Optimizing the Stage-Gate Process: What Best-Practice Companies Do—I

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Leading companies are replacing the traditional ideation stage with a proactive "discovery stage," as well as finding ways to harness fundamental research more effectively.

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OVERVIEW: *Now that most companies have implemented a systematic new product process to drive projects from idea to launch, the best-practice companies are improving their processes to make them both faster and more effective. With breakthrough ideas and home-run projects in short supply, some companies are adding a Discovery stage to the front end of the process in order to generate better ideas. Activities in this new stage include: building in an idea capture and handling system; doing voice of customer research work, including "camping out" with customers and working with innovative users; generating scenarios; and holding major revenue-generating events. Best-practice companies are also harnessing fundamental research more effectively by implementing a novel stage-gate approach.*

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Most product developers have installed new product processes by now, according to a study of the best practices by the Product Development & Management Association (*1*). Consequently, the question arises: what's next—what is the next set of best practices that can be applied to the conception, development and launching of new products?

The PDMA found that nearly 60 percent of the firms it surveyed use some form of Stage-Gate™ process for new product development (*2*). These firms, the study concluded, "are more likely to have moved from simpler Stage-Gate processes to more sophisticated facilitated or third-generation processes. . . .".

But other than third-generation processes, which incorporate flexibility, focus, fluid stages, fuzzy gates, and facilitation (*3*), what else are leading firms doing to enhance the effectiveness of their new product process? This two-part article reports our observations and experiences in working with more than 500 companies, and on some of the new practices they have incorporated into their new product processes. These include:

1. Adding a Discovery stage at the front end of the process to generate breakthrough product ideas.

2. Harnessing fundamental research more effectively.

3. Improving project selection and becoming more discriminating in the projects undertaken. This translates into incorporating more effective Go/Kill decision points ("tough gates") and moving toward portfolio management.

The first two practices are covered below; the third is discussed in Part II, forthcoming in *Research z Technology Management.*

After a decade of development focused on product extensions and "quick hits," the quest for the super-idea—the "home-run," breakthrough idea or major innovation—has become a vital management issue. A good new

product idea can make or break a project; indeed, ideas are the feedstock to the new product process. But don't expect a well-oiled new product process to make up for a shortage of quality ideas. If an idea is mundane to start with, don't count on your process turning it into a star!

What some companies are doing is replacing the traditional "light bulb" or ideation stage with a much more proactive "Discovery Stage," as in Figure 1. Here are some of the actions that take place in this new stage:

Idea Capture and Handling

Ideas are everywhere, inside and outside of the company. The trouble is, they often lie fallow; no decisions are made on them, and no actions are taken. Leading companies, such as Guinness Breweries, establish a proactive idea capture and handling scheme, as shown in Figure 2. Here's how it works (*4*):

n Ideas are fed to a focal person (normally the new product process manager) who then carries the ideas to Gate 1 for an initial screening. Note that there is *only one* on–ramp to the process—all new product and product improvement ideas go via this route. The only exception is "free time" or scouting projects, in which the employee uses his/her own free time to advance the idea (in such a case, install a self-managed Gate 1 at which the employee does his/her own initial screen).

n Gate 1, the Idea Screen, consists of a small, cross-functional group of mid-level managers who meet

bimonthly or monthly to review the ideas. Ideas are evaluated on a scorecard consisting of visible criteria (typically Yes/No and 0–10 scaled questions).

n If an idea is rejected, as most are, the idea submitter receives written feedback—how the proposed idea fared on the Gate 1 criteria and why. Feedback is important to ensure a steady stream of ideas from would-be idea generators.

n If the Gate 1 decision is a Go, the gatekeepers nominate a small cross-functional team—perhaps two or three people—to move the idea into the preliminary stage, Scoping. Obviously, the Gate 1 gatekeepers must have authority to approve these resources on the spot.

n Ideas classified Kill or Hold are stored in an idea vault or bank. This precludes losing good ideas whose time has not yet arrived, or that might need more gestation time and work.

n Others in the company have access to these ideas-in-the-vault via an on-line bulletin-board format; that is, employees can see the ideas, and even make suggestions for improvement.

n Periodically the process manager scans ideas in the vault. Where an idea has been augmented, s/he brings the idea to the Gate 1 review for a second hearing.

Such a scheme has proven effective in managing the front end of the new product process. It ensures that all ideas receive a hearing; that ideas are evaluated consis-
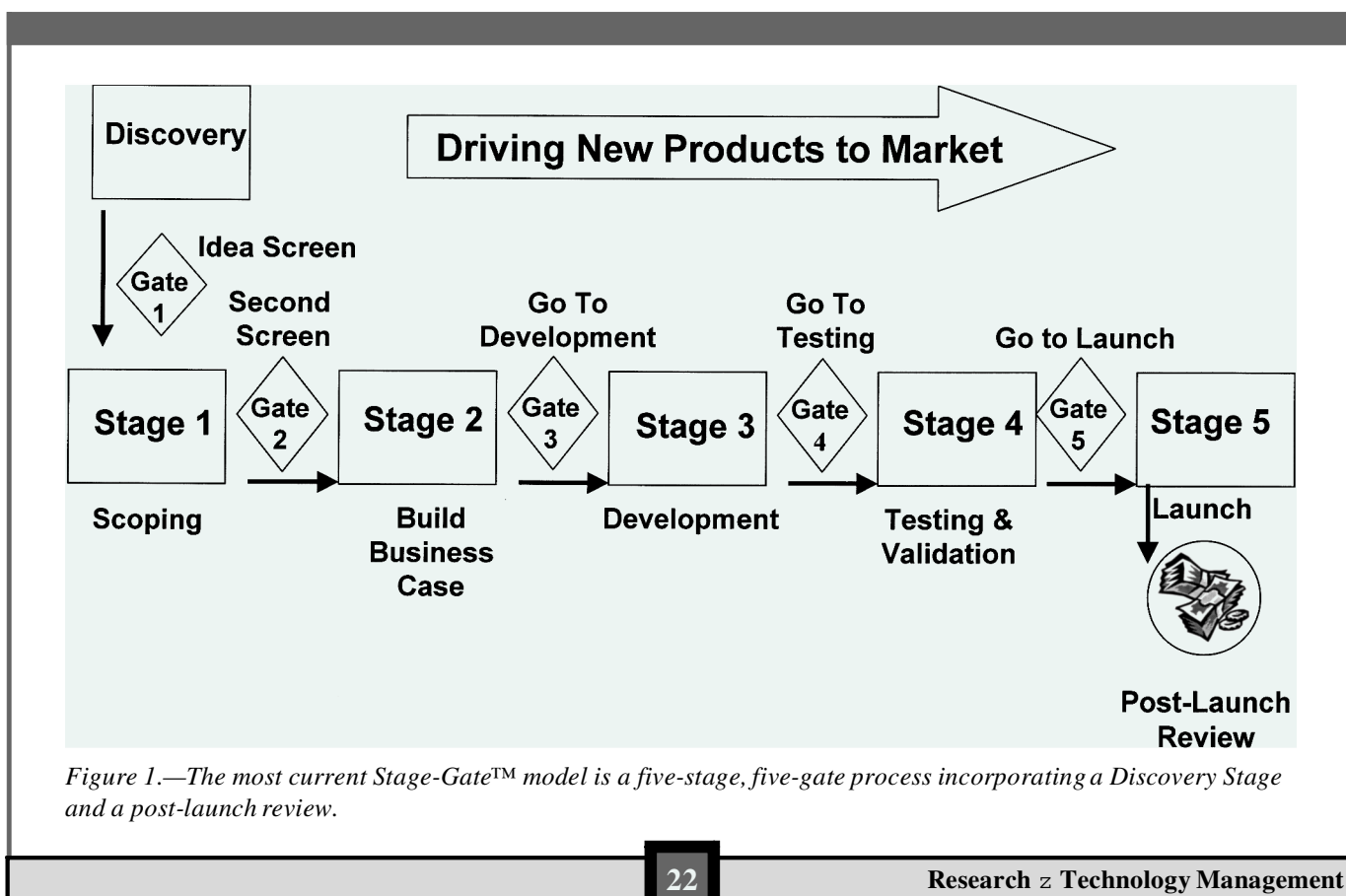

Figure 1.—The most current Stage-Gate™ model is a five-stage, five-gate process incorporating a Discovery Stage and a post-launch review.

tently, objectively, and in a timely manner; that the poor ideas are culled out fast and that the good ones receive resources and action; that idea submitters receive feedback; and that inactive ideas are not lost forever. IT support is clearly necessary, not only for managing the idea vault but also to permit electronic submission of ideas, electronic scoring of ideas at Gate 1, and electronic feedback of the decision.

Voice of Customer Research

Your customer probably has your next new product idea! Building Voice of Customer (VoC) work into your new Discovery Stage helps to identify customers' problems, unmet needs and even unarticulated needs. There is no standard methodology here, but the research usually involves working closely with customers, listening to their problems, and understanding their business or operation and its workflow.

Big ideas are solutions that solve big problems. Thus, one way to begin is by focusing on your customer's problems. As one CTO of a major U.S. corporation declared, "I employ some of the best engineers and scientists in the world . . . there's hardly a technical problem we throw at them that they cannot solve. The trouble is . . . three-quarters of them are working on the wrong problems!" He was referring to the tendency among technical people to jump to a technical solution before truly understanding the customer problem.

When interviewing your customers, don't simply ask them to indicate what new products or new features, functionality and performance they want—you will invariably get the obvious answers. Customers are constrained by their inability to think beyond current expe-

rience and practice. Instead, ask, "What's bugging you? What are your problems?" Most people have a long list of real and imagined complaints when it comes to almost any product or service category.

One technique is reverse brainstorming, when a customer group rips apart the current solution or product, identifying all that's wrong with it. Developing a problem inventory list, and clustering the major problem themes, provides the ammunition needed for initiating a creative problem solving session.

Camping Out with Your Customers

An anthropological style of research is used by many companies, such as Hewlett-Packard and Fluke Corporation (instruments), to uncover unmet needs and new product opportunities. Called "camping out," "fly on the wall" or "day-in-the-life-of" research (the formal term is *ethno-graphic* research), it involves spending time with your customers—observing them use and abuse your products, walking in their shoes, and experiencing their frustrations—in short, almost living with them. And this means the entire project team—engineers and scientists too—not just the sales and marketing folks. The point is: If you want to study gorillas, running a few focus groups, speaking with a few salespeople, and conducting a handful of interviews probably won't be enough. You must buy a tent and move onto their site—camp out with them!

Fluke, in Seattle, Washington and noted for its innovative hand-held measurement instruments, established a Phoenix team whose mandate was to deliver a superior product in a market outside of the firm's normal scope, namely in the chemical industry. Fly-on-the-wall
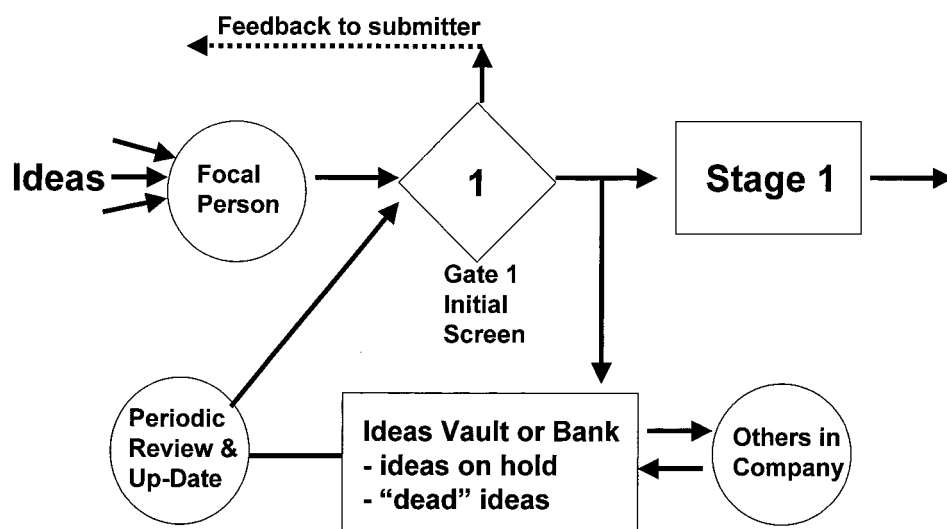

Figure 2.—Best-practice companies build an idea capture-and-handling system into the Discovery Stage.

research—site visits to control rooms in chemical plants by the entire team—was used to uncover the breakthrough. After some 25 visits, the project team acquired a good understanding of the instrument engineer's problems and needs. One problem observed was the quantity of equipment engineers had to carry to the plant merely to calibrate common instruments, such as pressure or temperature gauges. Every gauge and brand needed a different calibration instrument. Second, observation revealed that after the engineer had calibrated the gauge, he took a number of readings, recorded them on a clip-board, and later typed into his computer—a time-consuming process!

As a result, the Phoenix team's new product became:

n A universal calibration instrument, able to calibrate any gauge in the plant (made possible by replacing hardware with software in the hand-held device);

n An instrument that recorded the readings in the field; the user simply keyed in readings, which went into the device's memory, and down-loaded them directly into his computer after returning to the control room.

Fluke's Documenting Process Calibrator product line has become a great success, another testimony to really understanding customer needs, and to designing a superior product in response to those needs.

Working With Lead Customers

Work with average customers and you will get average ideas. But, if you identify and work closely with a select group of *innovative* or *lead users,* then you can expect much more innovative new products. It's an approach that Eric Von Hippel of MIT pioneered years ago, and has recently gained prominence at 3M as a key tool for uncovering innovative new product ideas (*5*). European firms, such as Hilti (concrete drills and fasteners), have used the approach for years.

Von Hippel's research reveals that many commercially important products are initially thought of, and even prototyped by, users rather than manufacturers. He also found that such products tend to be developed by "lead users"—companies, organizations or individuals that are well ahead of market trends and even have needs that go far beyond the average user. The trick is to track down lead users, who are, by definition, rare—the righthand tail of the distribution curve.

The lead user process has four main steps (*6*):

1. Laying the foundation—identifying the target market and company goals for innovations in this market.

2. Determining the trends by talking to people who have a broad view of emerging technologies and leading edge applications.

3. Identifying lead users—a networking and referral process.

4. Developing the breakthroughs by hosting a workshop with lead users and key in-house technical and marketing people.

In Step 4, participants work in small groups, then as a whole, to define innovative product concepts.

The Value of Scenarios

One of the most significant strategic decisions in recent years was made when AT&T reportedly turned down a free offer to take control of the Internet (*7*). In the late 1980s, according to this account, the National Science Foundation (U.S. government) wanted to withdraw from its role of administering the Internet, and offered AT&T a free monopoly position. But AT&T had a mental map of the future—namely, a scenario or picture of the future where its centrally switched technology would remain dominant. The notion of a packet-switched technology (what Internet uses) would never work. The technical experts at AT&T concluded that the Internet was insignificant for telephony and had no commercial significance in any other context.

What AT&T should have done was to develop *alternative scenarios of the future.* By all means, develop the scenario of the "official" or expected future—in AT&T's case, with centrally switched architecture remaining dominant. But develop an alternative scenario too, in this case one in which new markets for Internet services and new kinds of telephony challenge the dominant AT&T architecture. Such a scenario would, at a minimum, have given decision-makers a sense of the Internet's potential, and might have led them to consider different courses of action.

Developing alternative scenarios also helps decision-makers become much more *sensitive to signals of change.* "What has not been foreseen is unlikely to be seen in time" (*7*). For example, AT&T executives, by defining the alternative scenario, might have been more alert when increasing numbers of users began to go on the web, when web-pages began to mushroom, and when PC sales to home users grew exponentially in the early 1990s.

Developing alternative scenarios of the future usually involves senior people taking part in extensive discussions and work sessions. Because your purpose is to arrive at new product opportunities, restrict the discussion to scenarios that are relevant to the business, and deal with the external (or extended market) environment. Questions to work on include:

• What is the best future scenario?

• What is the worst possible scenario? What other scenarios might occur?

• What are some relevant dimensions that characterize these scenarios (for example, "centralized versus decentralized switching" in AT&T's case).

Then identify the *primary decisions* that managers face. For example: What types of new products should you be seriously looking at? Should you invest in a new technology or technology platform? Scenarios are utilized by imagining that one or another "future scenario" will be true, and assessing the consequences of making each decision, assuming each alternate future. Finally, markers or signals of each scenario occurring should be identified, so that managers can spot telltale signs over the next months or years as to which way the world is moving.

Harnessing the Entire Organization's Creativity

An MRG (*major revenue generator*) event is an off-site company event designed to produce or outline at least several MRGs at the end of a few days' tough work. The principle is that your own people, including senior people, often have the seeds of great new products within them. By harnessing the creative energy of the entire group, unexpected outcomes often result. An MRG event is a way to stimulate creativity but in a structured fashion.

An annual off-site company conference of senior and middle people is the venue. The goal by the end of Day 2 or 3 is to define 2–5 major revenue generating opportunities. Participants are assigned to teams, and teams are given assignments in rounds:

Round 1: Identify the major trends, shifts, changing customer needs, and potential disruptions taking place in your marketplace. Be sure to challenge teams to answer the key question: Do these shifts suggest any major new opportunities? After the team breakout session, teams report back.

Round 2: Identify the major technology shifts in the customer's industry that will impact the market and might change the way you do business.

Other rounds deal with similar topics, including an assessment of internal company strengths and core competencies, and shifts in the industry and value chain structure.

Next, the challenge shifts from identification to *opportunity mapping;* that is, the teams map out opportunities that their assessments have suggested. This usually involves clustering the many new opportunity suggestions into major opportunity themes.

Overnight, the event organizers work feverishly to cluster and collapse these many opportunity themes into a manageable subset of major opportunities. One major bank used "concept generators"—professional artists who translated the verbiage into line-drawings, sketches and even prototype brochures. The next morning, these major opportunities are displayed on large placards around the conference room.

Give your research lab more direction by introducing a stage-and-gate process for science projects.

Now for the hard work: translating some of these major themes into actionable new product ideas. Attendees vote with their feet—they go to the cluster they wish to work on. These self-selected "opportunity teams" are the work groups for the final session of the MRG event. Each opportunity team fleshes the opportunity out further, starts to shape the product or solution, and then maps a tentative forward plan.

Omnova Solutions (formerly GenCorp) of Akron, Ohio stumbled across a new technology via fundamental research that has become the platform for a number of new products. The new technology gives traditional polymers an extremely slippery surface; yet unlike other slippery materials, the resulting polymer retains its usual positive physical properties (e.g., abrasion resistance and toughness).

The technology probably would have remained buried somewhere deep within the corporation had it not been for an MRG event. In one of the breakout team rounds, a junior chemist asked "What about the PolyFox research project?," referring to company research being funded by the U.S. Navy. The technology was surfaced and became one of the "possibilities" identified at the event. By Day 2, a number of possible applications of this "slippery technology" were defined—ranging from graffiti-proof desk tops to stain-resistant textiles—and it was singled out as one of the blockbuster opportunities that emanated from the conference. A venture team was assembled immediately and the first products were being launched at the time of this writing: Memerase™, a dry-erasable wall covering designed for meeting room walls.

Although an MRG event costs money and time, the rewards are worth it. The result is usually 4–5 major opportunities identified and partially defined, a core of enthused people willing to work on each, and the beginnings of an action plan.

More Productive Fundamental Research

Recent years have witnessed the dismantling of many corporate central research laboratories. In many businesses, fundamental research is no longer fashionable and corporate scientists have been parceled out to the business units. The results are predictable: the research has shifted to a much shorter-term focus, and now industry leaders complain that there is nothing great coming down the pipe!

If your corporation still does fundamental research, be sure to engage this unit in the Discovery stage of your new product process. Fundamental research often plants the seeds for a great new product, product family or platform. The success rates may not be as high as for smaller, less venturesome, projects undertaken within business units, but the payoffs can be enormous.

The trouble is that much fundamental research is *undirected, unfocused and unproductive,* which is why so many CEOs have shut it down. If fundamental research is not yielding the breakthrough projects it should, then consider introducing a little stage-gate discipline here as well. Some scientists may scream their disapproval, but remind them that this is not a university where curiosity-based research is the rule—this is a business. Other scientists will welcome the opportunity to become more engaged in value-producing research for the corporation.

To provide more direction and focus to your fundamental research lab, introduce the concept of a *stage-and-gate process for science projects.* For example, Exxon Chemical has modified its excellent Product Innovation Process to accommodate industrial fundamental research projects (*8*).

The nature of a Stage-Gate process for technology developments or science projects is different from a standard product-oriented process, with much more experimentation allowed. We call the process StageGate-TD, for *technology developments:* projects where the immediate deliverable is *not* a new product or new manufacturing process but is new knowledge or a capability that may ultimately spawn new products or processes. The model in Figure 3 is a composite example of a technology development process for science projects (taken from a number of leading firms). Note that there are only two stages and three gates. And Gate 3—the Application Path gate—may be combined with Gates 1, 2 or 3 in the standard new product process at the bottom of Figure 3, so that the two processes are merged or overlapped. Figure 4 shows the same two-stage TD model, but with the high-level activities listed.

The gate criteria in StageGate-TD are much less financial and more strategic in nature than for the standard new product process. For example, Toray Chemical in Japan
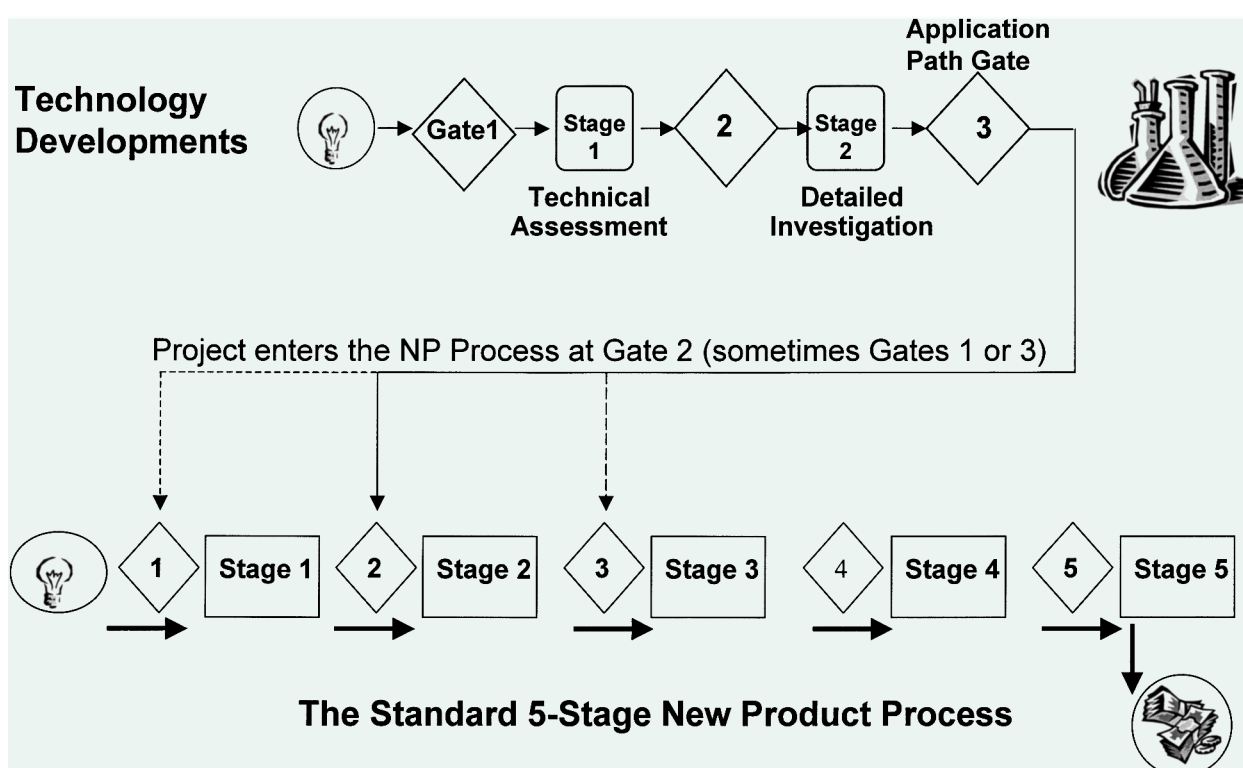

Figure 3.—A number of leading firms have designed a technology development process for their research projects and linked it to their standard new product process.
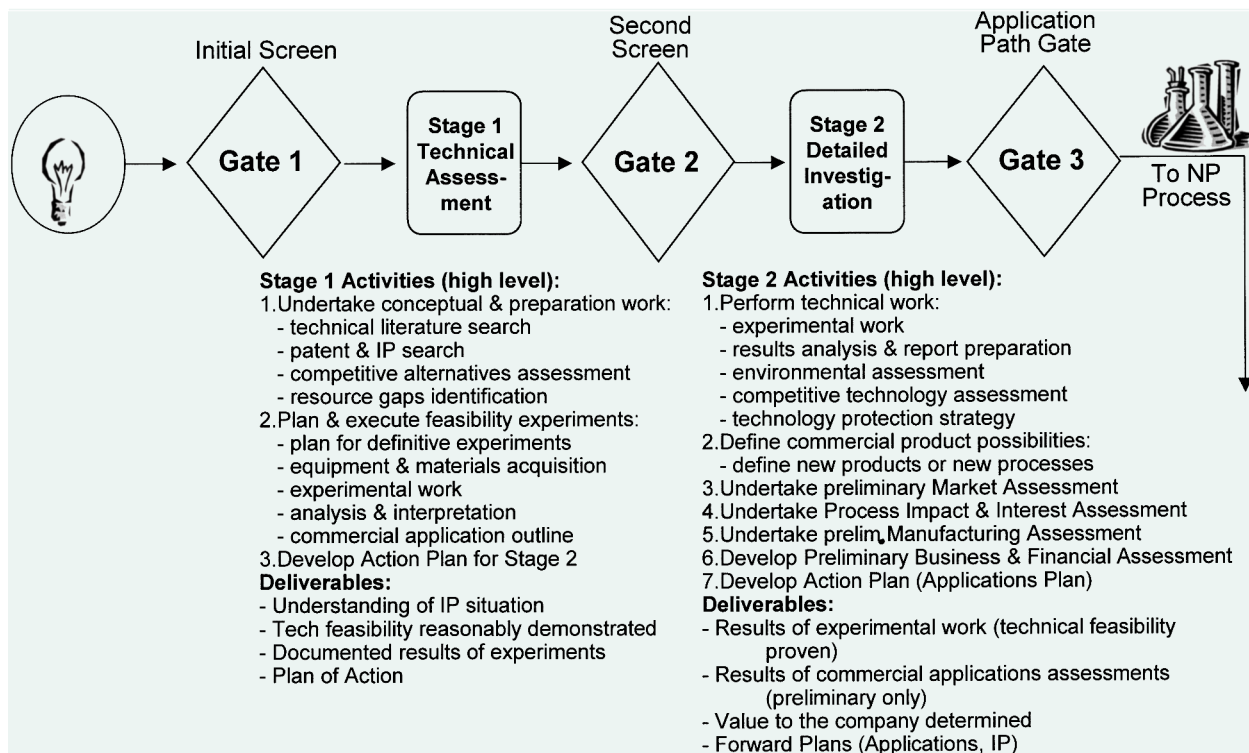
Figure 4.—*Specific activities take place at each stage in the technology development process.*

(developers of breakthroughs such as micro-fiber and ultra-suede fabrics) uses the following rating criteria for judging its technology development projects:

• Degree of strategic fit and strategic importance to the corporation.

• Ability to achieve strategic leverage (e.g., platform for growth, impact on multiple business units).

• Potential for reward (value to the company, if successful).

• Likelihood of technical feasibility.

• Likelihood of commercial success (e.g., competitive advantage, existence of in-house competencies).

If fundamental research, science projects or technology developments are undertaken in your business, try introducing a stage-and-gate process similar to that in Figure 4 in order to provide a little more direction and focus. But note that the process—its stages, gates, activities and gate criteria—will differ substantially from your new product process. Don't try to force-fit these science projects through your normal Stage-Gate process!

To Be Continued

Part 2, forthcoming in *RTM,* describes more ways that leading firms are improving their Stage-Gate processes, i.e., making gates more effective. ℂ

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