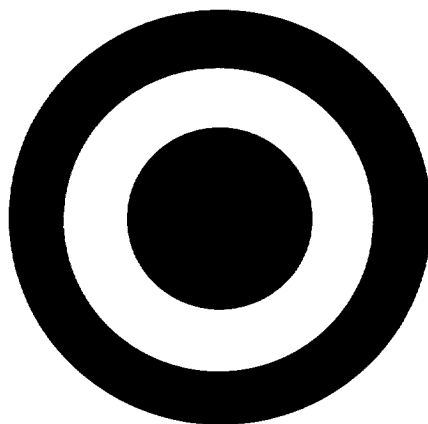BY ROBERT G. COOPER

WINNING WITH NEW PRODUCTS

DOING IT RIGHT

There are two ways that the best companies can win when they develop new products. One is to *do projects right*. That is, leading companies have focused on the process of innovation: They have re-engineered their new-product process and, in so doing, have built in the critical success factors that make the difference between winning and losing. Many companies now utilize a stage-gate new-product process to drive their new-product projects to market quickly and successfully.

The second way to win is by *doing the right projects*. Here, management focuses on project selection and ultimately implements the portfolio management principle for product innovation. Both approaches—stage-gate processes and portfolio management for new products—are the topics of this article.

INNOVATE OR DIE

The need for product innovation has never been greater. Product life cycles are shorter than ever and new products make your old ones obsolete. One German study revealed that product life cycles have shrunk by 400 percent across a broad array of product categories over the last 50 years. Driven by the globalization of markets, technological advances and ever-changing customer needs, product innovation is now the No. 1 plank in many companies' strategic platforms. For example, in the United States, new products now account for about 50 percent of companies' revenues from sales and 40 percent of their profits. The *Fortune* list of the Most Admired Companies contains the most innovative firms in America: Pfizer, 3M, Intel, General Electric, Johnson & Johnson, Procter & Gamble and others.

Companies that fail to innovate face a grim future. Their product lines fall victim to more aggressive, innovative competitors. And customers vote with their feet: As they switch allegiances, market share starts to suffer. Even stock market share prices weaken: These days, the financial markets place a high value on a company's ability to innovate.

The problem is that winning with new products is not so easy. An estimated 46 percent of the resources that companies devote to the conception, development and launch of new products go to ventures that don't succeed—they fail in the marketplace or never even make it to market. Only one out of four development projects succeeds commercially and one-third of all new-product launches fail.

In recent years, much research has been directed to uncovering the secrets to new-product success: What do the winners do differently? Our research has led to many prescriptions—including stage-gate methods and portfolio management tools—to heighten the odds of success (R.G. Cooper, *Winning at New Products: Accelerating the Process From Idea To Launch*, 1993; Cooper, *Portfolio Management for New Products*, 1998). But before we discuss these prescriptions, let's consider the major conclusions of studies on why new products succeed—the critical success factors. Even more, as you review each one, ask what your company has done to build these factors into their new-product game plan.

CRITICAL SUCCESS FACTORS
1. Seek differentiated, superior products

The top success factor is delivering a *differentiated product* with *unique customer benefits* and *superior value*. Such superior products have five times the success rate, more than four times the market share and four times the profitability of products that lack this ingredient. But most new products miss the mark here: The majority of products in our studies are tired "me too" products with little to distinguish them from competitors. A second, very popular scenario, which also yields poor results, *is the engineer building a monument to himself*—the technical solution in search of a market.

When it comes to explaining their methodology, very few firms can point to those specific facets that emphasize this one vital ingredient for success. Often, "product superiority" is absent as a project selection criterion, while steps that encourage the design of such superior products are rarely ▶
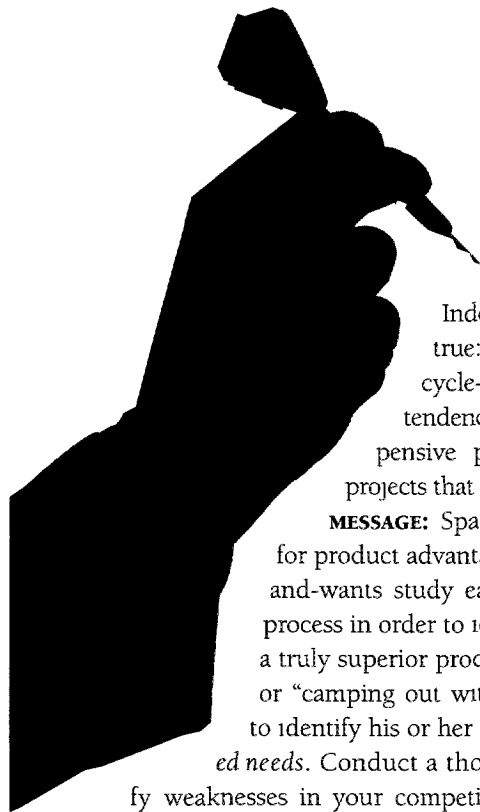
built into the process. Indeed, quite the reverse is true: The preoccupation with cycle-time reduction and the tendency to favour simple, inexpensive projects actually penalize projects that lead to product superiority.

MESSAGE: Spare no effort in the search for product advantage. Build in a user needs-and-wants study early in your new-product process in order to identify the components of a truly superior product. Use "fly-on-the-wall" or "camping out with the customer" research to identify his or her true and often *unarticulated needs*. Conduct a thorough analysis to identify weaknesses in your competitors' products. And once you arrive at a viable product concept, test it constantly with the customer via concept tests, *protocept* tests, rapid prototypes and, finally, full-product tests.

2. Up-front homework pays off

Too many new-product projects move from the idea stage right into development with little or no up-front homework. The results of this "ready, fire, aim" approach are usually disastrous. Solid pre-development homework drives up new-product success rates significantly and is strongly correlated to financial performance. Sadly, firms devote on average only seven percent of a project's funding and 16 percent of the person-days to these critical up-front homework activities. It's simply not enough.

MESSAGE: More time and resources must be devoted to the activities that precede the design and development of the product. Up-front homework means undertaking thorough market and competitive analyses, research on the customers' needs and wants, concept testing, and technical and operations feasibility assessments. All of these activities in turn lead to the preparation of a full business case prior to beginning serious development work.

3. Build in the voice of the customer

Successful businesses and teams that drive winning new-product projects have a slavelike dedication to the voice of the customer. According to our research, new-product projects that feature high-quality marketing actions are blessed with more than double the success rates and 70-percent higher market shares than those projects with poor marketing actions. Sadly, a strong market orientation and customer focus is noticeably absent from many businesses' new-product projects.

MESSAGE: The voice of the customer must be an integral part of your new-product process. This begins with *idea generation*—focus groups, customer panels and working with lead users. Use market research and customers as *input* into the product's design, not just as a confirmation of it. Make the customer a part of the development process via constant rapid-prototype-and-test iterations. Finally, ensure that the launch is well planned, adequately resourced and based on solid market information.

4. Demand sharp, stable and early product definition

A failure to *define the product* before development begins is a major cause of both new-product failure and serious delays in time-to-market. In spite of the fact that early and stable product definition is consistently cited as a key to success, firms continue to perform poorly here. Terms such as "unstable product specs" and "project scope creep" describe far too many new-product projects in our studies.

MESSAGE: Make it a rule: No project moves to the development stage without a sharp definition of the product, including:
- A target market definition
- A product concept and benefits to be delivered (written in the language of the customer)
- The positioning strategy (including the price point)
- Product features, attributes, performance requirements and high-level specs.

This definition must be fact-based and signed off by the project team. Senior management should also commit itself to the definition. Build this *definition checkpoint* into your new-product process.

5. Plan and resource the market launch early in the game

Not surprisingly, a strong market launch underlies the success of any product. For example, new-product winners devote more than twice as many person-days and dollars to the launch as do those that fail. Similarly, the quality of execution of the market launch is significantly higher for winners. The need for a quality launch—well planned, properly resourced and well executed—should be obvious. But not every project team and business devote the same effort and attention. In some businesses, it's almost as though the launch is an afterthought—something to worry about after the product is fully developed.

MESSAGE: Marketing planning is an integral part of the new-product process. It should begin early. The best companies require a launch plan on the table even before development proceeds. And set aside the launch resources early—the launch must be properly resourced!

6. Build tough Go/Kill decision points into your process—a funnel, not a tunnel

Too many projects move too far into development without serious scrutiny. In fact, once a project begins, there is very little chance that it will ever be killed. The result is that many marginal projects are approved and scarce resources are allocated improperly. Indeed, having tough Go/Kill decision points (or gates) is strongly correlated to the profitability of new-product efforts But tough Go/Kill decision points is *the weakest ingredient* of all process factors we have studied!

MESSAGE: Move towards effective *portfolio management*, where you view each new-product project as an investment. Build tough Go/Kill decision points into your new-product process—a funnelling approach—and use consistent, rigorous criteria at these gates. (There is more on portfolio management and project selection later in the article.)

7. Organize around true cross-functional project teams

Says Tom Peters, "Rip apart a badly developed project and you will unfailingly find 75 percent of slippage is attributable to (1) 'siloing,' or sending memos up and down vertical organizational 'silos' or 'stovepipes' for decisions, and (2) sequential problem solving." Numerous studies agree that good organizational design is strongly linked to success. Good organizational design means projects that are organized with a cross-functional team, led by a strong project leader accountable for the entire project from beginning to end, dedicated and focused (as opposed to spread over many projects). While the ingredients of a "good team" should be familiar ones, surprisingly many projects are found lacking in this regard.

MESSAGE: Move to team approaches that cut across functional lines. Functional managers must increasingly play the role of resource providers to project teams and team advisers, rather than bosses. Three approaches that appear to work well are the balanced matrix, the project matrix and the project team. All three emphasize the autonomy of the team and the independent authority of the project leader.

8. Attack from a position of strength

This may be an old adage, but it certainly applies to the launch of new products. The new product fares better when it leverages the business's core competencies. Leveraging core competencies means having a strong fit between the needs of the new-product project and the resources, strengths and experience of the company in terms of marketing, distribution, selling, technology and operations.

MESSAGE: These five ingredients become obvious checklist items in a scoring or rating model to help prioritize new-prod-

uct projects. If your leverage score is low, then there must be other compelling reasons to proceed with the project. Leverage is not essential, but it certainly improves the odds of winning.

9. Build an international orientation into your new-product process

New products aimed at international markets and with international requirements built in from the outset fare better. By contrast, products that are developed for domestic markets and sold locally are not nearly as profitable. The strategy of "design for local needs and adjust for export later" also does not work well; the product is usually compromised. North American companies often fail to consider the international dimension.

MESSAGE: An international orientation means defining the market as an international one and designing products to meet international requirements, not just domestic ones. The result is either a *global* product (one version for the entire world) or a *glocal* product (one development effort and one product concept, but perhaps several product variants to satisfy different international markets). An international orientation also means adopting a transnational new-product process, utilizing cross-functional teams with members from different countries, and gathering information for the new product's design from multiple international markets.

10. The role of top management is central to success

Top-management support is a necessary ingredient for product innovation, though it must provide the right kind of support. Many senior people get it wrong! Top management's main role is to *set the stage* for product innovation, to be a "behind-the-scenes" facilitator who is much less an actor, front and centre. This stage-setting role is vital, according to our research.

MESSAGE: Management must make the long-term commitment to product development as a source of growth; it must develop a vision, objectives and strategy for product innovation. It must make available the necessary resources and ensure that they aren't diverted to more immediate needs in times of shortage. It must commit to a disciplined game plan to drive products to market. And most important, senior management must empower project teams and support committed champions by acting as mentors, facilitators, "godfathers" or sponsors of project leaders and teams. Senior management's role is *not to get involved* in projects on a day-to-day basis, nor to be constantly meddling and interfering in the project, nor to micromanage projects from afar. ▶

ADOPT A STAGE-GATE NEW-PRODUCT PROCESS

How does one go about building these success factors into a new-product game plan? Leading companies have *overhauled their new-product processes*, incorporating the 10 success factors in the form of a Stage-Gate™ new-product process. According to a Product Development & Management Association (PDMA) best- practices study, 68 percent of U.S. product developers now use some type of stage-gate process (A. Griffin, *Drivers of NPD Success: The 1997 PDMA Report*, 1997).

Numerous global firms have implemented stage-gate processes including DuPont, Procter & Gamble, Exxon, Guinness, Unilever, Lego and Royal Bank of Canada. Ironically, stage-gate methods were first developed in Canada but they are now, for the most part, applied outside of this country.

The payoffs of such processes have been frequently reported: improved teamwork, less recycling and rework, improved success rates, earlier detection of failures, a better launch, and even shorter cycle times (by about 30 percent).

WHAT IS A STAGE-GATE PROCESS?

A stage-gate process is a *conceptual and operational road map* for moving a new-product project from idea to launch—a blueprint for managing the new-product process to improve effectiveness and efficiency. Stage-gate approaches break the innovation process into a predetermined set of stages, with each one consisting of a set of prescribed, cross-functional and parallel activities (see diagram below). At the entrance to each stage is a gate,

which serves as the quality control and Go/Kill checkpoint in the process.

THE STAGES

Stages are where the action occurs. The players on the project team undertake key tasks to gather information needed to advance the project to the next gate or decision point. Stages are cross-functional: There is no R&D or marketing stage. Rather, each stage consists of a set of parallel activities undertaken by people from different functional areas in the firm, working together as a team and led by a project team leader.

To manage risk via a stage-gate method, the parallel activities in a certain stage must be designed to gather vital information—technical, market, financial, operations—in order to drive down the technical and business risks. Each stage costs more than the preceding one, so that the game plan is based on incremental commitments. As uncertainties decrease, expenditures are allowed to mount and risk is managed.
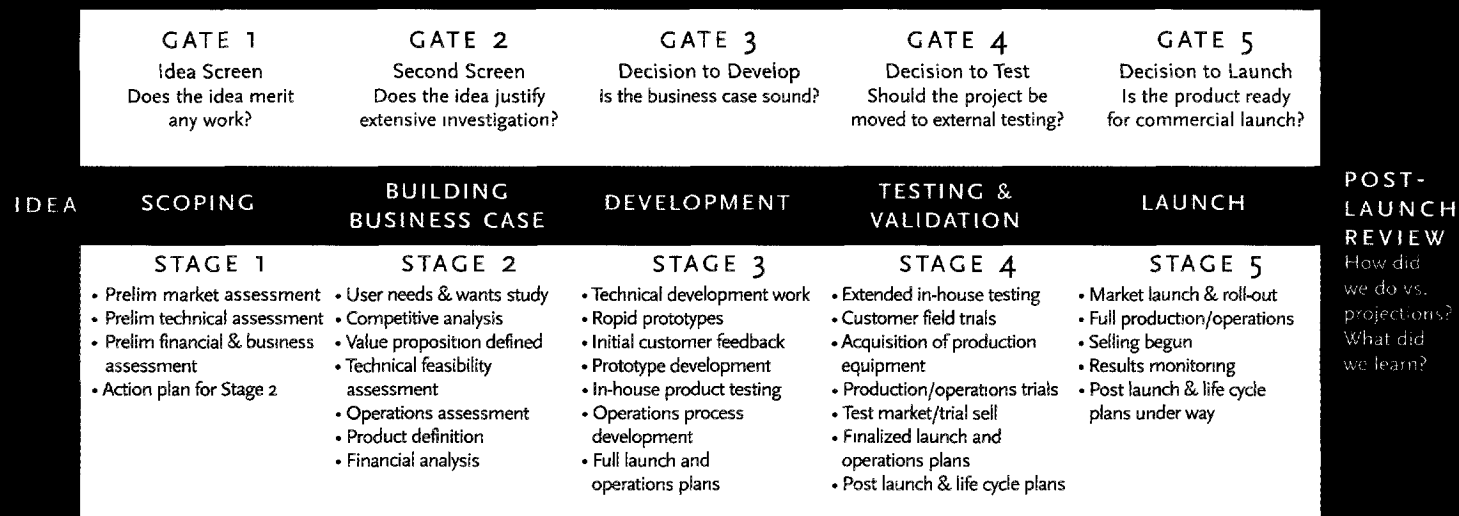
The diagram (below) shows the general flow of the typical, or *generic,* stage-gate process. Here, following idea generation, are the five key stages:

Stage 1 Scoping: a quick investigation and sculpting of the project.

Stage 2 Build the business case: the detailed homework and up-front investigation work leading to a business case; a defined product, a business justification and a detailed plan of action for the next stages.

Stage 3 Development: the actual design and development of the new product. Additionally, the manufacturing (or operations) process is mapped out, the marketing launch

FROM IDEA TO LAUNCH: A TYPICAL STAGE-GATE MODEL

GATE 1	GATE 2	GATE 3	GATE 4	GATE 5
Idea Screen	Second Screen	Decision to Develop	Decision to Test	Decision to Launch
Does the idea merit any work?	Does the idea justify extensive investigation?	Is the business case sound?	Should the project be moved to external testing?	Is the product ready for commercial launch?

IDEA	SCOPING	BUILDING BUSINESS CASE	DEVELOPMENT	TESTING & VALIDATION	LAUNCH	POST-LAUNCH REVIEW How did we do vs. projections? What did we learn?
	STAGE 1	**STAGE 2**	**STAGE 3**	**STAGE 4**	**STAGE 5**	
	• Prelim market assessment • Prelim technical assessment • Prelim financial & business assessment • Action plan for Stage 2	• User needs & wants study • Competitive analysis • Value proposition defined • Technical feasibility assessment • Operations assessment • Product definition • Financial analysis	• Technical development work • Rapid prototypes • Initial customer feedback • Prototype development • In-house product testing • Operations process development • Full launch and operations plans	• Extended in-house testing • Customer field trials • Acquisition of production equipment • Production/operations trials • Test market/trial sell • Finalized launch and operations plans • Post launch & life cycle plans	• Market launch & roll-out • Full production/operations • Selling begun • Results monitoring • Post launch & life cycle plans under way	

and operating plans are developed, and the test plans for the next stage are defined.

Stage 4 Testing & validation: the verification and validation of the proposed new product, its marketing and production. Stage 5 Launch: full commercialization of the product—the beginning of full production and commercial launch and selling.

At first glance, this overview portrays the stages as relatively simple steps in a logical process. But don't be fooled. What you see in the diagram (below) is only a high-level view of a generic process—a concept. In a real company process, drilling down into the details of each stage reveals a much more sophisticated and complex set of activities. Here you'll find a detailed list of activities in a stage, the how-tos of each activity, best practices that the team ought to consider, and even the required deliverables for each activity in that stage. In short, the drill-down provides a *detailed and operational road map* for the project team—everything it needs to know and do to successfully complete that stage of the process and project.

THE GATES

Preceding each stage is an entry gate or a Go/Kill decision point, shown in the diagram (right). Effective gates are central to the success of a fast-paced, new-product process:

- Gates serve as quality-control checkpoints: Is this project being executed in a quality fashion?
- Gates also serve as Go/Kill and prioritization decision points: Gates provide the funnels where mediocre projects are successively culled out.
- Finally, gates are where the path forward for the next stage is decided, along with resource commitments. Gate meetings are usually staffed by senior managers from different functions, who own the resources the project leader and team require for the next stage. These decision-makers are called "gatekeepers."

Gates have a common format:

- Deliverables: These are the *inputs* into the gate review—what the project leader and team deliver to the meeting. They are the results of the actions of the previous stage, and are based on a standard menu of deliverables for each gate.

GATES HAVE A COMMON FORMAT

DELIVERABLES → CRITERIA → OUTPUTS
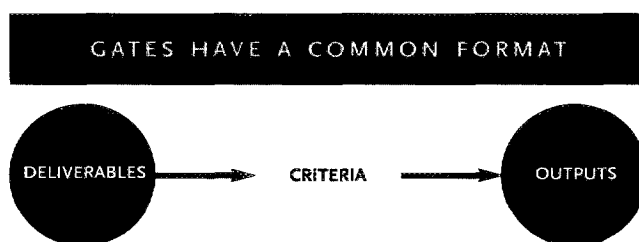
SAMPLE GATE 3 GO/KILL & PRIORITIZATION (SCORING) CRITERIA

1 STRATEGIC
- project aligns with the business's strategy
- strategic importance to the business

2 PRODUCT & COMPETITIVE ADVANTAGE
- offers unique benefits to users/customers
- meets customer needs better than competitive products
- provides excellent value for money to the customer

3 MARKET ATTRACTIVENESS
- market size
- market growth rate
- competitive situation

4 LEVERAGES CORE COMPETENCIES
- leverages our marketing, distribution & selling resources
- leverages our technological expertise & resources
- leverages our operations capabilities & facilities

5 TECHNICAL FEASIBILITY
- size of the technical gap (small)
- complexity of the project, technically (low)
- technical uncertainty of outcome (low)

6 RISK VS. RETURN
- expected profitability (NPV)
- percent return (IRR % or ROI %)
- payback period (years)
- certainty of estimates
- low cost and fast to do (low risk)

These questions are scored at the gate meeting (e.g., 1-5 or 0-10 point scales) and added to yield six Factor Scores, and added (weighted or unweighted) to yield the Project Score. This Project Score must pass a minimum hurdle for a Pass, and is also used to rank projects against each other.

- Criteria These are questions or metrics on which the project is judged in order to make the Go/Kill and prioritization decision.
- Outputs: These are the results of the gate review—a decision (Go/Kill/Hold/Recycle). An action plan is approved, and the date and deliverables for the next gate are agreed upon.

If your business does not have a systematic stage-gate process in place, or if your process is creaky or broken, the time is ripe for an overhaul. Those firms that have made the effort to design and implement such a process have reaped the benefits faster: They are more successful and enjoy more efficient product developments.

PICKING THE RIGHT PROJECTS —PORTFOLIO MANAGEMENT

The second way to win with a new product is to do the right projects—in short, project selection and portfolio management—which effectively complement a stage-gate process. Portfolio management deals with the vital question: How should the corporation most effectively invest its R&D and new-product resources? Much like a stock market portfolio manager, those senior executives who optimize their R&D investments—define the right new-product strategy for the firm, select winning new-product projects and achieve the ideal balance of projects—will win in the long run. ►
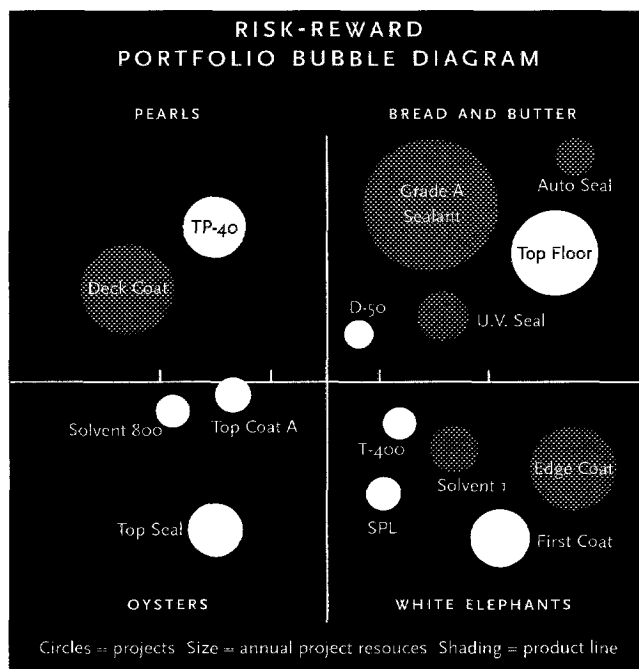
There are four goals in portfolio management:

a) Maximizing the value of the portfolio. The goal is to ensure that the total worth of new-product projects in the development pipeline yields maximum value to the corporation.

To achieve this goal, try to combine the use of a financial model with a scoring model. Many firms have elected commercially available *probabilistic financial models* (e.g., At Risk; Crystal Ball) to handle uncertain new-product projects. But as a recent study on portfolio management revealed, financial models typically yield *erroneous results*; when used as the dominant selection tool, they yield *inferior portfolios*. Thus, scoring models, where projects are rated and scored on qualitative criteria, are recommended: They yield efficient, effective decisions, according to the firms that use them (a sample scoring model is shown in the previous table).

b) Achieving the right balance of projects. "Don't put all your eggs in one basket" is a popular saying. Ideally, there is a balance between high-risk and low-risk, short-term versus long-term, genuine new products versus product improvements and extensions, and so on.

A popular portfolio model is the risk/return bubble diagram. Your portfolio of projects is plotted on two axes: the project's value (e.g., NPV, or net present value) on the horizontal axis, and its risk of probability on the vertical. The size of the bubbles shows the resources committed, so that at a glance, one can see where the money is being spent. Projects are classified as one of four types, each represented by a quadrant: pearls, oysters, bread and butter, and white elephants. An appropriate balance of projects is sought across the diagram and between risk and reward. Also, pie charts effectively reveal the breakdown of spending in your portfolio—across project types (new products, platform developments and improvements), markets and product categories.

c) Achieving a strategically aligned portfolio. Leading firms have defined a product innovation and technology strategy that will direct investments in R&D. A strategically aligned portfolio is one where *all the projects are on strategy*, and where the *spending breakdown mirrors the strategic priorities* of the business.

First, it is necessary to develop a product innovation and technology strategy—one that defines your business's new-product goals, the arenas of strategic thrust, and the spending splits (priorities) across these arenas. *Strategy begins when you start spending money!* Next, build strategic criteria into your project selection approaches (for example, in the scoring model example in the figure on page 59), so that all projects are "on strategy." Finally, ensure that spending splits by arena and by project type mirror the desired splits and strategy.

d) Resource balancing—the right number of projects. Most firms have far too many projects for the limited resources available. And the results are predictable: corners get cut, quality of execution suffers, projects underperform and take too long to get to market. An ideal portfolio sees the correct balance of projects—resource demands with resources available.

Monitor the demand-versus-supply of people resources—what people are available and what people commitments you have made across all projects in the pipeline. Some project management software (Microsoft Project and Primavera) enables one to look for resource bottlenecks, matching resource availability with demand.

THE PATH FORWARD

Product innovation is a vital task for the modern corporation. Your success with new products may well decide the fate of your business. If you lack a systematic new-product process, or if portfolio management for new products is a foreign concept, then now is the time to act. Put together a task force and challenge it to design an effective stage-gate road map from idea to launch. And while they're at it, ask them to develop and implement an effective portfolio management system. The effort is significant—it may take a year or so of hard work. But those firms that have successfully implemented stage-gate and portfolio management methods for product innovation are reaping the benefits ▓

RISK-REWARD
PORTFOLIO BUBBLE DIAGRAM

PEARLS | BREAD AND BUTTER

TP-40
Deck Coat
Grade A Sealant
Auto Seal
Top Floor
D-50
U.V. Seal

OYSTERS | WHITE ELEPHANTS

Solvent 800
Top Coat A
Top Seal
T-400
Solvent 1
SPL
Edge Coat
First Coat

Circles = projects   Size = annual project resources   Shading = product line