
Product Innovation Best Practices Series

Portfolio Management for New Products: Picking The Winners

Reference Paper # 11

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New product portfolio management is about how you invest your business's product development resources – project prioritization and resource allocation across development projects. This paper addresses the four goals of portfolio management and the importance of having an established, high quality Stage-Gate® system in place.

Keywords:

Stage-Gate®, new product process, portfolio management, project prioritization, and resource allocation.

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Executive Summary

- ✚ New product portfolio management is about how you invest your business's product development resources – project prioritization and allocating resources across development projects.
- ✚ There are four goals in portfolio management – maximizing the value of the portfolio, seeking the right balance of projects, ensuring that your portfolio is strategically aligned, and making sure you don't have too many projects for your limited resources. And there are many tools – some quantitative, others graphical, some strategic – designed to help you chose the right portfolio of projects.
- ✚ Most important, your new product process or Stage-Gate system must be working in order to achieve effective portfolio management: it must deliver data integrity and also weed out the bad projects early.

Maximizing Your Profits From R&D Investments

How should you most effectively invest your product development resources? And how should you prioritize your development projects and allocate resources among them? These are crucial issues in new product portfolio management. Much like a stock market portfolio manager, those senior executives who manage to optimize their R&D investments – to select winning new product projects and achieve the ideal balance and numbers of projects – will win in the long run¹.

Portfolio management is a critical senior management challenge, according to our best practices study². And top performing businesses tend to rate the importance of portfolio management much higher than do poorer performers. Here's why:

- First, a successful new product effort is *fundamental to business success*. This logically translates into portfolio management: the ability to select today's projects that will become tomorrow's new product winners.
- Second, new product development is the *manifestation of your business's strategy*. One of the most important ways you operationalize strategy is through the new products you develop. If your new product initiatives are wrong – the wrong projects, or the wrong balance— then you fail at implementing your business strategy.
- Third, portfolio management is about *resource allocation*. In a business world pre-occupied with value to the shareholder and doing more with less, technology and marketing resources are simply too scarce to waste on the wrong projects. The consequences of poor portfolio management are evident: you squander scarce resources, and as a result, starve the truly deserving projects.

Four Goals in Portfolio Management

There are four goals in new product portfolio management:

Goal #1. Maximize the Value of Your Portfolio: Here the goal is to select new product projects so as to maximize sum of the values or *commercial worths* of all active projects in your pipeline in terms of some business objective. Tools used to assess "project value" include³:

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- *NPV*: Determine the project's net present value and then rank projects by NPV divided by the key or constraining resource (for example, the R&D costs still left to be spent on the project; that is, by NPV/R&D). Projects are rank-ordered according to this index until out of resources, thus maximizing the value of the portfolio (the sum of the NPVs across all projects) for a given or limited resource expenditure.
- *ECV*: The Expected Commercial Value method uses decision-tree analysis, breaking the project into decision stages – for example, Development and Commercialization (Figure 1). Define the various possible outcomes of the project along with probabilities of each occurring (for example probabilities of technical and commercial success). The resulting ECV is then divided by the constraining resource (as in the NPV method), and projects are rank-ordered according to this index in order to maximize the *bang for buck*. The method also approximates *real options theory*, and thus is appropriate for handling higher risk projects⁴.
- *Scoring model*: Decision-makers rate projects on a number of questions that distinguish superior projects, typically on 1-5 or 0-10 scales. Add up these ratings to yield a quantified Project Attractiveness Score, which must clear a minimum hurdle. This Score is a proxy for the "value of the project" but incorporates strategic, leverage and other considerations beyond just financial measures. Projects are then rank-ordered according to this score until resources run out. A typical scoring scheme is shown in Figure 2.

Goal #2. Seek Balance in Your Portfolio:

Here the goal is to achieve a desired balance of projects in terms of a number of parameters; for example, long term projects versus short ones; or high risk versus lower risk projects; and across various markets, technologies, product categories, and project types (e.g., new products, improvements, cost reductions, maintenance and fixes, and fundamental research).

Pictures portray balance much better than do numbers and lists, and so the techniques used here are largely graphical in nature. These include:

- *Bubble diagrams*: Display your projects on a two-dimensional grid as bubbles as in Figure 3 (the size of the bubbles denotes the spending on each project). The axes vary but the most popular chart is the risk-reward bubble diagram, where NPV is plotted versus probability of technical success. Then seek an appropriate balance in numbers of projects (and spending) across the four quadrants.
- *Pie charts*: Here show your spending breakdowns as slices of pies in a pie chart. Popular pie charts include a breakdown by project types, by market or segment, and by product line or product category.

Both bubble diagrams and pie charts, unlike the maximization tools outlined above, are not decision-models, but rather *information display*: they depict the current portfolio and where the resources are going – the "what is". These charts provide a useful beginning for the discussion of "what should be" – how should your resources be allocated.

Goal #3. Your Portfolio Must Be Strategically Aligned:

This means that all your projects are "on strategy"; and that your breakdown of spending across projects, areas, markets, etc., must mirror your strategic priorities (your areas of focus and their respective priorities). Several portfolio methods are designed to achieve strategic alignment:

- *Top-down, strategic buckets*: Begin at the top with your business's strategy and from that, the *product innovation strategy* for your business – its goals, and where and how to focus your new product efforts. Next, make splits in resources: "given your strategy, where should you spend your money?". These splits can be by project types, product lines, markets or industry sectors, and so on. Thus, you establish *strategic buckets* or envelopes of resources.

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Then, within each bucket or envelope, list all the projects – active, on-hold and new – and rank these until you run out of resources in that bucket. The result is multiple portfolios, one portfolio per bucket. Another result is that your spending at year-end will truly reflect the strategic priorities of your business.

- *Top-down, product roadmap:* Once again, begin at the top, namely with your business and product innovation strategy. But here the question is: “given that you have selected several areas of strategic focus – markets, technologies or product types – what major initiatives must you undertake in order to be successful here?”. It’s analogous to the military general asking: given that I wish to succeed in this strategic arena, what major initiatives and assaults must I undertake in order to win here? The end result is a mapping of these major initiatives along a timeline – the product roadmap (Figure 4). The selected projects are 100% strategically driven.
- *Bottom-up:* “Make good decisions on individual projects, and the portfolio will take care of itself” is a commonly accepted philosophy. That is, make sure that your project gating system is working well – that gates are accepting good projects, and killing the poor ones – and the resulting portfolio will be a solid one. Even better, to ensure strategic alignment, use a scoring model at your project reviews and gates (Figure 2), and include a number of strategic questions in this model. Strategic alignment is all but assured: your portfolio will indeed consist of all “on strategy” projects (although spending splits may not coincide with strategic priorities).

Note that regardless of the strategic approach here, all of these methods presuppose that your business does indeed have a *product innovation strategy*, something that many businesses lack according to our benchmarking study ⁵.

Goal #4. Pick the Right Number of Projects:

Most companies have too many projects underway for the limited resources available⁶. The result is *pipeline gridlock*: projects end up in a queue; they take too long to reach the market; and key activities — for example, doing the up-front homework— are omitted because of a lack

of people and time. Thus an over-riding goal is to ensure a balance between resources required for the active projects and resources available. Here are the ways:

- *Resource limits:* The value maximization methods (Goal #1) build in a resource limitation – rank your projects until out of resources. The same is true of bubble diagrams (Goal #2): the sum of the areas of the bubbles – the resources devoted to each project – should be a constant, and adding one more project to the diagram requires that another be deleted.
- *Resource capacity analysis:* Determine your resource demand: prioritize your projects (best to worst) and add up the resources required by department for all active projects (usually expressed in person-days per month)⁷. Project management software, such as MS-Project, enables this roll-up of resource requirements. Then determine the available resources (the supply) per department – how much time people have to work on these projects. A department-by-department and month-by-month assessment usually reveals that there are too many projects; it suggests a project limit (the point beyond which projects in the prioritized list should be put On Hold); and it identifies which departments are the bottlenecks.

Your New Product Process Must Work

Before you charge ahead with portfolio management, put first things first: make sure that your new product process or *gating system* is working well. A majority of product developers have implemented *Stage-Gate*[®] systems, according to a PDMA study⁸, but experience suggests that many are due for an overhaul. An effective new product process is central to portfolio management for two reasons:

1. First, regardless of the sophistication of the portfolio models used, your input data must be sound. And look to your new product process to deliver *data integrity*. Usually this is not the case. For example, our best practices survey revealed that, in spite of their theoretical rigor, financial models (NPV and ECV) yield the worst portfolios of projects, not because the models are wrong, but because the input data were so much in error.

2. Second, your gating process should at minimum kill or cull out the bad projects, and in so doing, yield a better portfolio. Again often this does not happen: management confessed to an inability to kill projects, the lack of effective gate criteria, and many projects simply “getting a life of their own”.

Data integrity means that the up-front homework in projects must be done. Many companies have improved the quality of execution and at the same time provided far better data for project selection by implementing a systematic *Stage-Gate* new product process. Build into your process two stages of homework prior to the beginning of Development (Figure 5):

- the Scoping Stage, which entails a preliminary market, technical and business assessment
- Building the Business Case, which involves much more detailed market research (a user needs-and-wants study, competitive analysis, concept tests) along with technical and manufacturing assessments.

Incorporating in these two key stages as part of your new product process not only results in better and sharper product definition, a critical success driver, but also much better data as inputs to the various portfolio models above.

An effective new product process also means effective gates. In best-practice businesses, this translates into a menu of specified deliverables for each gate, visible Go/Kill and prioritization criteria at the gates (many companies use scorecards to rate projects at gate meetings), defined gatekeepers per gate, clear gate outputs, and even “rules of engagement” for the gatekeeping or leadership team of the business. If your gates are weak – if they fail to weed out mediocre projects – then check yourself against gating best-practices above. Perhaps it’s time to rethink your new product process!

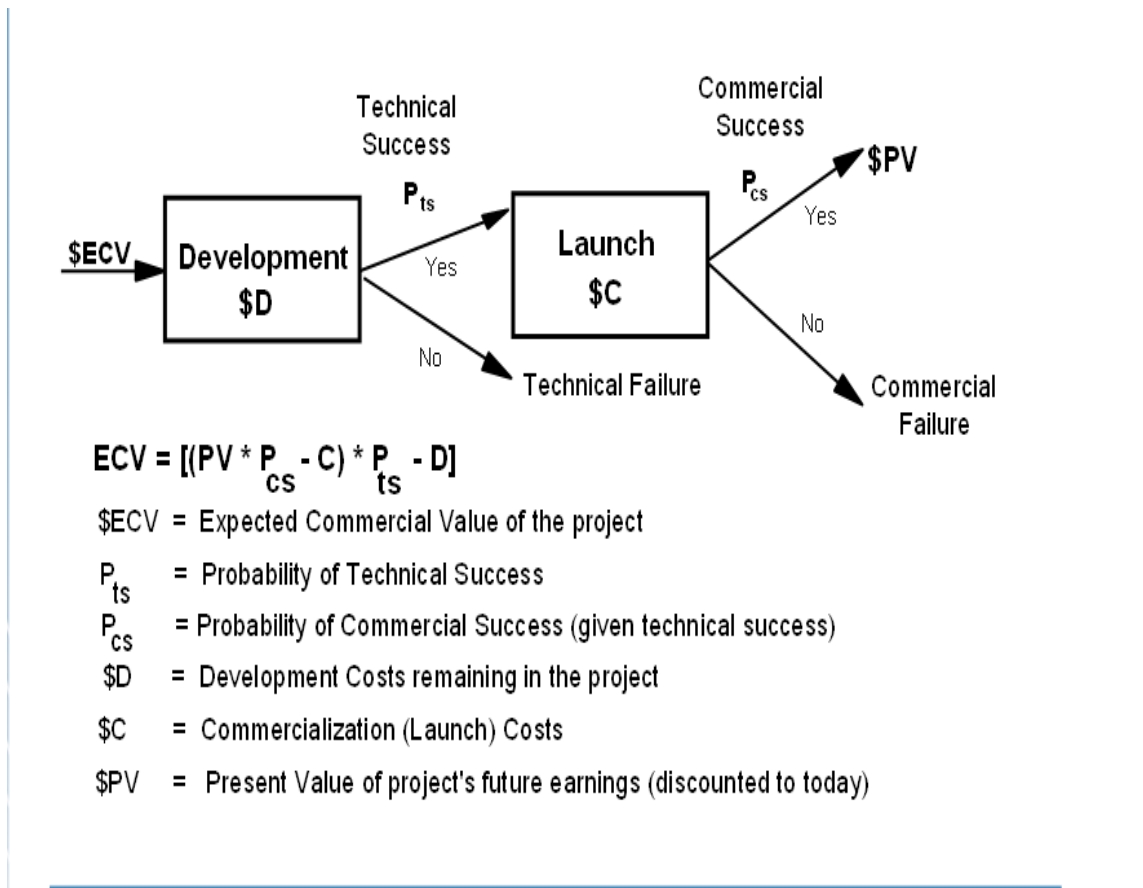
Conclusion

Portfolio management is fundamental to new product success. But it’s not as easy as it first seems. Not only must you seek to maximize the value of your portfolio, but the development projects in your portfolio must be appropriately balanced, there must be the right numbers of projects, and finally, the portfolio must be strategically aligned. No one portfolio model can deliver on all four goals, and so best-practice businesses tend to use multiple methods to select their projects. Finally, our studies reveal that any portfolio method outlined above is better than none at all, so our advice is: just do it!

- End-

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Figure 1. Determination of Expected Commercial Value of Project



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Figure 2. **A typical Scoring Model For Project Prioritization**

Strategic Alignment:

- Degree to which project aligns with our strategy
- Strategic importance

Product/Competitive Advantage:

- Offers customers/users unique benefits
- Meets customer needs better
- Provides value for money for the customer/user

Market Attractiveness:

- Market size
- Market growth rate
- Competitive intensity in the market (high=low score)

Synergies (Leverages Our Core Competencies):

- Marketing synergies
- Technological synergies
- Operations/manufacturing synergies

Technical Feasibility:

- Size of technical gap (large=low score)
- Technical complexity (barriers to overcome)
(many/high = low score)
- Degree of technical uncertainty (high=low score)

Risk Vs. Return:

- Expected profitability (magnitude: NPV)
- Return on investment (IRR)
- Payback period (years; many=low score)
- Certainty of return/profit estimates
- Low cost & fast to do

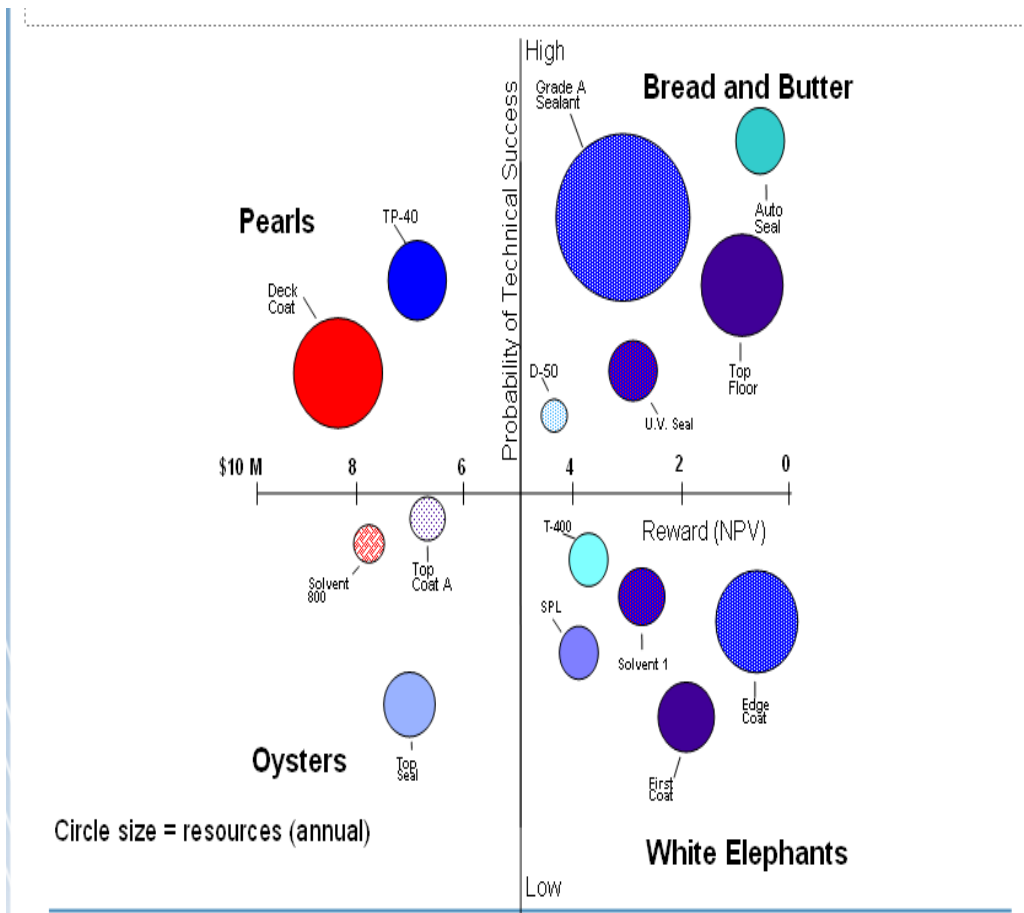
The six Factors are scored (0-10) for each project at gate review meetings by the 'gatekeepers". Bulleted items are discussed to arrive at Factor Scores. Each Factor must clear a minimum hurdle. They are then added (weighted or unweighted) to yield the Project Attractiveness Score, which is used to make Go/Kill decisions at gates and to prioritize projects.



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Figure 3. A Typical Risk-Reward Bubble Diagram

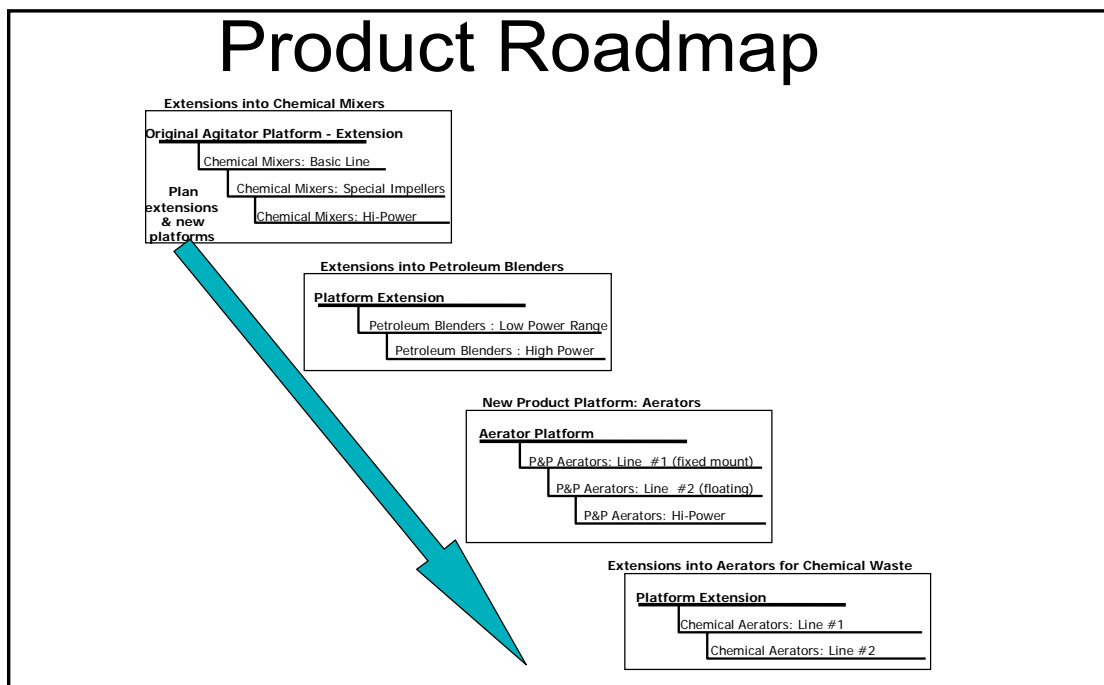
Projects are shown as bubbles. This high growth business has too many “White Elephants” and too much spending in the “Bread & Butter” quadrant, not enough in the “Pearls” quadrant, and is underfunding the “Oysters”. Example based on a growing Business Unit within a large chemical company.



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Figure 4. **The Product Roadmap**

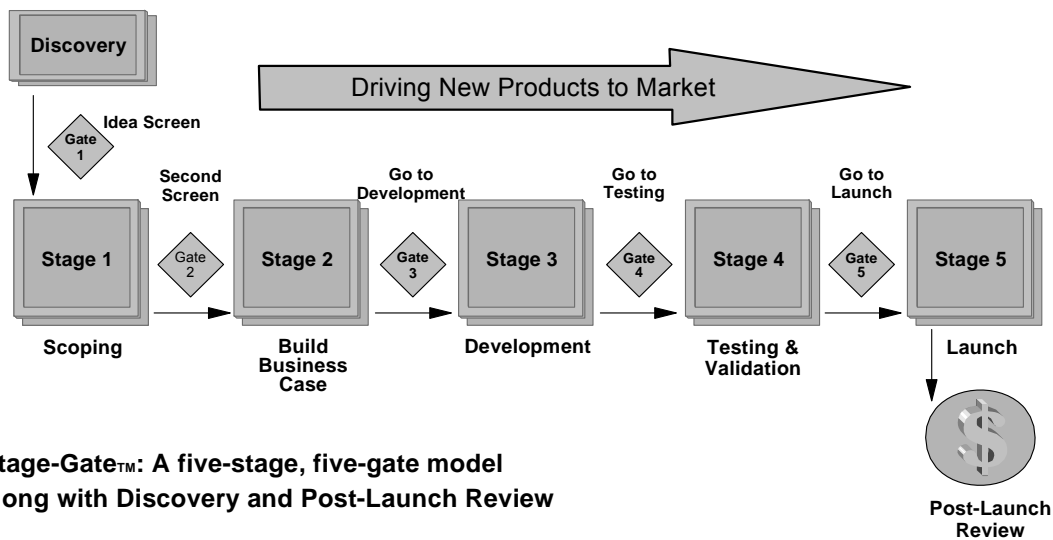
The Product Roadmaps shows the major development initiatives (platforms and products) on a timeline for several years into the future. This example is from a manufacturer of process equipment (mixers & agitators)



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Figure 5. An overview of a Typical Stage-Gate® Process

There are five stages plus the idea or “Discovery” stage. Each stage is preceded by a gate, where a team of “gatekeepers” (senior management) make Go/Kill decisions on projects. The stages are where prescribed activities are undertaken by cross-functional project teams. Almost 70% of U.S. product developers have implemented such Stage-Gate processes, according to a PDMA study.



Source: *Winning at New Products* [4]

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Additional Reading

¹ This essay is based on a number of books and articles by the authors: R.G. Cooper, S. J. Edgett & E.J. Kleinschmidt, *Portfolio Management for New Products*. 2nd Edition, Cambridge, Mass: Perseus Books, 2001; Cooper, R.G., *Winning at New Products: Accelerating the Process from Idea to Launch*, 3rd edition. Cambridge, Mass: Perseus Books, 2001; Cooper, R.G., Edgett, S.J. & Kleinschmidt, E.J., "Portfolio management in new product development: lessons from the leaders – Part I", *Research-Technology Management*, Sept-Oct 1997, 16-28; Part II, Nov-Dec 1997, 43-57. Also see: www.prod-dev.com.

² Portfolio management best practice studies: R.G. Cooper, Edgett, S.J. & Kleinschmidt E.J., "Best practices for managing R&D portfolios", *Research-Technology Management*, 41, 4, July-Aug. 1998, 20-33; and: Cooper, R.G., Edgett, S.J. & Kleinschmidt, E.J., "New product portfolio management: practices and performance", *Journal of Product Innovation Management*, 16,4, July 1999, pp 333-351.

³ For more information on all portfolio methods, see: *Portfolio Management for New Products*, reference note 1 above.

⁴ For a discussion of real options theory, see: T. Faulkner, "Applying 'Options Thinking' to R&D Valuation." *Research-Technology Management*, May-June 1996, pp. 50-57.

⁵ New product benchmarking studies: Cooper, R.G., "New product leadership: building in the success factors," *New Product Development & Innovation Management*, 1,2, 1999, 125-140; Cooper, R.G., "Product Innovation and Technology Strategy" in the "Succeeding in Technological Innovation" series, *Research-Technology Management*, 43,1, Jan-Feb. 2000, 28-44; and: Cooper, R.G. & Kleinschmidt, E.J., "Winning businesses in product development: critical success factors", *Research-Technology Management*, 39, 4, July-Aug 1996, 18-29.

⁶ See articles in reference note 2; also: Cooper, R.G., Edgett, S.J. & Kleinschmidt, E.J., "New problems, new solutions: making portfolio management more effective", *Research-Technology Management*, 2000, 43, 2, 18-33.

⁷ For more on resource capacity analysis, see: Cooper, R.G., "The invisible success factors in product innovation," *Journal of Product Innovation Management*, 16, 2, April 1999, 115-133.

⁸ Stage-Gate processes are widely used by the top performing companies. See: A. Griffin, *Drivers of NPD Success: The 1997 PDMA Report* (Product Development & Management Association) 1997. For more information on Stage-Gate processes, see *Winning at New Products*, reference note 1; and www.prod-dev.com



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