, II.1, and so on) are indeed the five boxes of Figure 1.5, but expanded to show more detail on what happens at each phase in the process. In this chapter, we go more deeply into the phases of the new products process model of Figure 1.5, illustrating what tasks are required at each phase and who is responsible for what. We then explore several issues important to product managers: how the new products process can be sped up (without sacrificing product quality or running up the budget), how the process would have to be adapted for the development of new services, how to develop breakthrough innovations, and how the skills and resources of external partners can be leveraged to improve the process.

We begin by relating a short new product story to illustrate some of the key activities in the new products process in action. This will lead into a deeper discussion of the new products process and its managerial aspects. In particular, the story clearly shows how the new products process is interwoven with the other strategic elements introduced in Chapter 1, that is, the product innovation charter and the new product portfolio. It also introduces the idea of the cross-functional team and the importance of effective team management in implementing the new products process.

The LEGO New Products Saga[1]

The LEGO Group, manufacturer of those plastic bricks popular with children worldwide, was founded in 1932 in Denmark by Ole Kirk Christiansen. The name LEGO was picked as a short form of "leg goet," or "play well" in Danish, but by coincidence,

[1]This saga is adapted from several sources, including David Robertson, "Innovation at Lego," *Visions*, 35(3), 2011, pp. 10–17; Anonymous, "So What Did Lego Do Anyway," *Visions*, 36(1), 2012, pp. 24–25; Bradford Wieners, "Lego Is for Girls," *Bloomberg BusinessWeek*, December 15, 2011; and *Innovation at the LEGO Group*, International Institute for Management Development, Case IMD-380, 2008.

it also means "I connect" in Latin, and one cannot imagine a more appropriate name for the little connecting bricks. LEGO manufactured wooden toys for the first few years of its existence, but in 1947, Christiansen bought a plastic injection molding machine, and by 1958, the company was manufacturing the familiar plastic bricks. From 1958 to 1978, sales grew at a steady pace to about $180 million worldwide. By 1978, LEGO had introduced the Castle, Space, and Fabuland play themes and the Technic building system. Buoyed by these and other product innovations, sales really took off, doubling once every five years up to about 1993.

Faced with slowing sales in the early 1990s, LEGO began product line extensions, tripling the number of stock-keeping units (SKUs), but these only cannibalized existing products. Overall company sales were unaffected, and the product development efforts ate into LEGO profits. In 1998, LEGO lost money (a company first) and laid off 1,000 workers.

Customer and industry research suggested several reasons for the declines in sales and profits. A generation earlier, kids would have played with LEGO until they reached about 10 or 11 years old; by the late 1990s, they were losing interest earlier. In addition, many children, including the very young, were getting into video and electronic games and preferred these to building blocks. These consumer trends were unlikely to change soon. Industry changes were also taking place. Most competitors were manufacturing in China, while LEGO still produced bricks at more expensive European locations. The channel power in the toy and game industry had shifted away from manufacturers and now belonged to huge discount retailers. LEGO's patent on the plastic brick was also about to expire, truly leaving LEGO in a "change or die" situation.

In 2000, LEGO developed a new mission statement: "To become the world's strongest brand among families with children by 2005." This mission statement was designed to boost innovation throughout the company. To pursue the mission and spur the innovative process, LEGO followed the wisdom of the best business consultants and academics. Some of the most notable activities were as follow:

- LEGO hired creative people internationally, from Italy to Japan to the United States, for their Concept Lab, a new products center to increase diversity and stimulate creativity.
- LEGO created a wide spectrum of innovations, including LEGOLAND amusement parks and education centers, and also opened LEGO retail stores.
- For the first time, LEGO partnered with movie producers to develop Star Wars and Harry Potter LEGO sets in addition to Steven Spielberg Movie-Maker toys.
- New electronic toys such as Galidor, Bionicle, and Mindstorms were added. Galidor interacted with a TV program of the same name, and Bionicle was paired with a movie. A line of Explore electronic toys was also designed for very young children.
- LEGO launched the Digital Designer, with which children could use virtual LEGO bricks to design creations on the computer.

Unfortunately, nothing worked. By 2003, LEGO had lost about $300 million and was almost bankrupt. It was very likely that the company would be sold within a year.

LEGO seemed to have implemented effective strategies: boosting creativity, finding innovation partners, looking for disruptive opportunities, and building an innovation culture. All of these activities were investments in the innovation "engine." With the power of this engine, LEGO was capable of rapid new product development. This did not guarantee successful new products, however. The Concept Lab was charged with developing new products but was not held responsible if its products were not very innovative or good (hence, adding a seventh line of LEGO people to an already wide-enough product line). Movie licensing was only profitable in the years when Harry Potter or Star Wars movies were released, and that was out of LEGO's control. Something still needed to be done.

The big turnaround to save the company began in earnest in 2003. LEGO sold most of the LEGOLAND parks and its headquarters building. Brick production was outsourced to cheaper locations (Mexico and Czech Republic). The number of SKUs was cut in half, as many of these were redundant (for example, at one time, there were seven different lines of LEGO people, all with slightly different faces). Within a year, LEGO had raised enough cash to stave off bankruptcy, but now a long-term plan was required.

The Product Innovation Charter (PIC)

The starting point for the turnaround was a clear product innovation charter (PIC), which begins with an honest situation assessment and opportunity identification. According to Professor David Robertson of the Wharton School, what was missing at LEGO was an innovation guidance system: "Like a rocket car without a steering wheel, LEGO's innovation engine had launched them down a path at high speed, without the ability to navigate the curves in the road ahead. And like such a car, the end of such a ride is destined to be disastrous." To be sure, there were successes, such as the very popular Mindstorms, which LEGO could build upon. But to improve the success rate substantially, LEGO needed to institute an effective guidance system, which, according to Robertson, would have to provide answers to three questions: Where are you now, where do you want to go, and how will you get there?

LEGO's new strategy for innovation centered not on making toys but rather on "developing new experiences that were obviously LEGO but never seen before." Organizational changes were also made to facilitate this new strategy: The Concept Lab was separated from the product development department and set up as an independent profit center. Concept Lab designers were now working with a smaller number of SKUs and were encouraged to use the principle "less is more" by combining familiar elements in different ways. This appealed to the designers, as it was not too different from the LEGO experience itself: making an unlimited number of creative models using a simple system of bricks.

While you will learn more about the PIC in Chapter 3, the important thing to know is that it is a systematic way for managers to develop a new product strategy that considers the goals for their product innovation efforts and how these efforts fit overall business strategy. It involves identifying a strategic focus (i.e., which markets and technologies will be targeted). Any new product opportunities that did not clearly help LEGO achieve its objectives would no longer be pursued.

The New Products Process

A second strategic element is the new products process, which is the path the new product takes from idea to the time of launch and beyond. While LEGO had a new products process in place, it was formalized at this time to a phased process with specific evaluation points and deadlines. LEGO begins by collecting input from customers, suppliers, and other outside sources. A two-day workshop is held in February to examine market trends and identify ideas sourced from inside the company and from the outside sources, and a two-year roadmap is planned for product innovation. In June, product team members present their findings on trends and themes and suggest concepts; the concepts are screened, and the best ones are selected for further consideration. By September, the concepts are more fully developed, business plans and sales projections are prepared, and early prototypes (such as sketches) are prepared and presented. The concepts with the most potential are approved for further work. Then, in December, a full screen is done: the product teams select the concepts that will go into product development, more fully designed prototypes (realistic models, package design ideas) are created and evaluated, business plans are finalized, and required resources are planned. In January, these concepts go into development, with a planned launch later in the year (in time for the November–December peak buying season), and the cycle begins again. This formalized process aided in screening out the weaker ideas, allowing LEGO to concentrate on the highest-potential concepts while keeping to the two-year innovation cycle.

The New Product Portfolio

In addition to a well-functioning new products process, there also needs to be an assurance that the firm is developing the right products with respect to its product portfolio. LEGO management established a plan for thinking about the categories of innovation they were involved in and which ones needed to be focused on. Management defined three broad innovation categories. *Adjusted innovation* is continuous improvement of existing product categories, based on experience and insight. *Reconfigured innovation* involves creating new and better value-providing solutions, supported by studies of customer needs and marketplace changes. And *redefined innovation* means never-before-seen solutions that provide new strategic directions for the future, based on an understanding of social and cultural trends as well as industry trends.

LEGO's product launches during this time reveal the new product portfolio in action. A key component of LEGO's turnaround was the development of Mindstorms NXT, an extension of the original Mindstorms robotic set. LEGO worked with dedicated Mindstorms hobbyists, who enthusiastically made many useful suggestions on potential applications and new components to add to the set. In the words of LEGO management, the hobbyists "came up with ideas we had not even dreamed of." Mindstorms NXT was launched at the Consumer Electronics Show in January 2006 and featured powerful programming capabilities with a visual interface. Mindstorms NXT was targeted to consumers and also to educators through its LEGO Education Group. It became one of the most profitable products in the company's history.

LEGO did not ignore its traditional brick playset line either. When consumer research found that LEGO sets were much more popular with boys, it began to work on a playset specifically targeted to girls. Launched in late 2011, the LEGO Friends line

featured realistic-looking play figures, settings, and storylines designed to appeal to girls. And, noting how movie licensing had been profitable in the past, the company got into that business as well, with the 2014 release of *The Lego Movie*, followed by other successful titles.

What Happened in That Saga?

We just read several years' worth of product development activity in a few minutes. The story began with an ongoing operation that was facing a difficult situation. The saga illustrates how the managers involved applied the strategic elements effectively. We also saw how important it was to get support for the process from top management.

This situation is typical in that the new products process *does not usually begin with a new product idea*. It is folklore that someone, somewhere, wakes up in the middle of the night with a great insight. It can happen, but successful new product programs are not built on such slender hopes. As the saga shows, the process usually begins with what amounts to strategy. With top management's support and good execution of all the strategic elements, LEGO was able to revitalize its innovation process and get back on course.

Note too that development does not take place behind the closed doors of a research lab. Along the way, LEGO's creative people worked with enthusiastic hobbyists, as well as educators and other partners. Also, marketing doesn't start when the product is finished. It becomes involved very early in the process—in this saga, marketing provided key information for the development of the PIC.

Last, the process is not over when the new product is launched. It ends when the new product is *successful,* usually after some in-flight corrections. LEGO monitors the sales, profits, and market shares of its new products and takes corrective actions if interim goals are not reached.

The next section looks more deeply at the phases of the new products process, first introduced in Chapter 1.

The Phases in the New Products Process

Figure 2.1 shows a more detailed version of the **new products process**. Let's examine each of the phases individually to understand the basics.

Phase 1: Opportunity Identification and Selection

The first phase is strategic in nature; successful completion of this phase yields strategic guidance to the new products team, which guides idea generation and all remaining phases in the new products process.

At least three main streams of activity feed strategic planning for new products. They are as follows.

- **Ongoing marketing planning.** Example: The annual marketing plan for a CD-ROM line calls for a line extension to meet encroachment of a new competitor selling primarily on price.
- **Ongoing corporate planning.** Example: Top management adopts a strategy that says either own a market (meaning get either a first- or second-place share) or get

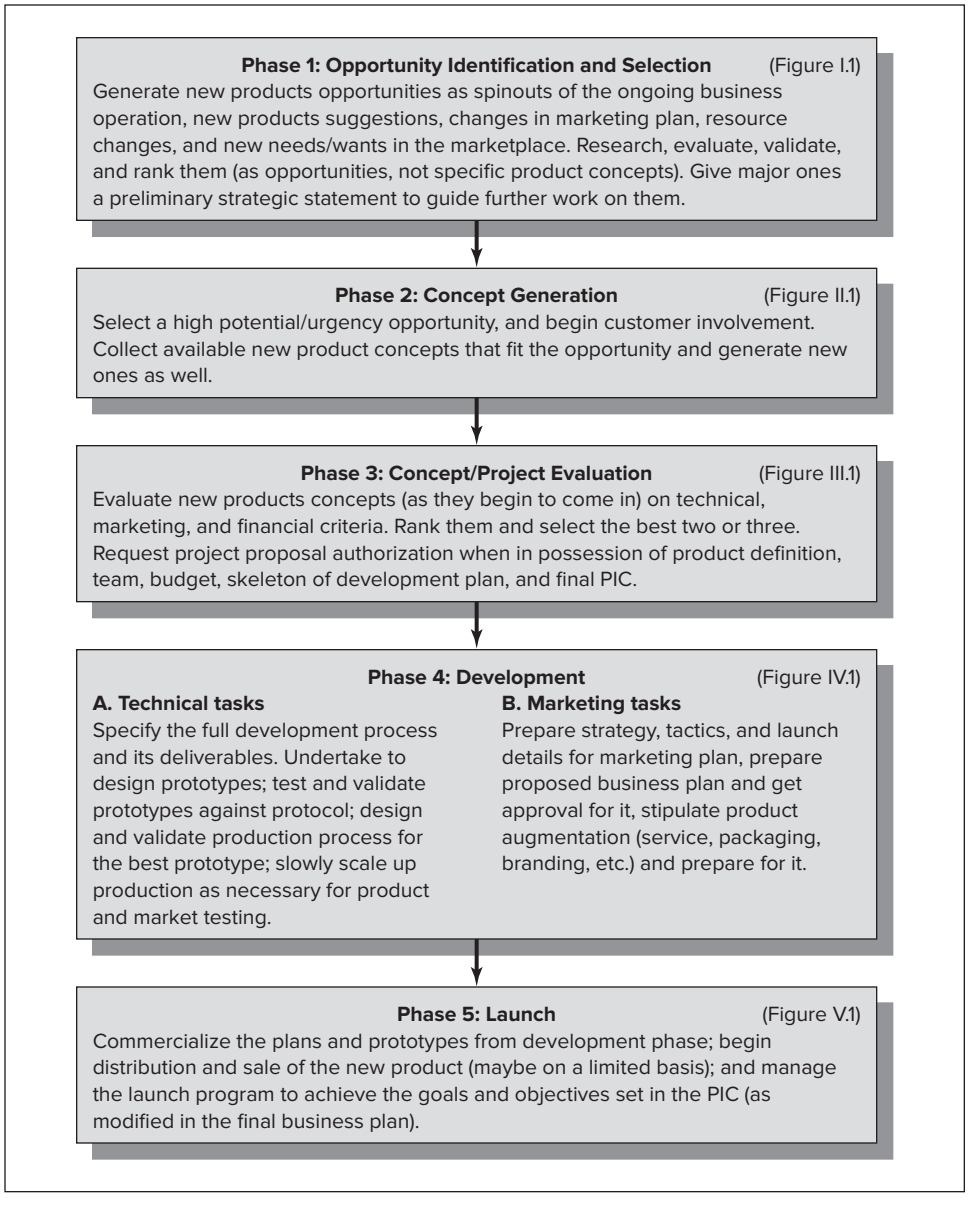


FIGURE 2.1
The Phases of the New Products Process

out of it. This will require new product activity in all desirable markets where the firm holds a minor position.

- **Special opportunity analysis.** One or more persons (in the firm or a consulting firm) are assigned to take an inventory of the firm's resources (people, facilities, reputations, to name a few). Example: A firm in the auto parts business called for an audit of its manufacturing operation. It turned out that manufacturing process engineering had been overlooked or just not appreciated; that skill could serve as the base for a new products program.

From these activities, the opportunities identified can be sorted into four categories. Here are illustrations:

- **An underutilized resource:** A bottling operation, a strong franchise with dealers, or that manufacturing process engineering department.
- **A new resource:** A chemical company discovers a new compound with hundreds of potentially commercial uses and applications.
- **An external mandate:** The market may be stagnant, the competition may be threatening, or customer needs may be evolving. Challenges like this will cause the firm to search for new opportunities, as we saw in the LEGO saga earlier.
- **An internal mandate:** Long-range planning often establishes a five-year-out dollar sales target, and new products people often must fill part of the gap between current sales and that target. That assignment is called the **product innovation** (and/or *acquisition*) **gap**. Other common internal mandates are simply upper management desires, such as Steve Jobs's stated goal to "reinvent the phone" with the iPhone project.[2]

The process of creatively recognizing such opportunities is called **opportunity identification**. The opportunities are carefully and thoroughly described, then analyzed to confirm that a sales potential does, indeed, exist. Recall that LEGO recognized that robotic-based building toys could be a viable business direction and also realized that the new products process needed to be fixed in order to support new products of this type. Opportunities can be anywhere, and firms like Corning have "opportunity scouts" and "tech scouts" who work with networks of external technologists and business leaders to find promising opportunities.[3]

Of course, no firm wants to exploit *all* opportunities; some are better than others. Some may not fit with company skills, some are too risky, some require more money than the firm has. So, most firms have **ongoing strategies** covering product innovation. For example, Waterford had a strategy that no new product would jeopardize the firm's great image. Gillette and Sony usually choose leading-edge innovation strategies.

Once an opportunity is approved, managers turn to various techniques to guide new product people in exploiting it. This we will call the **product innovation charter (PIC),** and it will be explained in Chapter 3.

Phase 2: Concept Generation

In some cases, merely identifying an opportunity spells out what is wanted (for example, an opportunity to add a small size of deodorant for travelers). Most times, however, it is not so clear, so an immense set of ideation tools has evolved. Creating viable **product concepts** sounds fun and interesting, but it is hard and sometimes frustrating work.

The most fruitful ideation involves identifying problems people or businesses have and suggesting solutions to them. For example, if the opportunity focused on "people

[2]Henry Robben, "Opportunity Identification," in Jagdish N. Sheth and Naresh K. Malhotra, *Wiley International Encyclopedia of Marketing*, Volume 5, Product Innovation and Management (West Sussex, UK: John Wiley, 2011), p. 153.

[3]Jacquelin Cooper, "How Industry Leaders Find, Evaluate and Choose the Most Promising Open Innovation Opportunities," *Visions*, 36(1), 2012, pp. 20–23.

moving their families over long distances," the first ideation step is to study those people and find what problems they have. This is the **problem find-solve** approach.

While this problem-based ideation is going on, unsolicited ideas are pouring in via phone, mail, and e-mail from customers, potential or former customers, employees (especially sales, technical, and operations), and every other source imaginable. These ideas are reviewed briefly by whomever receives them to see if they are even relevant to the firm and its strategies. They are then put into the pool with the ideas that came from problem-solving activities.

Concept generation is covered in Part II, Chapters 4 through 6.

Phase 3: Concept/Project Evaluation

Before development work can begin on new ideas, they need to be evaluated, screened, sorted out. This activity, sometimes called **screening** or **pretechnical evaluation**, varies tremendously. But most firms generally follow a sequence from quick looks to complete discounted cash flows and a net present value. The quick look is necessary because the flow of new product concepts is huge and can easily reach the thousands in many firms.

But what happens next is the first formal type of evaluation. Depending on the idea, this may be end-user screening or technical screening, or both. The work may be extensive and difficult, or it may take no more than a few phone calls or e-mails. In the LEGO example, many of the proposed new products may have originated among the Concept Lab people; this would have to be followed by a **concept test** to see what potential consumers thought about it. Ultimately, these views all come together in what is often called the **full screen**. It uses a scoring model of some type and results in a decision to either undertake development or quit.

If the decision is to go ahead, the evaluation turns into **project evaluation**, where we no longer evaluate the idea but rather the plan we propose for capitalizing on that idea. This involves preparing a statement of what is wanted from the new product. Firms using **Quality Function Deployment** (a method of project management and control, which we explore in Chapter 10) see this as the first list of customer needs. A more common generic term is **product description** or **product definition**. In this book it will be called **product protocol**. Protocol here means a kind of agreement, and it is important that there be agreement between the various groups *before* extensive technical work gets under way. The protocol should, to the extent possible, be *benefits* the new item is to yield, not the features the new item is to have.

The lack of good hard information complicates all pretechnical evaluation. In fact, the first three phases (strategic planning, concept generation, and, especially, concept/project evaluation) comprise what is popularly called the **fuzzy front end** or simply **front end** (of the new product process). By the end of the project, most fuzz will have been removed, but for now, we move with more daring than the data allow.[4] The various pretechnical evaluation actions are covered in Part III, Chapters 7 through 10.

[4]The fuzzy front end has been the subject of much research the past few years. A good resource is Peter A. Koen, Greg A. Ajamian, Scott Boyce, Allen Clamen, Eden Fisher, Stavros Fountoulakis, Albert Johnson, Pushpinder Puri, and Rebecca Seibert, "Fuzzy Front End: Effective Methods, Tools, and Techniques," in P. Belliveau, A. Griffin, and S. M. Somermeyer, *The PDMA Toolbook for New Product Development* (New York: John Wiley, 2002), Ch. 1.

Phase 4: Development

This is the phase during which the item acquires finite form—a tangible good or a specific sequence of resources and activities that will perform an intangible service. It is also the phase during which the **marketing plan** is sketched and gradually fleshed out. Business practice varies immensely, but we often find the following components.

Resource Preparation

Often overlooked by new products managers is a step called **resource preparation**. For product improvements and some line extensions, this is fine, because a firm is already up and running in a mode that fits products that are close to home. The culture is right, market data are more reliable, and ongoing managers are ready to do the work. But a particular innovation charter may leave familiar territory, forcing problems of fit. If a firm wants new-to-the-world products (more about them later in this chapter), then the team will need to be adequately prepared: it may need special training, new reward systems, revisions in the firm's usual project review system, and special permissions.

The Major Body of Effort

Next comes what all of the previous steps have been leading up to—the actual development of not one thing, but three—the item or service itself, the marketing plan for it, and a business (or financial) plan that final approval will require. The product (or concept) stream involves industrial design and bench work (goods) or systems design (services), **prototypes**, product specifications, and so on. It culminates in a product that the developers hope is finished: produced, tested, and costed out.

While the technical developers are at work, marketing planners are busy making periodic market scans (to keep up with changes out there) and making marketing decisions as early as they can be made—first strategic and then tactical. Marketing decisions are completely interlaced with technical ones and involve package design, brand name selection, and tentative marketing budgets. A technical disappointment down the line may junk the early package design, name, or whatever. But we have to pay that price; we can't wait for each step to be conclusive before going to the next one.

Along the way, concept evaluation continues; we evaluated the concept well enough to permit development work (discussed earlier), but we have to keep evaluating technical and marketing planning *results*. We evaluate prototypes primarily, checking to be sure that the technology being developed meets the needs and desires of the customers in a way that creates value for them, while at the same time being profitable commercially.[5] By the time this phase winds down, we want to be assured that the new product actually does solve those problems we began with.

Comprehensive Business Analysis

If the product is real and customers like it, some firms make a comprehensive **business analysis** before moving into launch. The financial analysis is still not firm, but it is good enough to assure management that this project will be worthwhile. The financials will gradually be tightened during the launch phase, and where the actual Go/No Go point

[5]Edward U. Bond, III and Mark B. Houston, "Barriers to Matching New Technologies and Market Opportunities in Established Firms," *Journal of Product Innovation Management*, 20(2), March 2003, pp. 120–135.

is reached varies with the nature of the industry. Approval for a new food product can be held until just before signing advertising contracts, but a new chemical that requires a new manufacturing facility has to Go much earlier, and the pharmaceutical industry really makes the Go decision when it undertakes the 10-year, $50 million R&D research effort. The development phase is covered in Part IV, Chapters 11 through 13.

Phase 5: Launch

Traditionally, the term **launch**, or *commercialization,* has described that time or that decision when the firm decides to market a product (the Go in Go/No Go). We associate this decision with building factories or authorizing agencies to proceed with multimillion-dollar advertising campaigns.

But launch is more complex than that. The launch is not a single point in time, the "opening night," so to speak. Rather, product teams think of launch as a *phase*, including the last few weeks or months before and after the product is launched. During the launch phase, the product team is living life in the fast lane (or in the pressure cooker). Manufacturing is doing a gradual scale-up of output. The marketing planners, who got a good look at their ultimate target market as early as the opportunity, are now deep into the hundreds of tactical details required for launch. The critical step (if a company takes it) is the **market test**, a dress rehearsal for the launch, and managers hope any problems discovered are fixable between dress rehearsal and opening night. If not, the opening has to be delayed. We will review many market test techniques in Chapter 16.

Sooner or later, the preparation activities lead to a public announcement of the new product through advertising, sales calls, and other promotional tactics. The announcement is often called *launch.* Most firms today execute the launch gradually, over a period of at least several weeks, since there are suppliers to bring on line, sales forces to be trained, distributors to be stocked and trained, and a large set of market support people to be educated (columnists, scientists, government people, and others).

One thing that is often overlooked at this point is the activity of planning for **launch management**. When spacecraft are launched, a plan of tracking has been carefully prepared. The space control center implements the tracking plan, seeking to spot every glitch that comes up during launch and hoping it was anticipated so that a solution is on board, ready to use. New products managers often do the same thing, sometimes formally but often *very* informally.

The launch phase is covered in Part V, Chapters 14 through 18.

Evaluation Tasks Throughout the New Products Process

Figure 2.2 illustrates the evaluation tasks encountered in the new products process. As shown, different kinds of questions need to be asked after different phases. For example, once concepts are generated, each is subject to an initial review: Is it any good, and is it worth refining? At the concept evaluation phase, careful screening is required, as concepts that pass this phase move on to development and begin incurring significant costs. In development, relevant questions are "Are we done yet?" and "If not, should we continue to try?" These questions are best answered through progress reports. Finally, at launch, the main questions concern whether the product should be launched, and later, how well it has done relative to expectation. We pick up discussion of

FIGURE 2.2
The Evaluation Tasks in the New Products Process

New Products Process Phase	Evaluation Task at End of Phase
Opportunity Identification and Selection	*Direction:* Where should we look?
Concept Generation	*Initial Review:* Does the idea pass initial screen and go on to concept development?
Concept/Project Evaluation	*Full Screen:* Should we put the concept into development?
Development	*Technical Questions:* Have we developed the product? And if not, should we continue to try? *Marketing Questions:* Should we market it? And if so, how?
Launch	*Post-Launch Evaluation:* How are we doing relative to objectives?

Figure 2.2 later, in Chapter 7, when we go much more in depth into which evaluation techniques are the most useful at each point in the new products process.

You may have noticed by now that the new products process essentially turns an opportunity (the real start) into a profit flow (the real finish). It begins with something that is not a product (the opportunity) and ends up with another thing that is not a product (the profit). The product comes from a situation and turns into an end.

What we have, then, is an **evolving product**, or better, an evolving concept that, at the end, if it is successful, becomes a new product. Even a new product announcement just tells the world about a concept, hopefully a winner, but actually just in temporary form. Forces are standing by to see what revisions need to be made, even now, if it is off track.

This evolution is linked to the phases of the new products process (see Figure 2.3). Here are the phases in that process, using a new skim milk product as an example:

Phase 1: Opportunity Identification

- *Opportunity concept*—a company skill or resource, or a customer problem. (Assume that skim milk drinkers tell us they don't like the watered look of their favorite beverage.)

Phase 2: Concept Generation

- *Idea concept*—the first appearance of an idea. ("Maybe we could change the color... .")
- *Stated concept*—a form or a technology, plus a clear statement of benefit. (See Chapter 4.) (Our firm's patented method of breaking down protein globules might make the liquid more cloudy; emphasis on the *might*, at this time.)

Phase 3: Concept/Project Evaluation

- *Tested concept*—it has passed an end-user concept test; need is confirmed. (Consumers say they would very much like to have such a milk product, and the method of getting it sounds fine.)

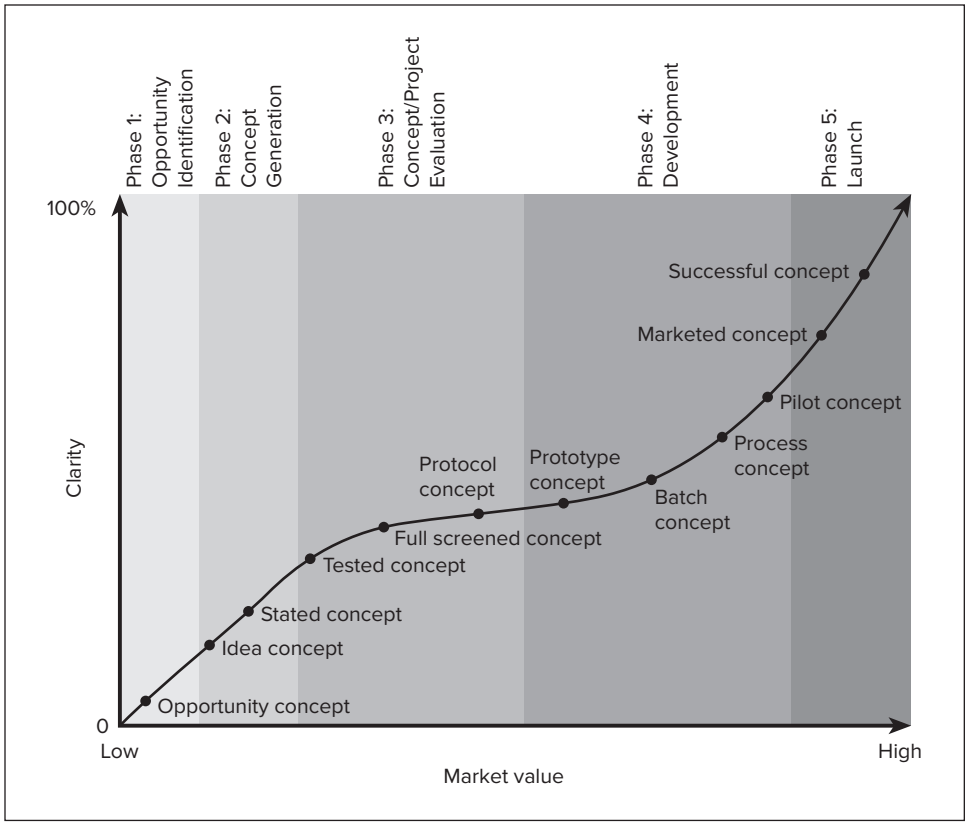


FIGURE 2.3
The Evolution from Concept to New Product

- *Fully screened concept*—it passes the test of fit with the company's situation.
- *Protocol concept*—a product definition that includes the intended market user, the problem perceived, the benefits that a less watery skim milk would have to have, plus any mandatory features. (Our new product must taste as good or better than current skim milk, and it must yield exactly the same nutritional values.)

Phase 4: Development

- *Prototype concept*—a tentative physical product or system procedure, including features and benefits. (A small supply of a full-bodied skim milk, ready to consume, though not yet produced in quantity.)
- *Batch concept*—first full test-of-fit with manufacturing; it can be made. Specifications are written stating exactly what the product is to be, including features, characteristics, and standards. (Skim milk ingredients: Vitamin A source, fat, fiber, and so on.)
- *Process concept*—the full manufacturing process is complete.
- *Pilot concept*—a supply of the new product, produced in quantity from a pilot production line, enough for field testing with end users.

Phase 5: Launch

- *Marketed concept*—output of the scale-up process from the pilot—a milk product that is actually marketed, either for a market test or for full-scale launch.