

Harvard Business School
Case Selections (Reprint)



哈佛商学院案例精选集

(英文影印版)

商务基础系列

Business Fundamentals Series

新产品开发 (第二版)

New Product Development (Second Edition)

Conrad Berenson 康拉德·贝伦森

Iris Mohr-Jackson 艾里斯·莫尔-杰克逊 等 编写

Marco Iansiti 马克·扬西蒂

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NEW PRODUCT DEVELOPMENT, Second Edition



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INTRODUCTION

Welcome to this entry in the Business Fundamentals series from Harvard Business School Publishing.

Most of the readings in this collection were developed for the MBA and executive education programs of Harvard Business School. These programs rely heavily on the case method of instruction, in which students analyze and discuss firsthand accounts of actual management situations. Students also learn the fundamentals of what managers do: how they build strategies, make choices, organize their activities, and measure performance. The fundamentals are often taught through background notes, which explain best practices, describe management tools, or analyze industries. Five such notes are the backbone of this volume on new product development. In addition, this title features a Harvard Business School case study plus three articles from journal-reprint collections that HBS Publishing distributes: *Harvard Business Review*, *California Management Review*, and *Business Horizons*.

While no Business Fundamentals title is intended as a comprehensive textbook-style presentation of the subject, we have brought breadth as well as depth to this volume, and we believe you will find that it examines trenchantly many of the essential aspects of new product development. We also strive to be current: nearly every item herein was published in the past five years.

The Business Fundamentals titles are designed for both individual study and facilitated training. If you want to use this collection of materials for self-study, we have provided a summary, outline, learning objectives, and a list of questions, ideas, and exercises for each reading to help you get started. If these readings are part of a training program in your company, you will find them to be a valuable resource for discussion and group work.

You can search for related materials on our Web site: www.hbsp.harvard.edu.

We wish you a rich learning experience!

The Editors

New Product Development

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THE NEW PRODUCT DEVELOPMENT IMPERATIVE

(S. C. Wheelwright / #9-699-152 / 20 p)

Summary

Introduces the best practices for managing new product development projects. Includes concepts and tools related to structuring teams consistent with project objectives as well as concepts and processes for improving project execution.

Outline

Product Development Capability as a Sustaining Strategy

A Revolutionary Development Strategy--Creating the Right Set of Projects

Outstanding Project Execution--Two Imperatives

Getting on the Right Trajectory for Effective Product Development

Learning Objectives

- Understand the four basic types of product development, and the special characteristics and needs of each type
- Become acquainted with practical techniques for planning and managing product development
- Understand basic concepts and tools including project mix, project roadmap, and aggregate project plan
- Become familiar with best practices in developing and managing teams, schedules, and communications

Questions, Ideas, and Exercises

1. See Exhibit 2. How many of the "Myths" of correct product development have you been perceiving as true? Try this list out on a few trusted colleagues, but don't reveal that the myths are either correct or incorrect. How many colleagues support at least a few of these myths?
2. The new product development imperative is about the quest for growth in a competitive environment. However, one of the authors' cautionary principles might be expressed as: don't attempt too much too fast. See the section entitled "Defining the Contents of Individual Projects." In the third paragraph, note the limits on product development that most firms accept: breakthrough projects should incorporate no more than one or two major new ideas; platform projects, three to five major new features; derivative projects, a few modest modifications. Consider any new-product projects you are working on. Does your team have reasonable limits on its product-development ambitions?

3. Note the authors' coverage of teams and, in particular, Exhibit 11, "Types of Development Teams." Note especially the benefits of fitting each product-development type with the right type of team -- and the dangers of failing to do so. Based on this typology, what has your experience been with product-development teams? Were the right members chosen? Were your teams given appropriate resources and authority throughout their existence? What key lessons might your firm still need to learn about assembling and managing product-development teams?



The New Product Development Imperative

I. Product Development Capability as a Sustaining Strategy

Traditional approaches to running and growing a business favor sophisticated strategies, or perhaps marketing prowess, to bring the company to the leading edge of its industry. However, by focusing on effective new product development a compelling solution to the problem of survival and growth, with a different emphasis than the traditional one, becomes apparent. In this prescription, creating and applying the product development skills and capabilities of the firm play a central role. By continually enhancing its development capabilities, the company is able to reinvent existing product lines as well as create new ones, and thereby achieve market leadership: it beats its competitors to the market with the “right” product. The company that continually refines these capabilities creates its future. The company that doesn’t may find itself reacting to competitive and market stimuli using ad hoc fire-fighting skills. Indeed, for the latter company, the time necessary to plan for the future may never be available.

The ability to systematically and quickly reinvent distinctive products and processes may be the optimal way for many companies to compete. Customer expectations, technology and competition are dynamic factors which mean that existing products will have a limited lifetime and either need to be significantly improved upon or replaced altogether. Outstanding new product development can provide a company with just the vehicle needed to meet these challenges. Through product offerings which continually evolve, a company can satisfy a dynamic rapidly changing set of customer needs and stay out in front of its competitors (see **Exhibit 1**). The smaller competitor with outstanding development capabilities (e.g. short development cycle times and effective resource allocation) can win the race against much larger, better-resourced but slower, less productive, opponents.

Research Associate Edward Smith prepared this note under the supervision of Professor Steven C. Wheelwright as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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Exhibit 1

Forces Driving Development Imperatives

Driving Forces		Development Imperative		Implications
1. Intense competition; changing customer expectations; accelerating technological change	⇒	Fast and Responsive	⇔	Shorter development cycles; better targeted products
2. Exploding product variety; sophisticated discerning customers; technical diversity	⇒	High Development Productivity	⇔	Leverage from critical resources; increased number of successful development projects per engineer
3. Demanding customers; crowded markets; intense competition	⇒	Products with Distinction and Integrity	⇔	Creativity combined with total product quality; customers integrated with truly cross-functional development process

While the promise of product development is increasingly viewed by most managers as substantial, the reality is that development efforts most often are frustrating and disappointing both to the individuals involved as well as to senior managers. Underlying this disparity between promise and reality is a set of common misconceptions regarding the planning, direction and execution of development projects. It's not only that firms often lack a set of "correct principles" to guide their development work, but they systematically follow a set of "incorrect principles" which hamper their efforts. Examples of the latter mode of operation, and the likely outcomes, are summarized in Exhibit 2.

In contrast, for the company that recognizes the strategic importance of outstanding product development capabilities, and that adopts a set of efficient, effective principles to guide its development work, the benefits can be huge. To help structure management's thinking about product development, it's useful to consider the challenges as three fold. First, the company has to create the right set of development projects. Second, it has to execute those projects on target, on time and on budget. Third, the company must capture the lessons learned from each project so that capabilities for future projects are developed which enable it to respond to, or even pre-empt, changes in consumer expectations, technology, and competition. Through disciplined application of processes which support these three objectives over time, the company can become systematically better and faster at product development and play an increasingly proactive role in determining its future.

Exhibit 2

Examples of "Incorrect Principles"
(Obstacles to Outstanding Development Capabilities)

Myth	A Probable Outcome if Applied
<ul style="list-style-type: none"> • Management should select from proposed projects. 	Development strategy created by a random process – disconnected from company objectives
<ul style="list-style-type: none"> • Portfolio of projects should exceed capacity 	Over-commitment of resources means that completed projects are late, over budget and inferior
<ul style="list-style-type: none"> • Dynamic environment requires frequent changes in priorities 	Increasingly reactive to the environment (e.g., a competitor's moves and feigns); the company's trajectory is chaotic
<ul style="list-style-type: none"> • Individuals should work on multiple projects concurrently 	People are over committed and ineffective; disenchantment and inefficiencies grow
<ul style="list-style-type: none"> • All projects should follow the same process 	Putting a square peg in a round hole—projects with different needs receive the same prescription.
<ul style="list-style-type: none"> • Cannot compare projects—each one is unique 	Experience from one project cannot be applied to another; new development projects "reinvent the wheel"
<ul style="list-style-type: none"> • Repeated Go/No-go reviews lead to better project results 	Delays propagate through project phases; deliverables are late

II. A Revolutionary Development Strategy—Creating the Right Set of Projects

Where exactly a company chooses to pursue growth and apply its development capabilities is the starting point for defining a development strategy. Generally, there are three different areas where the company's attention can be focused: new product development, new customer development (in the existing market), or new market development. For example, when an existing product is no longer competitive, or the market in which it's sold is saturated, a company may supplant old products with new ones to maintain or increase market penetration. Alternatively, a new product designed to complement an established line can leverage existing products and broaden the company's offerings while taking advantage of existing technology, channels and customers. Or an existing product, as well as new ones, can be leveraged for entrance into a completely new market. Deciding what combination offers the best solution to the problem of sustainable profits and growth

is the challenge. Increasingly, companies are finding that a set of development principles – operationalized through a series of concepts and tools – can help management address these important issues (see **Exhibit 3**).

Exhibit 3

Concepts and Tools for Creating the Development Portfolio
(8 steps towards building outstanding development capabilities)

Concepts & Tools	Description
<i>Pre-Project</i>	
• Characterizing project types	A common language is established by defining types of development projects; each project's contribution to the larger strategic framework becomes evident
• Strategic choice of project mix	Creating by design a development portfolio that is aligned with the company's objectives
• Creation of road maps	Linking and sequencing the individual projects in the project mix; mapping out the evolution of future product generations
• Aggregate Project Planning	The big picture: managing the strategic project portfolio
<i>Project Execution</i>	
• Type of project team	Building a development team that is matched to the project type; nurturing the teams that will be executing tomorrow's development projects
• Prototyping	Monitoring project performance and status relative to established targets; testing market realities and consumer acceptance
<i>Learning from Projects</i>	
• Project audits	Post project analysis of performance to capture know-how; creating effective processes for future development projects
• Learning across projects	Building process capabilities as a means for competitive renewal; building confidence and enabling repeated success

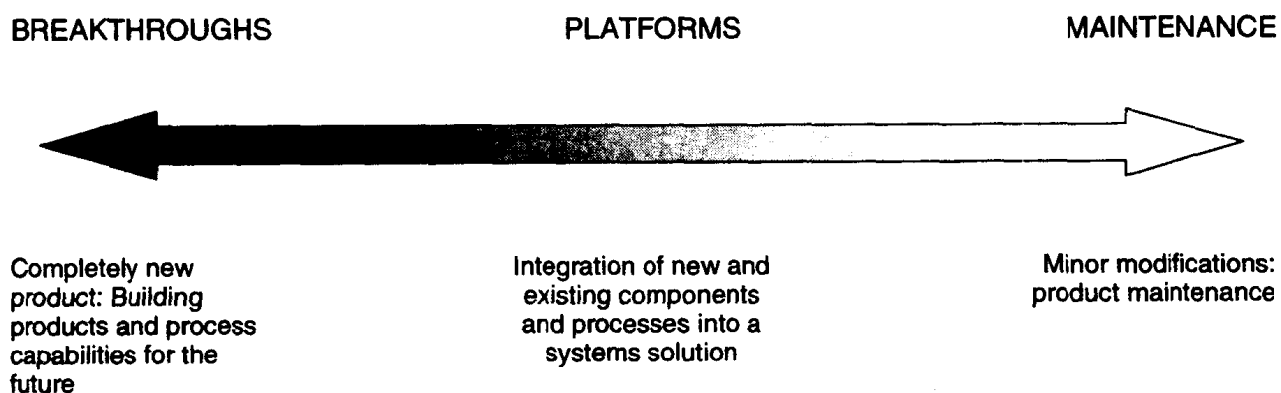
Tools and Concepts for a New Product Development Strategy

The first step in getting the company on the right trajectory for sustainable growth through new product development is to create a framework and terminology for thinking about and discussing development projects. This framework can help the organization recognize the patterns that emerge from past development projects and, ultimately, help the organization identify the cause-and-effect relationships which drive them. Every project is unique, yet shares common characteristics with other projects. By categorizing projects by type, the company begins building a framework which facilitates the recognition of patterns and their systematic analysis for learning.

Characterizing Project Types

Projects can vary from the small cost-cutting ones to the most radical commercialization of leading edge technology. This diversity in the degree of change can be represented by the continuum shown in **Exhibit 4**. Categorizing development projects by type can help management decide what mix of distinct development activities must be performed to launch a new product, as well as helping those working on projects to better understand their assignment and its objectives. Most firms have found that development projects can be separated into four main categories – breakthrough, platform, derivative and maintenance. Often these categories differ according to the degree of change in product technology and development know-how that each project type entails. The differences helps management understand how each of the types vary along such dimensions as scope, team size, budget, duration, etc.

Exhibit 4 Defining Development Projects
(The development project continuum)



Breakthrough At one end of the continuum are breakthrough projects, characterized by discrete and often disruptive changes in a product technology and the processes used to make it. A successful breakthrough project can become the basis for a seminal product line at a startup or a whole new line of products for a more mature company. For example, advances in flat panel displays and the miniaturization of computer peripheral devices in the mid 1980's enabled a manufacturer of desktop computers like Compaq, or later Dell, to bring a breakthrough product to market: the portable laptop computer. The product had significantly different technologies and manufacturing requirements from their desktop models and had to be effectively designed from scratch. The ultimate success of a breakthrough project, like the laptop, depends on a company's ability to apply new technologies and concepts and to embed them in products that customers often don't yet know they need. As a result of a breakthrough project's complexity, the duration of development activities typically extends over several years.

Platform A platform project establishes the next generation of a product line and usually represents a systems solution to a product challenge. For example, anticipating that its laptop computer would cannibalize sales of its lowest performance desktop model, a computer manufacturer thoroughly redesigned the desktop line to make its features and performance more distinctive. The new platform would use the latest microprocessor architecture to achieve the performance boost, which in turn would require significant changes in the computer's motherboard and substantial re-engineering. Furthermore, recent technological advances in multi-media hardware and in communications protocols would be incorporated, and aesthetics would be changed to ensure product distinction from the previous desktop generation. Though technological features of the new generation platform would have much in common with the previous one (facilitating a seamless transition for customers), it represented an integration of new product functions and features, as well as the development of new manufacturing processes. As a result of the project's broad scope, a multi-functional effort would be needed to carry out the necessary development activities and would require about one and a half years to complete. Though these types of projects represent a significant investment, especially for a small company, a well-designed platform can be the foundation for derivatives for many years to come and thus should have a major impact on the company's future.

Derivative Derivative projects are undertaken when an incremental change to an existing platform, or an existing product's manufacturing process, is required. The result may be an added feature or even reduced cost. This is a less demanding type of project since changes involved are limited in scope and require fewer resources to affect (the platform version of the product has already defined many of the development choices). An example of a derivative project would be the introduction of a "faster" laptop computer by replacing its microprocessor with a faster version of the same chip. Another derivative based on the same platform, but "slower", could address the lower end of the market. In this example, the derivatives are classified by the speed of the laptop's microprocessor chip (e.g. 200 megahertz versus 300 megahertz). Other simple modifications could be used to create even more derivatives however: the 350 megahertz model might come with a standard 8 gigabyte disk drive, a smaller lower cost 4 gigabyte drive, or a larger more expensive 10 gigabyte drive. The key factor is that new features can be added easily to the existing platform to specifically target the needs of smaller and smaller markets. The limited scope of derivative projects means that the development team can pursue its activities with limited supervision, relying instead on existing procedures for guidance. These types of projects can typically be completed by small functional teams in just a few months.

Maintenance This is the simplest type of project and encompasses improvements in, or maintenance of, existing products and processes. Often this includes projects which result in increased manufacturing efficiencies, reduction of chronic low-level problems and reduction of manufacturing costs. These projects are performed by small functional teams.

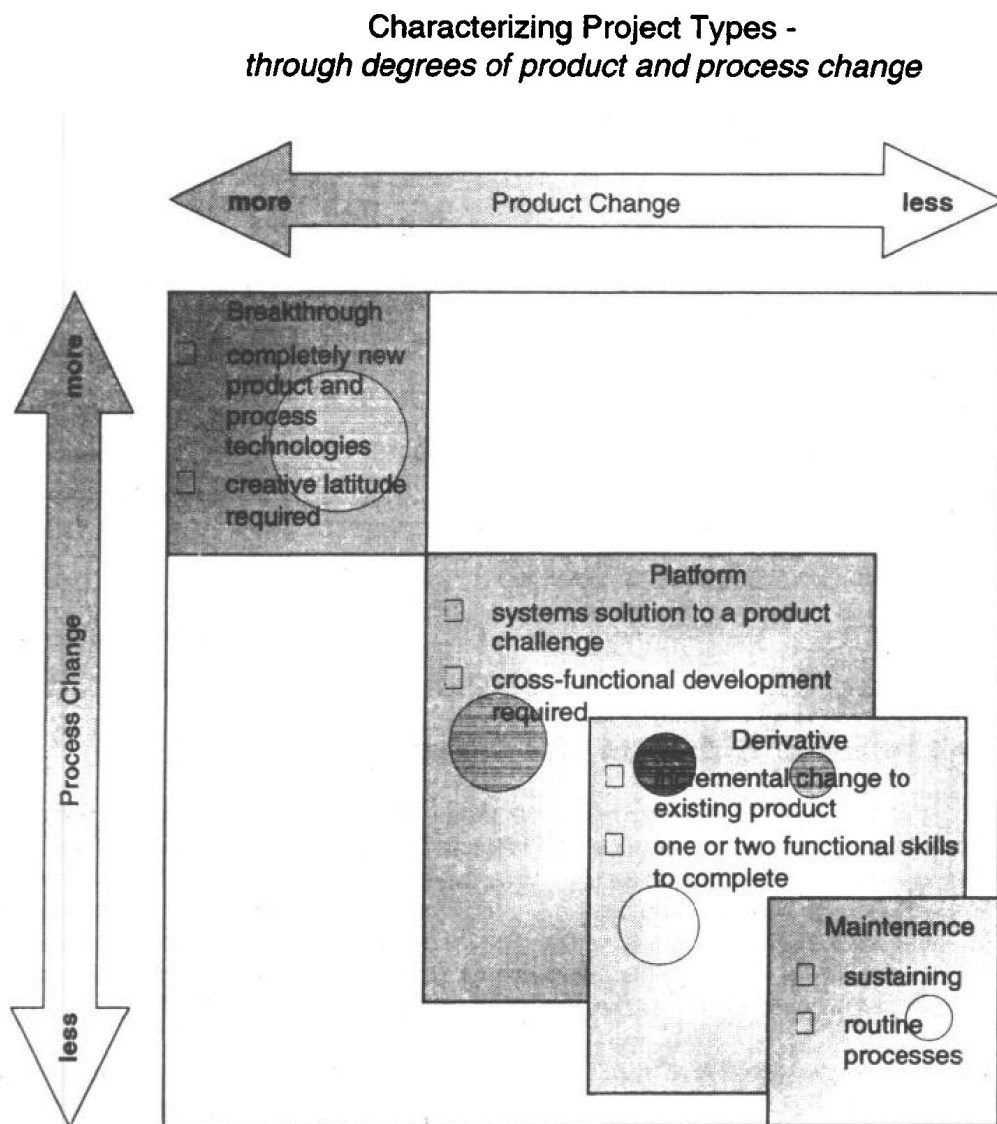
While "the degree of product change" embodied in each individual development project is a primary dimension for distinguishing project types, adding one or more secondary dimensions can often provide additional insight and guidance. Possible candidates for this second dimension would include: degree of manufacturing process change, degree of delivery channel change, and degree of change required by the customer's processes. Which of these continuums will be the most helpful complement to the primary continuum – degrees of product change – depends on the product, the market and the company's strategy.

Many manufacturing firms have found "the degree of manufacturing process change" to be a particularly useful second dimension. The result is a two-dimensional graphic as shown in **Exhibit 5**. Although an "on diagonal" project mix is not essential, it is the most prevalent. Projects in the upper right seldom are attractive, because to capture the full benefit of manufacturing process change usually requires significant product change (i.e. getting enough bang for the buck). Projects in the lower left are infrequent, because dramatic product change generally requires significant process change in order to deliver the full power and feature benefits of the new product.

A two-dimensional display of project types can be used not only to guide the definition and discussion of future projects, but also to assess the current portfolio of projects. For example, each project might be represented by a circle and positioned on **Exhibit 5**, with the location indicating the degree of product and process change and the size of the circle indicating the amount of resources

required for each project. Some companies have then found colors a useful way to show which projects are early, on time or late, or to show which projects are under, on, or over budget. Such analyses can help identify biases and trends, and focus management attention on needed improvements.

Exhibit 5 The four primary types of projects differ in the degree of change they require in product and process technology. Circles are used to indicate the location and size of individual projects within the product/process change framework.



Continual Improvement of the Definitions of Project Types

For firms which have developed a process for classifying projects, many have learned over time that the definitions of project categories become even more useful as they are narrowed. Conversely, the greater the overlap between project definitions, the greater the confusion that is likely to result. When definitions are narrowed, a precise language is established that provides for efficient, effective communication with everybody "on the same page" when they plan and discuss projects.