

# WINNING BUSINESSES IN PRODUCT DEVELOPMENT: THE CRITICAL SUCCESS FACTORS

*A formal new product process isn't enough—you need a high-quality process, a clear and visible strategy, enough people and money, and a respectable R&D budget. How does your program rate on these 10 metrics?*

Robert G. Cooper and Elko J. Kleinschmidt

**OVERVIEW:** 2007 is Research-Technology Management's 50th year of publication. To mark the occasion, each issue reprints one of RTM's six most frequently referenced articles. The articles were identified by N. Thongpapanl and Jonathan D. Linton in their 2004 study of technology innovation management journals, a

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Robert Cooper is professor of marketing at the M.G. DeGroote School of Business, McMaster University, Hamilton, Ontario, Canada, and president of the Product Development Institute Inc. He is an active researcher, author and consultant in the field of product innovation management, and the developer of the Stage-Gate® idea-to-launch process. He has won two Maurice Holland awards for the best paper published in Research-Technology Management in 1990 ("New Products: What Distinguishes the Winners?") and 1994 ("Debunking the Myths of New Product Development").  
**robertcooper@cogeco.ca; www.stage-gate.com**

Elko Kleinschmidt is professor of marketing at the M.G. DeGroote School of Business, McMaster University, and a prolific researcher and author in the field of management of new products. He holds a mechanical engineering degree from Hanover (Germany) Engineering College and an M.B.A. and Ph.D. from McGill University, Montreal.

citation-based study in which RTM ranked third out of 25 specialty journals in that field (see RTM, May–June 2004, pp. 5–6). The benchmarking study reprinted here was originally published in 1996 and has been updated with its author's reflections. Their study of 161 business units uncovered the key drivers of new product performance at the business unit level. Ten different performance measures were gauged, including percentage of sales by new products, profitability and success rate. The ten gauges were reduced to two key performance dimensions—profitability and impact—which defined the "performance map." Nine possible drivers—including strategy, process, organizational design, and climate for innovation—were investigated, and four key drivers of performance were identified; namely, a high-quality new product process, the new product strategy for the business unit, resource availability, and R&D spending levels. Merely having a formal new product process had no impact.

**KEY CONCEPTS:** product development, new product performance, critical success factors, strategy.

What are the critical success factors that underlie excellent new product performance? Our benchmarking study was designed to uncover the drivers of performance by studying business units within corporations, and linking their new product performance to various

practices. We measured performance in different ways, including profitability, success rates and percentage sales by new products. Some of the business units studied boasted superb performance; others had a more mediocre new product track record. By benchmarking against both the good and the bad, we were able to obtain much greater insights into the factors and practices that really discriminate between the top and poorer performers. In short, we were able to link specific practices to high performance.

The results of this study of 161 businesses are provocative. Here is a sample:

- The strongest driver of profitability is the *existence of a high-quality, rigorous new product process*—one that emphasizes up-front homework, tough Go/Kill decision points, sharp early product definition, and flexibility. By contrast, merely having a formal new product process has no impact at all on performance!
- The role of *new product strategy* in the business unit—whether or not there is one, what it contains and whether it is clearly communicated—has a pronounced effect on performance.
- Resources—both people and money—are strongly tied to new product performance. R&D spending per se had a strong but very focused impact: It drove only some performance measures, but *not profitability*.
- The use of cross-functional teams helps, but does not have the dramatic impact on performance that we had expected. Rather, the *quality of the teams* seems to make all the difference to the business unit’s new product performance.

Before discussing the critical success factors in detail, here is some background to the study: its rationale, its framework, and what was measured and how.

### In Search of the Critical Success Factors

The quest for the drivers of new product success has been a popular research topic for the last decade or so. However, merely studying successful and unsuccessful new product projects, as we too have done in the past, misses many of the key factors in success. Consider this: The typical study, which focuses on *specific new product projects*, compares and contrasts the characteristics of winning versus losing projects, and in so doing, uncovers those factors that discriminate between the two (see, for example, 1,2).

This success/failure research has uncovered many factors that we now take for granted as driving success (see Table 1). But this research does have its limitations. Perhaps the most fundamental flaw is the fact that research done at the project level often *fails to identify*

*those company practices that decide success*. There are three reasons:

1. First, success at the company or business-unit level may differ from success at the project level. For example, a business may have a string of “successful” projects, as measured by return-on-investment of each project; but overall, these projects have relatively little impact on the firm, and so the business’s total new product effort is judged to be mediocre.
2. Next, often important practices—for example, creating an innovative climate and culture—are not readily apparent or measurable at the product level. Consequently, they are missed in such success/failure studies.
3. A more subtle and final reason for omissions is the way the research is designed. When pairs of successes and failures are selected from each firm, company characteristics that may have a strong impact on success will be *common to both projects*. And so these company characteristics do not emerge in an analysis of factors that distinguish the successes.

In recent years, benchmarking against other companies has become popular, and has in part overcome some of the deficiencies listed above. But the benchmarking practiced by most firms also has its problem. First, it is very time-consuming; second, there is the problem of getting the cooperation of other firms; third, there are methodological problems: the fact that those in the company doing the benchmarking may not be experi-

**Table 1.—Factors That Drive New Product Success at the Project Level**

<i>Strategic Factors:</i>	
Product advantage	
Marketing synergy	
Technological/Manufacturing synergy	
Availability of resources	
Strategy of the new product	
<i>Development Process Factors:</i>	
Proficiency of technological activities	
Proficiency of marketing activities	
Proficiency of up-front (homework) activities	
Top management support	
Speed to market	
Proficiency of financial/business analysis	
<i>Market Environment Factors:</i>	
Market potential/size	
Market competitiveness	
External environment	
<i>Organizational Factors:</i>	
Internal/external relations (of team)	
How team was organized	

Source: Montoya-Weiss and Calantone (2).

enced at such research, are not sure what to measure, talk to the wrong people, interpret the “data” incorrectly, and so on—in short, all the classic errors made by an inexperienced investigator.

Finally, relationships typically are not studied. Best practices are noted, but *the link between practices and improved performance remains largely speculative*. Thus, there always remains the concern that an observed

### How the Research Was Done

Numerous studies into new product success and failure, together with case studies and popular books, have suggested myriad factors that ought to drive new product performance. From these, we developed a framework, which identified five major blocks of characteristics for measurement:

**1. Process:** *the firm’s new product development process and the specific activities within this process.*—Processes that promote a strong market orientation, undertaking the marketing tasks in a quality fashion, doing the pre-development activities well, and having sharp, early product definition, are purported to yield positive outcomes.

**2. Organization:** *the way projects are organized.*—Investigations conclude that the use of a cross-functional team, interfaces between departments, and an empowered leader yield much better results than a functionally based new product effort.

**3. Strategy:** *the firm’s total new product strategy.*—Having an explicit new product strategy—which defines the role and goals of new product development in the company’s overall strategy, specifies product/market arenas as areas to focus on, and formalizes the necessary organizational structures for implementation—results in more positive performance.

**4. Culture:** *the firm’s internal culture and climate for innovation.*—Facets of a positive climate include: encouraging intrapreneurship; providing support (rewards, risk, tolerance, autonomy, and acceptance of failures without punishment); fostering the submission of new product ideas; and providing free time and resources to undertake creative activities.

**5. Commitment:** *senior management’s involvement with and commitment to new product development.*—Success factors here include: senior management commitment to risk-taking; clear messages from senior management about the importance of new product development; and availability of funds and resources for product development.

Data were collected via a detailed, four-page questionnaire. The questionnaire contained 48 measures that captured new product practices (based on the five blocks, outlined above). These 48 measures were gauged via 1–5 Likert-type scales with anchor phrases, and were used to develop eight main themes or *constructs* (via adding subsets of the 48 variables together). Cronbach alphas and item-total correlations were used to check for internal

consistency of these constructs. R&D spending (% of sales) and proportion going to new products were also gauged.

Ten performance merits were measured; eight of these were captured on 1–5 Likert-type scales, again with anchor phrases; two were directly measured as percentages (success rates and percentage sales by new products). These ten performance metrics were reduced to *two underlying performance dimensions* via factor analysis (SPSSX routine; principal component analysis; varimax rotation). The drivers of performance were identified by *correlating* the eight constructs (which captured new product practices), R&D spending, and the 48 characteristics (mentioned above) versus the two performance dimensions. Additional characteristics of the company or division—size, R&D spending, location and industry—were also measured. The questionnaire itself was extensively pre-tested via personal interviews.

Firms were selected from private lists of companies, compiled from databases and directories of companies known to be active in new product development. A total of 161 business units from Europe (primarily Germany and Denmark) and North America (U.S. and Canada) participated in this study. Questionnaires were directed to corporate executives responsible for their business unit’s new product development effort. All respondents had more than three years involvement here; many had considerably more experience. Follow-up personal interviews were conducted with particularly proficient firms to identify best practices and provided the “anecdotal evidence” and examples cited. For more detail, see (3,4).

The average annual sales revenue for the business units (or divisions) was US\$562.8 million, with no significant differences between North American and European firms in the sample. R&D spending was 7.5 percent of sales on average, with 71.8 percent of this going to product development. No significant differences emerged between North American and European firms in terms of these R&D spending patterns. The industry breakdown was:

	Percent
Chemicals/materials	12.6
Communication products	11.9
Machinery/equipment	33.3
Electronics/electrical products	1.5
Food	9.6
Automotive parts/components	3.0
Miscellaneous	8.1
Total	100

**R.G.C. and E.J.K.**

practice does not really have much impact on performance.

The current study sought to overcome both sets of problems. First, by focusing on the *business unit* as the unit of analysis, rather than individual new product projects, we identified a number of company characteristics or practices often missed in traditional research. Second, the research is rigorously designed, employs a large sample of firms, and utilizes sophisticated data analysis methods. Finally, the *link* between practice and performance is investigated, so that one can conclude that certain practices really do discriminate top performers from the rest.

A total of 161 business units in a variety of industries in the United States, Germany, Denmark, and Canada agreed to participate in the benchmarking study. A diagnostic questionnaire was directed to the senior executive in charge of product development in the business. The questionnaire was designed to characterize the business's new product practices in each of five major areas: process, organization, strategy, culture, and commitment (see "How the Research Was Done," previous page). These five areas were measured via 48 metrics, from which nine themes or dimensions of firms' practices and characteristics were identified (listed in Table 2). In addition, ten performance metrics captured how well the business unit's total new product effort performed.

### The Performance Map

Ten key performance metrics were gauged:

- *Success rate*: The proportion of development projects that became commercial successes.
- *Percentage of sales by new products*: The percentage of the business unit's sales accounted for by new products introduced within the last three years.

# Success at the company or business level may differ from success at the project level.

- *Profitability relative to spending*: How profitable the business unit's total new product efforts were, relative to the amount spent on them.
- *Technical success rating*: How successful the total effort was from a technical/technological perspective.
- *Sales impact*: How strong an impact the total new product effort had on the business unit's top line or sales revenues.
- *Profit impact*: How strong an impact the effort had on the business unit's bottom line or annual profits.
- *Meeting sales objectives*: The extent to which the total new product effort met the business unit's sales objectives for new products.
- *Meeting profit objectives*: The extent to which it met the business unit's profit objectives.
- *Profitability versus competitors*: How profitable the total new product effort was relative to competitors.
- *Overall success*: All things considered, how successful the business unit's total new product efforts were when compared to competitors.

Overall, our sample of companies fared quite well in terms of the performance of their total new product

Table 2.—The Impact of Nine Drivers of New Product Performance at the Business Unit Level

Performance Driver	Effect on Profitability*	Effect on Impact*
A high-quality new product process	→ <b>.416</b>	.226
A defined new product strategy for the business unit	.228	.211
Adequate resources—people and money—for new products	.244	.197
R&D spending on new products (as % of the business's sales)	ns	→ <b>.395</b>
High-quality new product development teams	.196	.208
Senior management commitment to new products	→ <b>.268</b>	ns
An innovative climate and culture in the business unit	.243	ns
The use of cross-functional teams for product development	.230	ns
Senior management accountability for new product results	.228	ns

\*Numbers are correlation coefficients between specific drivers and two performance dimensions. All significant at the 0.01 level. Bold numbers and arrows denote strong correlations, significant at the 0.001 level.



efforts when gauged on these ten metrics. New products introduced in the previous three years represented 28.4 percent of annual sales, on average; 56.9 percent of projects that entered development were eventually launched as commercial successes; and on the eight scaled performance metrics, companies scored about mid-scale, on average.

A Performance Map was constructed based on these ten performance metrics. A review of performance made clear that the ten metrics were strongly connected to one another. Therefore, factor analysis was used to identify the underlying dimensions of performance and to develop a Performance Map (SPSSX routine, principal component analysis, varimax rotation; two factors were selected based on both the Scree test and eigenvalues > 1.0). Two performance dimensions emerged:

**1. Profitability.**—This was the strongest dimension, and captured how *profitable* the businesses's total new product efforts were. It comprised: the profitability

versus competitors and overall success rating of the business's total new product effort; whether the total initiative met product objectives; its profitability relative to spending; and the impact of the total effort on the business unit's profits.

**2. Impact.**—This performance dimension, also a strong one, had less to do with profitability and more with the *impact* that the total new product efforts had on the business. It comprised: percentage sales by new products achieved by the business unit; the impact of new products on both sales and profits of the unit; the success rate achieved; and the technical success rating.

The two dimensions can be used to capture the new product performance of business units in a macro or broad way; that is, new product performance measured in various ways boils down to two fundamental or underlying dimensions, namely *profitability* and *impact on the business*. These two dimensions thus become the vertical and horizontal axes of the Performance Map in Figure 1.

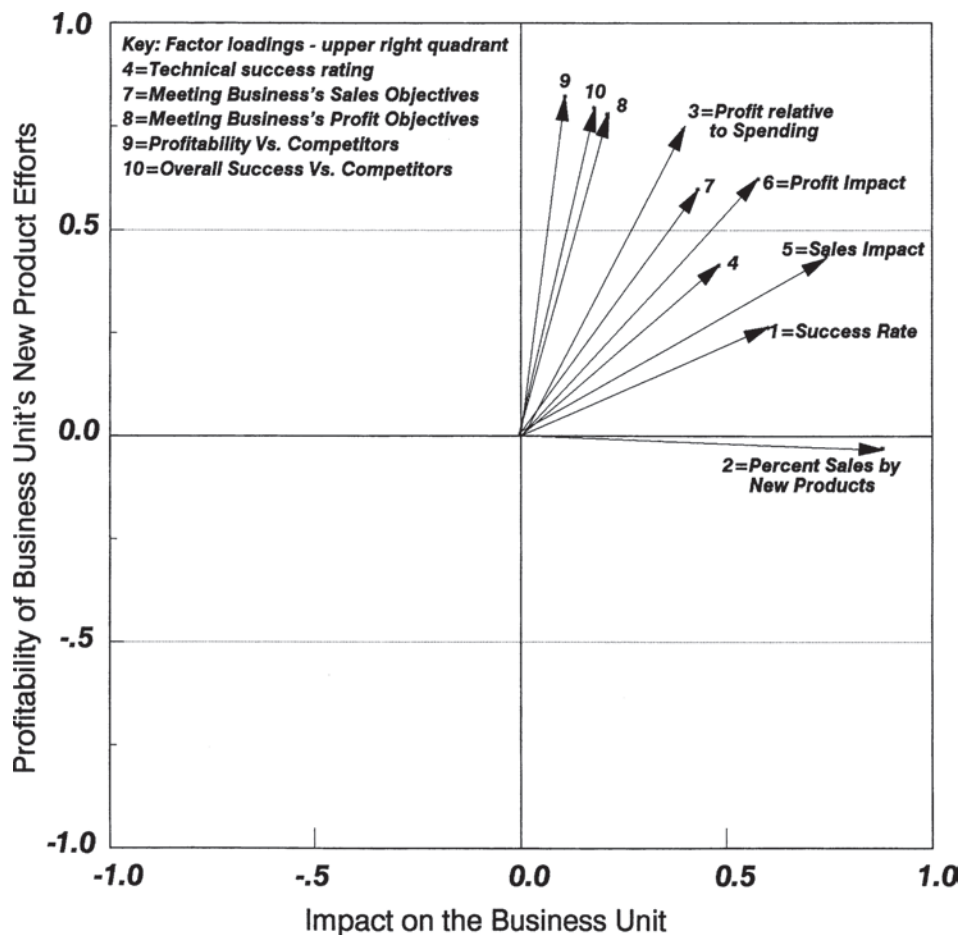


Figure 1.—The Performance Map is based on the 10 performance metrics. The arrows show how each metric loads on the two map dimensions, Impact and Profitability.

Here we also show the ten performance metrics, revealing visually how each metric loads on each performance dimension (the correlations between each performance metric and the two performance dimensions).

#### Four Key Success Factors

What then are the critical success factors in product development—the factors that drive performance at the business unit level? The study uncovered nine factors that distinguished the better performing businesses, four factors in a very strong way. The top four are:

1. *A high-quality new product process.*—One that demanded up-front homework, sharp and early product definition, tough Go/Kill decision points, and quality of execution and thoroughness, yet provided flexibility.

2. *A defined new product strategy for the business unit.*—One in which: There were new product goals for the business unit; areas of focus were delineated, the role of new products was clearly communicated, and there was a longer-term thrust.

3. *Adequate resources of people and money.*—Where senior management had provided the needed people (and freed up their time for projects), and resourced the effort with adequate R&D funding.

4. *R&D spending for new product development* (as a percentage of sales).

The other success factors, with a more modest effect on performance, included:

5. *High-quality new product project teams.*

6. *Senior management committed to, and involved in, new products.*

7. *An innovative climate and culture.*

8. *The use of cross-functional project teams.*

9. *Senior management accountability for new product results.*

Table 2 summarizes the effects of these nine drivers (the correlations between the success factors and the performance dimensions), while Figure 2 shows the Performance Map, but this time indicating the direct links between performance and business practices. Consider now the top four success factors in more detail:

1. *A high-quality new product process.*—This was the strongest common denominator among high-performance businesses (see Table 2 and Figure 2). Here the term “new product process” means those steps, activities and decision-points that new product projects follow from idea to launch and beyond.

**A high-quality new product process was the strongest common denominator among high-performance businesses.**

A word of caution here: The mere existence of a *formal* product development process had absolutely *no effect* on performance; there was no correlation at all between merely having a process and performance results. So those companies that mistakenly believe they can “go through the motions” and re-engineer their new product processes (usually amounting to documenting what they are already doing!) are in for a big disappointment. Having a process did not seem to matter; rather it was *the quality and nature of that process*—building in best practices—that really drove performance.

Here are the six ingredients we measured to gauge the quality of the process, and when considered together, add up to a quality process and positive performance. We also use the anecdotal evidence from the study to show how some firms were particularly proficient in terms of these six ingredients:

- *First, there was an emphasis on up-front homework—both market and technical assessments—before projects moved into the development phase.*

Too many projects move from the idea stage right into development with little or no assessment. The results of this “ready, fire, aim” approach are usually disastrous. Inadequate up-front homework has been found to be a major cause of failure in product development. In the best new product processes we saw, management had deliberately built in one or two homework stages before the “go-to-development” decision point, comprising vital “must do” actions. For example, in the five-stage process employed by the Professional Division of SC Johnsons Wax, the two homework stages entail:

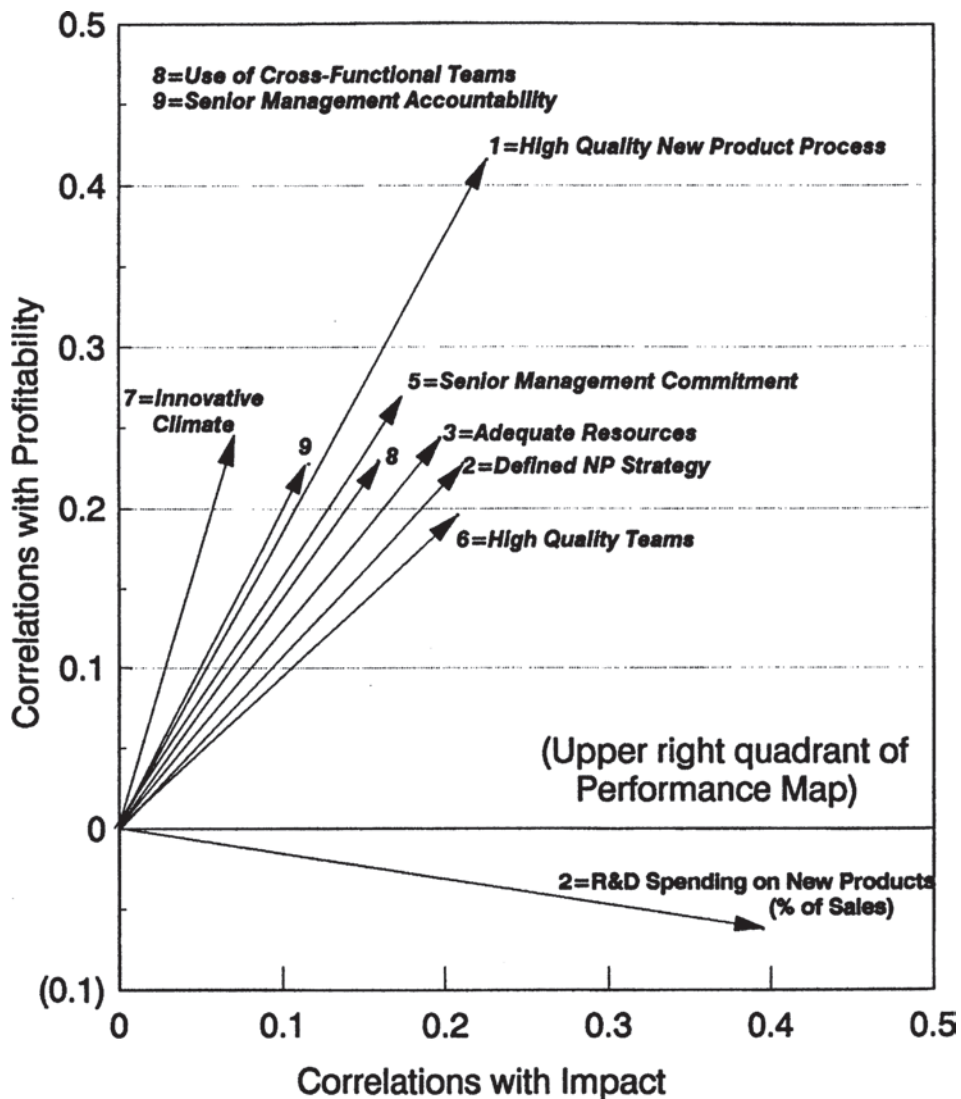


Figure 2.—How the critical success factors drive new product performance, as gauged by correlations of nine drivers with the two performance dimensions.

- Preliminary market assessment: A preliminary and quick assessment of the market potential, need level, and customer requirements, done very early in the project.
- Preliminary technical assessment: A parallel activity to identify the technical possibilities and risks.
- Detailed market studies: User needs-and-wants studies (to pin down exact customer needs, requirements and benefits sought), competitive analysis, and concept testing (to ascertain probable purchase intent).
- Detailed technical assessment: Determination of the probable technical route, risks, patent position, manufacturability, costs and capital requirements, timing and resources required.

- Financial and business analysis: Based on the above actions, a profitability analysis (a discounted cash flow with sensitivity analysis) and the business rationale for moving ahead with the project.

The result of these homework actions at SCJ is a “business case”—a mandatory element prior to moving the project into the development stage.

- *The process included sharp, early product definition, before development work began.*

Failure to define the product—its target market; the concept, benefits and positioning; and its requirements, features and specs—before development begins is a major cause of both new product failure and serious

delays in the development cycle. Some companies, such as Hewlett-Packard, have placed major emphasis in their Phase-Review Process on getting the product definition pinned down before a formal development project is approved. This definition, of course, is based on facts, rather than hearsay and speculation; hence the need for a solid up-front homework phase.

- *There were tough Go/Kill decision points in the process, where projects really did get killed.*

Projects tend to take on a life of their own! In too many companies we investigated, projects moved too far into development without serious scrutiny. And it was only as the project approached commercialization that the hard truths were recognized: The market was not quite as large as expected, or manufacturing costs were higher than anticipated, and so on. The lack of tough Go/Kill decision points meant too many product failures, resources wasted on the wrong projects, and a lack of focus. The result was too many marginal projects in the pipeline, while the truly meritorious projects were starved.

In the better processes we observed, companies had designed a *funnelling or culling process* in the form of tough review points or *gates*. For example, in Rohm & Haas's WIN process, there are five gates, where senior management reviews the deliverables, evaluates the project against pre-set criteria, and approves the action plan and resources for the next stage. The decision process is timely and efficient, and ensures that poor projects are weeded out before excessive spending occurs.

- *There was a focus on quality of execution, in which project activities were carried out in a quality fashion.*

An emphasis on quality-of-execution in many firms came about after internal studies revealed that too many projects suffered from weak, inconsistent work, some of the most deficient areas being the market-related ones. Top-performing firms work at improving quality of execution of key tasks and activities throughout the process, from idea generation right through to launch.

Some companies, such as ECC in Atlanta (the world's major producer of clay) have re-engineered their product development processes in order to achieve quality-of-execution improvements. By specifying the key deliverables at each gate or decision point, and by conducting a thorough review at the gate, (where the quality of work done in the previous stage or phase is rigorously scrutinized), the quality of work has significantly improved. Project teams and leaders know what rigor is expected of them, and hence set their own quality or action standards higher.

# Failure to define the product before development begins is a major cause of both new product failure and serious delays in the development cycle.

- *The new process was complete or thorough; every needed activity was carried out, with no hasty corner-cutting.*

Many companies had discovered that not only was the quality of work lacking, but in some cases, the *work was lacking altogether*. That is, key tasks, such as market analysis, business assessment, and customer research, were simply not done (or left until far too late in the process). This deficiency caused some companies to redesign their processes, building in these tasks at the appropriate point in the process.

In ECC's process, *deliverables* have been defined *a priori* for each decision-point or gate review; these deliverables specify what is required at a given point in the project, and hence determine what work or tasks must be undertaken within a given stage.

- *The new product process was flexible; stages and decision points could be skipped or combined, as dictated by the nature and risk of the project.*

One pitfall some firms encounter when they do re-engineer their product development process is the failure to build in flexibility. Instead of being a template or roadmap, the "formal process" becomes a straight-jacket beset with bureaucracy. By contrast, companies such as Procter & Gamble specify in their new product process that flexibility is key, that certain steps and activities can be omitted, and that the beginnings and ends of succeeding phases overlapped "provided that we understand the risks involved and have agreed at the previous decision checkpoint" (5).



A high-quality new product process clearly pays off. Companies that boasted proficient new product processes—ones that incorporated the six ingredients listed above—were rewarded with superior performance: higher profitability and higher impact efforts. Once again, note that merely having a formal process had

no impact; it was *the quality of that process* that made the difference!

**2. A defined new product strategy for the business unit.**—Having a clear and visible new product strategy was the No. 2 driver of businesses’ new product performance.

## “Winning Businesses in Product Development: The Critical Success Factors” Revisited

Why do some businesses make product innovation seem so easy—a steady stream of new product winners? Our 1996 article reported the results of our first major benchmarking study that investigated new product development (NPD) performance results and how top-performing firms achieved positive results.

A number of best-practice themes emerged from that 1996 study, and they are as relevant today as then (since then, we have undertaken other benchmarking studies in order to refine our insights into what leads to success in product innovation, also reported in *RTM, 1*). The outcome of these studies is the *performance diamond*, next page, which summarizes the four major performance drivers of NPD results (2):

**1. Strategic**—Top performers possess a *product innovation strategy*, driven by the leadership team and its strategic vision for the business. Notably, even today, about half of businesses lack key facets of this strategy!

This innovation strategy consists of a number of elements, including the business’s goals for product innovation (for example, 3M’s goal of “percentage of sales from new products” has been adopted by many firms) and how the business’s new product effort ties into its overall business goals. Arenas of strategic focus—where the business will focus its R&D efforts—are also a part of the innovation strategy, along with how the business plans to win in each area.

Attack plans include strategic stance, entry strategy and alliance strategy (for example, P&G’s strategy of “connect and develop” or working with partners to develop new products outside the corporation). And the innovation strategy includes the product and technology roadmaps which spell out the major development initiatives (for example, HP maps out its major developments over a five-to-seven-year time horizon).

**2. Portfolio management and resource allocation**—A second common denominator of top-performing businesses is making sure that the business has the necessary resources available for NPD, both funds and people from all functional areas. But deep pockets is not the only driver of high performance; rather, astute investment of these resources is key too: top performers have a *portfolio*

*management system* that helps the leadership team allocate these resources to the right areas and right projects—the right mix and balance of NPD investments, and a strategically aligned portfolio.

Strategic buckets is a method designed to allocate resources to the right strategic arenas and to achieve the right balance of projects (3). Note, for example, that best-performing businesses have a different breakdown in the types of NPD projects, with a much higher proportion of bolder, larger and riskier ventures than do poor performers (4).

Top-performing firms also maximize the productivity of their R&D spending: they ensure that funds and people are focused on high-value projects. The best firms rely on several powerful methods—scorecards, the productivity index, and real options—to select and prioritize their new product projects (5).

**3. The NPD Process**—Most firms have implemented a gating or Stage-Gate® idea-to-launch new product process (6). But there is great variability among companies in how well the process works. The top performers have a well-crafted, robust new product process in place, one that drives NPD projects from idea to launch and beyond; their process emphasizes up-front homework, voice-of-customer input, quality of execution, and performance results metrics.

Top performers embrace their NPD process and practice discipline in its implementation; they have also streamlined the process in the last ten years, making it flexible, adaptive and scalable (for example, there are Lite and XPress versions of Stage-Gate for lower-risk projects). Finally, they have built *lean principles* into their NPD process (7).

**4. People: culture, climate, teams, and the role of senior management**—A fourth dimension was later added to the 1996 study’s results to yield the performance diamond depicted on the following page. This fourth dimension is about people. In top-performing businesses, there is a positive climate and culture for innovation; the leadership team of the business actively supports innovation with words, actions and resource commitments, and senior management is engaged in the decision-making process in the right way. Additionally top-performing businesses embrace a true team approach to NPD: they field effective, properly-resourced cross-functional teams that are accountable for the end result.

Strategy was linked to both performance dimensions (see Figure 2 and Table 2).

Here are the four main ingredients of a positive new product strategy, which when taken together, add up to positive performance:

- *There are goals or objectives for the business's total new product effort (e.g., what sales, profits, etc. the new products will contribute to the business).*

What surprised us was how many businesses lacked defined, clear and written goals for their total new-

The diamond had its seeds in our 1996 *RTM* article, reprinted here, and captures the key success drivers in product innovation. Use it as a compass or guide to managing your innovation effort; for example, Procter & Gamble is one leading firm that has adopted this diamond—they call it the “Initiatives Diamond”—and it has proved to be a powerful guide to product innovation there (8).—**R.G.C. and E.J.K., May 2007.**

### Notes and References

1. Subsequent benchmarking studies are reported in the three-part *RTM* series: R. G. Cooper, Edgett, S. J., and Kleinschmidt E. J. Benchmarking Best NPD Practices—Parts I, II and III. *Research-Technology Management*, 47, 1, Jan.–Feb. 2004, pp. 31–43; also: 47, 3, May–June 2004, pp. 50–60; and 47, 6, Jan.–Feb. 2005, pp. 43–55.

2. More on the performance diamond in R. G. Cooper. *Product Leadership: Pathways to Profitable Innovation*, 2nd edition. New York, NY: Perseus Publishing, 2005. [www.stage-gate.com](http://www.stage-gate.com)

3. For more on strategic buckets see the two-part *RTM* series: R. G. Cooper, Edgett, S. J. and Kleinschmidt E. J. Portfolio management in new product development: lessons from the leaders—Parts I & II. *Research-Technology Management* 40, 5, Sept.–Oct. 1997, pp. 16–28; and: 40, 6, Nov.–Dec. 1997, pp. 43–52.

4. Cooper, R. G. Your NPD portfolio may be harmful to your business's health. *PDMA Visions*, XXIX, 2, April 2005, pp. 22–26

5. For project selection methods, see: R. G. Cooper and S. J. Edgett. 10 ways to make better portfolio and project selection decisions. *Visions Magazine (PDMA)*, XXX, 3, June 2006, pp. 11–15.

6. Stage-Gate® is a registered trademark of the Product Development Institute Inc.

7. R. G. Cooper and S. J. Edgett. *Lean, Rapid and Profitable New Product Development*. Product Development Institute, [www.stage-gate.com](http://www.stage-gate.com) 2005.

8. The P&G Initiatives Diamond and how it is used to achieve superior NPD results is reported in R. G. Cooper and M. Mills, Succeeding at new products the P&G way: A key element is using the “Innovation Diamond.” *PDMA Visions*, XXIX, 4, October 2005, pp. 9–13.



*The Performance Diamond depicts the four main drivers of positive NPD performance. Use it to guide your NPD efforts. (Stage-Gate® is a trademark of Product Development Institute Inc.)*

product effort. And the lack of this rather basic ingredient of strategy had negative consequences for the business. By contrast, leading firms, such as 3M, make new product goals such as “30 percent of our division’s sales will come from new products introduced over the next three years” an explicit part of every division’s business goals. Other commonly cited goals, besides percentage of sales, are “dollar sales to be generated from new products”; “percentage of profits”; and “numbers of major and minor launches per year.”

- *The role of new products in achieving business goals is clearly communicated to all.*

The reason for having goals is that everyone involved in new products can have a common purpose—something to work toward. Far too often, the people who worked on new product projects were not aware of their business’s new product objectives, or the role that new products played in the total business objectives. The message is this: Do what 3M does. Set goals for the new product effort (e.g., percentage of sales, profit or growth over the next X years), and make them clear to everyone involved.

- *There are clearly defined areas of strategic focus—strategic arenas—to give direction to the business’s total new product effort.*

The new product strategy specifies “the arenas where we will play the game,” or perhaps more important, where we won’t play . . . what is *in bounds* and *out of bounds*. These arenas were often defined in terms of the types of products, markets or technologies the business unit would focus on. With arenas undefined, the search for specific new product ideas or opportunities is unfocused; over time, the portfolio of new product projects is likely to contain a lot of unrelated projects, in many different markets, technologies or product-types—a shotgun effort.

- *The business’s new product effort has a long-term thrust and focus, including some longer-term projects (as opposed to short-term, incremental projects).*

The short time horizon of firms has been a criticism widely voiced. Importantly, this one ingredient was the most important of the four strategy ingredients, and significantly linked to a number of specific performance metrics.

A sound new product strategy lies at the heart of a business’s new product effort. Those businesses that lacked goals for their total new product efforts—where arenas or areas of strategic thrust had not been defined, where the strategy and projects were short-term in nature, and where the strategy was not well-communicated—were at a decided disadvantage on both performance dimensions.

Corning Incorporated, for example, has heeded the message. The company is installing a first-rate portfolio

management approach to help allocate resources to the right projects within business units. The approach does a superb job of linking the project portfolio to strategy, and begins first with a clear delineation of the business unit’s strategy: its goals for new products, and the arenas of strategic focus.

- 3. *Adequate resources of people and money.*—Top-performing firms had in place the needed resources to undertake new products; that is, senior management had made the *necessary resource commitment, and kept it*. This was the No. 3 driver of superior performance. Resource commitment drove both the profitability of the business’s total new product effort, as well as the impact of this effort on the business (see Figure 2 and Table 2).

Three main ingredients lead to resource adequacy and, in turn, positive performance for the business:

- *The necessary resources have been devoted by senior management to achieve the firm’s new product objectives.*

In an effort to overcome weak new product performance, some managements had undertaken a re-engineering or strategic planning exercise. The problem was that the resulting strategy, goals or processes were not backed up with the needed resources. And so the initiative floundered. As one manager eloquently stated, “Even the best game plan in the world comes to nothing if there aren’t players on the field!”

A lack of resources continues to plague new product projects, and was often the culprit underlying poor quality of execution; there simply weren’t the necessary people in place, nor the time available to do a quality job. The result was that corners were cut, activities were done in haste, tasks were left out—and the results were predictable. The point is: For positive results, *the resource commitment must be aligned with the business’s new product objectives and processes.*

- *R&D budgets are adequate to achieve the stated objectives.*

This is just another facet of the resource question, but with a specific focus on technical budgets. Later, we look specifically at R&D spending as a percentage of sales, and its effect on new product performance.

- *The necessary people are in place, and release time is given for specific new product projects.*

Projects are approved, and people are assigned to them. Too often, the assigned people are expected to work on another six projects, or in the case of marketing and manufacturing people, to do “their real job” in addition to the new product project. Some enlightened firms, however, are taking steps to overcome this deficiency. At Alcoa’s Knoxville packaging division, for example, when a project’s action plan is approved at each gate



review, the plan spells out resource commitments, people and their time allocation. Assignments of personnel to specific projects are made realistically, and in full awareness of their other duties and obligations.

Having a solid new product process (critical success factor No. 1) is only part of the answer. So too is having an enunciated new product strategy (factor No. 2). Unless the process and the strategy are properly resourced with people, time and money—and the commitments kept—don't expect stellar performance.

**4. R&D spending.**—R&D spending for product development, measured as a percentage of sales, was by far the strongest determinant of the *impact* of the product development effort (see Table 2 and the horizontal dimension in Figure 2). But R&D spending had *no significant effect whatsoever* on the other performance dimension; namely, profitability of the total new product effort. Thus, metrics that capture performance magnitude or impact, such as the popular, “percentage of sales by new products” measure are driven by the magnitude of spending.

The message is clear: If your performance goal is to have a high-impact new product effort—for example, to achieve a high percentage of your business unit's sales from new products—then increased R&D spending is the most obvious lever to pull. The relationship is not one-to-one, but it is strong!

### Five Other Success Factors

Another five drivers of new product performance were also identified (see Figure 2), but their impacts were more modest than the four critical success factors highlighted above.

**5. High-quality new product teams.**—The various organizational and team measures contained two distinct factors. The first captures the quality of the team, which was a fairly strong driver of performance; the second (No. 8, next page), whether it was a true cross-functional team or not, played a lesser role. The first of these, a *high-quality team*, meant:

- The team leader *was dedicated to this one project* (as opposed to trying to lead many projects, or having many other assignments). Sadly, in too many business units we studied, team leaders were spread too thinly across too many projects or had too many other duties to run projects effectively.
- The team interacted and communicated well and often, with *frequent project update meetings*, progress reviews, and problem resolution sessions. The best teams we witnessed had short but weekly meetings to ensure that the entire team was up to speed.
- Decisions made by outsider groups or people (outside the team) were handled *quickly and efficiently*. This

Companies such as Procter & Gamble specify in their new product process that flexibility is key.

was usually the result of proficient team actions. For example, the team was able to do whatever internal marketing, communication and persuasion was necessary to get outsiders on-board and to deliver quick, efficient decisions.

Firms that boasted good-quality project teams, as defined above, had positive results on both performance dimensions (see Table 2 and Figure 2).

**6. Senior management commitment.**—Businesses with greater senior management commitment to, and involvement in, new products boasted more profitable total new product efforts. Firms where senior managements were very much involved in new products were ones in which:

- Senior management was strongly committed to new products and product development.
- Management had committed the necessary resources to achieve the firm's new product goals.
- Senior management was closely involved in the project Go/Kill and new product spending decisions—they had a central role in the new product project review process.

**7. Innovative climate and culture.**—The climate for innovation within the firm was a success factor, but perhaps not as strong as one might have expected. Sadly, the average scores on individual ingredients here were among the lowest of any success factors. Here, positive climates were ones in which:

- There was a *new product idea scheme* within the business unit, which solicited ideas from all employees.
- Technical people were given *free time, scouting time or time off* to work on projects of their own choice. Typically this was between 10 and 20 percent of the work week. Here we saw some evidence that, while some firms made this option available to their technical employees, relatively few employees took advantage of the offer.
- *Resources were made available* to employees so that they could informally advance their own projects or undertake creative work of their own choice. Such



resources often included seed money for technical research, bootstrapping accounts to fund unapproved projects, etc.

- Skunk works or *teams working on unofficial projects* were encouraged.

**8. Cross-functional team.**—This second facet of the project team captured whether or not it was a true cross-functional team. Here, positive performance was achieved when:

- All projects had a *defined and accountable team leader*—a person who was responsible for advancing the project.
- Project leaders were *responsible for the project from beginning to end* (as opposed to being responsible for

only one phase of a project, or having project leadership changing hands many times during a project's life).

- All projects had an *assigned team of players*, who worked on specific projects.
- These assigned players, who executed projects, were a *cross-functional team*—from R&D, Marketing, Manufacturing, Engineering, etc.

Businesses that consistently used cross-functional teams were rewarded: the total new product effort was more profitable on average. But the mere use of cross-functional teams did not have the dramatic impact on profitability or impact that we had expected; rather, team quality (No. 5 above) had the stronger effect.

**9. Senior management accountability.**—This final driver had the least effect overall on performance, but it did help to drive the profitability that the business unit achieved from new products. Management accountability captures the degree to which new product performance was measured, and senior management was held accountable for the program results. Scores were *very low* on all ingredients of management accountability. Consider each ingredient in greater detail:

- New product performance was a part of senior management's personal *performance objectives*.
- Senior management's *compensation* or bonus scheme was tied to the business unit's new product performance. Very few businesses employed this practice.
- The *performance results* of the new product program were actually *measured* (e.g., percentage of annual sales generated by new products, or success, fail and kill rates). Surprisingly, this practice was rare—firms simply failed to keep score!

The evidence suggests that not only is the business unit's new product performance *not a factor* in senior management's compensation scheme, or even an integral facet of senior management's annual performance objectives, but such new product performance results are likely *not even measured* at all for a great many firms.

## Conclusions

**1.** New product performance at the business-unit level can be reduced to two major underlying dimensions—*profitability* and *impact on the business*. This reduction greatly simplifies the measurement and reporting of performance. Note that there exist many measures of new product performance—percentage of sales, success rates, meeting sales and profit objectives, various measures of profitability, and even technical success ratings. We used ten of these many performance metrics in the current study. One problem with multiple measures is that the performance issue becomes clouded—it is more complex and more confusing.

### The Cornerstones of New Product Performance

**1.** A *high-quality new product process*, meaning:

- An emphasis on up-front homework—both market and technical assessments—before projects move into the development phase.
- Sharp, early product definition, before development work begins.
- Tough Go/Kill decision points in the process, where projects really do get killed.
- A focus on quality of execution, where activities in new product projects are carried out in a quality fashion.
- A complete and thorough process, where every needed activity is carried out without hasty corner-cutting.
- A flexible process, where stages and decision points can be skipped or combined, as dictated by the nature and risk of the project.

**2.** A *clearly defined new product strategy* for the business unit, which means:

- There are goals or objectives for the business's total new product effort (e.g., what sales, profits, etc. new products would contribute to the business).
- The role of new products in achieving business goals is clearly communicated to all.
- There are clearly defined areas of strategic focus—strategic arenas—to give direction to the business's total new product effort.

**3.** *Adequate new product resources*, meaning:

- Committing the necessary people.
- Allowing them sufficient time.
- Providing an adequate R&D budget.

The current study provided needed clarification here. The many measures of performance used really boil down to two major dimensions, according to our statistical analysis results:

- How *profitable* the businesses' total new product efforts are, including: the profitability versus competitors and the overall success rating of the business's total new product effort; whether the total initiative meets profit objectives; its profitability relative to spending; and the impact of the total effort on the business unit's profits.
- The *impact* of the total new product effort on the business, including: percentage sales by new products achieved by the business unit; impact of new products on both sales and profits of the unit; success rate achieved; and the technical success rating.

Thus, when speaking of "the performance of a business's new product efforts," our research suggests that it makes sense to simplify the discussion and focus on two broad performance areas: *profitability* and *impact*. (One could even reduce "new product performance" to two performance indices consisting of a number of metrics; the weights or loadings shown in Figure 2 enable the computation of these two indices). The Performance Map shown in Figure 1 proved to be a most useful visual tool to capture these two dimensions and the multiple metrics that comprise them. Indeed, it makes sense to plot individual business units within a corporation on this X-Y map, in order to display pictorially the high-impact and/or the high-profitability business units.

2. The three cornerstones of new product performance—the factors that really drive performance—are:

- A high-quality new product process.
- A clearly defined new product strategy for the business unit.
- Adequate new product resources—people and money.

These three together had by far the strongest effect on both measures of the business's new product performance. Merely having a formal new product process in place had no effect on performance. Rather, it was the nature of the process—a high-quality process which built in the ingredients listed in "The Cornerstones of New Product Performance (below)—that made the difference.

The message is clear. Technology or new product strategy must be firmly linked to business strategy. This means that management must develop a *new product strategy for the business*—a product innovation charter (6)—that ties new products closely to the achievement of business goals, has clearly stated objectives, and defines areas of strategic focus or thrust.

**R&D spending for product development was by far the strongest determinant of the impact of the product development effort.**

The third cornerstone of performance—*adequate new product resources*—is sometimes overlooked in these days of right-sizing and re-engineering. Management must realize that developing a grandiose strategy, or hiring consultants to re-engineer the new product process, will not yield results if there are no or too few players on the field. The goal of a high-performance new product effort and a high-quality new product process will not be achieved unless the resources are in place. Management must make the commitment here, and keep it!

3. The R&D spending devoted to new products was the *single strongest driver of program impact*. This comes as no surprise, but it is reassuring to see the relationship verified and quantified. If the business unit's goal is a high-impact new product effort—one that yields a high percentage of sales by new products, and has a large impact on the business's sales and profits—then increased new product R&D spending is one route. Put another way, don't expect to have a high-impact effort if management is not prepared to commit the R&D dollars as a percentage of sales. Note that the mean R&D spending for the business units studied was already relatively high at 7.5 percent of sales. There are caveats here, however:

- There was no relationship at all between R&D spending and the *profitability* of the new product effort.
- The link between R&D spending and impact was not one-to-one (the correlation was strong at 0.395, but far less than 1.00).

4. Other factors did enter the performance equation, but these factors have far less effect than the three cornerstones of performance highlighted above. These lesser factors are:

- *High-quality new product teams:* Dedicated team leaders, full-time on their one project; good internal team communications; and the ability to manage the external decision-making process.

- *Senior management commitment:* Senior managers strongly committed to new products; commitment of the necessary resources; and senior management closely involved in Go/Kill and spending decisions.

- *Innovative climate and culture:* A new product idea submission scheme; free time or scouting time available for technical employees; resources available for creative, unapproved projects; and skunk works on unofficial projects. Note that most firms were particularly weak on this factor.

- *Cross-functional teams:* A defined and accountable leader who was accountable from beginning to end of the project, and an assigned team of players from various functions in the business.

- *Senior management accountability:* New product performance results were measured; new product performance was a part of senior management's performance objectives; and senior management's compensation or bonuses were tied to new product results. Businesses fared very poorly on these three accountability practices.

**5. Beware naive process re-engineering!** Recall that simply having a formal new product process—one that maps out the steps in a product development from idea to launch—*does not lead to positive performance*, according to our study's results. Many firms are currently busy documenting their product innovation processes, simply to meet ISO standards; the end result is a "formal process" but likely *no increase in performance!* If you naively reengineer your innovation process—that is, simply document what you are now doing—don't expect positive results. Rather, consider the success factors of a high-quality innovation process—those factors listed in conclusion 2 above—and build these into your new product process. Many firms have utilized the stage-gate model as a basis for redesigning their new product process (7); the stage-gate approach emphasizes many of the ingredients listed above: homework, voice of the customer, tough gates, quality of execution; and flexibility. Some progressive firms have even moved beyond this into third-generation new product processes (8).

**6. Benchmark before re-engineering.** The beginning of a solution is understanding the problem. Before you embark on a re-engineering "solution," take time to benchmark your business unit's performance and practices against other firms. The ten performance metrics and the 48 measures of practices used in our research are a good starting point (i.e., become the logical variables or measures to use in such a benchmarking exercise).

In subsequent work, we have extended our analysis and developed our ProBE (for Product Benchmarking and Evaluation) benchmarking tool, which enables you to compare your new product performance and practices against the many business units in our database. If you cannot afford extensive benchmarking, then at minimum, perform a diagnostic on your own business unit; that is, rate your own performance and practices on the ten metrics and 48 measures of new product practices we have used.

In sum, new product development, more than ever, is tied to corporate fortunes and prosperity. An understanding of the factors that drive new product performance at the business unit level is critical if we are to achieve the goal of increased performance. By identifying these driving factors—in particular, a high-quality innovation process, a defined innovation strategy, and adequate resources to support both strategy and process—this benchmarking study has provided hard and quantified evidence for management to take the steps toward winning at new products. ☺

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## References

1. Cooper, R. G. "Debunking the Myths of New Product Development." *Research Technology Management* 37, 4 (July–August 1994): 40–50.
2. Montoya-Weiss, M. M. and R. J. Calantone. "Determinants of New Product Performance: a Review and Meta Analysis." *Journal of Product Innovation Management* 11, 5 (Nov. 1994): 397–417.
3. Cooper, R. G. and E. J. Kleinschmidt. "Benchmarking the Firm's Critical Success Factors in New Product Development." *Journal of Product Innovation Management* 12, 5 (Nov. 1995): 374–391.
4. Cooper, R. G. and E. J. Kleinschmidt. "Benchmarking Firms' New Product Performance and Practices." *Engineering Management Review* 23, 3 (Fall 1995): 112–120.
5. *Product Launch Road Map for Success.* Procter & Gamble. Cincinnati: P&G internal document (July 1993).
6. Crawford, C. M. "Defining the Charter for Product Innovation." *Sloan Management Review* (1980): 3–12.
7. Cooper, R. G. *Winning at New Products: Accelerating the Process from Idea to Launch.* Reading, Mass: Addison-Wesley, 1993.
8. Cooper, R. G., "Third-generation New Product Processes." *Journal of Product Innovation Management* 11, 1 (Jan. 1994): 3–14.





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