Starting a new business is essentially an experiment. Implicit in the experiment are a number of hypotheses (commonly called assumptions) that can be tested only by experience. The entrepreneur launches the enterprise and works to establish it while simultaneously validating or invalidating the assumptions. Because some will be dead wrong and others partially wrong, an important goal of the business plan must be to continually produce and build on new knowledge. Managers must justify moving to each new stage or milestone in the plan on the basis of information learned in the previous stage.

Learning in an evolutionary way is valuable not only for venture managers but also for investors, senior corporate managers, and directors. It can help them make informed decisions about whether to fund each stage, as indications of the business's potential unfold. They can use our milestone approach to measure management performance by examining what has been learned and how effectively the venture planners have modified plans to respond to new information—rather than use projections versus performance as the measure.

Milestone planning is hardly new. Traditionally, though, such forethought relies on predetermined dates set for reviews or project completions. The problem with date milestones is that they are totally unreliable for new ventures. Therefore, we suggest that managers make financing decisions instead as events are completed, using what they have just learned to make go, no-go, or redirection decisions. Obviously, new enterprises may need some deadlines and constraints. For instance, a recent proposal for a health and indoor tennis center included a completion date that would allow the club to open for the coming winter season. Every milestone was linked to meeting this deadline.

For most ventures, however, significant events—not dates—should determine milestones. The only hard dates in the plan should be externally imposed, for example, by factors like contract agreements or competitive pressures.

This approach to milestone planning has three advantages for enterprises:

1. It helps avoid costly mistiming errors.
2. It gives logical and practical milestones for learning and for reevaluating the entire venture.
3. It offers a methodology for "replanning" based on a growing body of ever harder information.

Writing the plan

To give an event milestone maximum learning value, the business plan must define the event's completion so that managers can test any assumptions they make. For example, a plan would not read:

"Milestone—completion of product development."
A better, more specific statement would be:

"Milestone completion of product development. Completion of a prototype machine that costs no more than $150,000; that can be manufactured for a direct cost of $12,000; that can produce 40 widgets per minute at 30 cents per widget; that the FCC will approve; and that high school graduates can operate with three days of training."

As planners reach each milestone, they can compare results with the detailed specifications to ascertain whether their original assumptions still hold. Then they can use their experience to make decisions about the next steps.

As an example, suppose you are managing the project we have just described and you learn after completion of product development that the assumptions appear well founded except that the direct cost will be $30,000 instead of $12,000. You know that you need to find out how you can change the price. Is there still a market at another price? Do you continue the project, redirect it, or abort it? How does the new target market differ from the one you originally projected? Does the prototype have any other features negative or positive you had not anticipated? How will you go about changing your plan? What will the changes teach you?

Few entrepreneurs use such planning for their new ventures, explicitly mapping out a sequence of events. More common are the horrifying consequences of not planning thoroughly: the attendant mistimings, heightened cash-flow burn rates, and the accumulation of losses.

Obviously, all enterprises are different, and while every event in a product’s history can teach something, our experience suggests several important milestones that are likely to be most significant. We describe them in this article, and for each important event, we ask appropriate questions and offer lessons based on actual cases.

**Milestone 1—Completion of Concept and Product Testing**

This stage has a very low cost relative to future steps and precedes complete product development; indeed, it often comes before any product development at all. This phase’s purpose is to determine whether to proceed with any further development. At this point, planners consider whether a real market need exists for the product as they have conceived it or the model they have developed, or whether it has a potentially fatal flaw. At this milestone, entrepreneurs may have discovered a different opportunity as the result of testing their original concept and changing it.

The concept testing challenges assumptions made about desired product characteristics, target markets, pricing range, and perception of need. Planners need to ask themselves the following questions:

- Have we confirmed that an opportunity exists with sufficient upside gain to warrant the necessary risks and costs?
- What has this test taught us that modifies our assumptions and therefore, possibly, product development objectives and target markets?
- Concept and product model testing are probably the least expensive ways of avoiding costly failure if planners link product development decisions to results. While some actual product development, production, and test marketing may appear cheap enough to warrant eliminating this stage, it has tremendous value as a safeguard against self-delusion and as a source of alternative opportunity identification in every situation.
- For example, long before starting development work, entrepreneurs in a word processor venture in the 1970s identified through interviews with potential users highly desirable characteristics for the processor. They then looked at important target markets with special programming needs in law firms and government agencies. Long before they initiated expensive microprogramming efforts, the founders radically revised the initial product concept, based on the research results, to be a software product rather than a combined hardware-software product.

**Milestone 2—Completion of Prototype**

Entrepreneurs can obtain much useful information from carefully analyzing prototype development. They must look carefully at what caused roadblocks and disappointments and how they overcame them; the seeds of significant, hidden opportunities lie in the creative solutions to these frustrations.

For example, the software programmer in one venture to develop a specialized, interactive information retrieval service eventually had to work out some radically new programming procedures to overcome a serious data-searching bottleneck. When the entrepreneurs looked for lessons in the situation, they realized they had an important invention on their hands. They are now patenting it. The invention’s profit potential is ten times greater than that of the original business, and developed at a fraction of the cost.

To apply lessons from prototype completion, entrepreneurs must answer the following questions:

- What assumptions did we make about development time and costs and how have they changed? Why?
- What impact have those changes had on our plans and timing with respect to new hires, plant construction, marketing, and so forth?
- How do they affect financial needs and timing?
- What have we learned about labor, material, and equipment availability and costs and how does this affect our pricing plans?
- Do our observations and assumptions about our target markets still hold? If not, how have they changed, and how will the changes affect our plans—objectives, timing, and resource utilization—for each succeeding event?
- Do the product’s characteristics fit with the original concept and plan? Does this create any new opportunities? How should we modify our actions as a consequence?
- Are our assumptions regarding significant competitors and customers valid?
petitive product characteristics still valid?

How should we revise our investment requirements?

Are our projections about important suppliers and service distributors still valid?

If planners expect product development time to be lengthy, they may find it useful to divide development activities into milestones for review.

**Milestone 3 – first financing**

Whether the first outside financing is for seed money to test the concept’s potential, start-up financing for product development and market testing, or first-stage financing to initiate manufacturing or sales, the entrepreneur must understand how investors perceive the venture.

Businesses must compete in the capital as well as product markets to survive. Entrepreneurs should view securing financing as an opportunity to learn about their ventures’ acceptable financial and expense structure in view of the highly competitive financial market.

For example, a publisher seeking funds for a new magazine soon learned that investors objected to her plan because she had budgeted for the purchase of a large piece of capital equipment. In a revised plan, she budgeted for leasing the equipment at conventional rates; once again she encountered resistance. Eventually, she persuaded a supplier to lend her the equipment for the first nine months of operations. This favorable assist to cash-flow projections, along with her determination, enabled her to secure the funding she needed. What was important in this case was that she treated each rejection as an opportunity to ask why the plan had been turned down, and she learned what investors considered to be an acceptable financial structure.

**Milestone 4 – Completion of initial plant tests (or pilot operation for a service venture)**

Entrepreneurs should use pilot operations to challenge or change their assumptions and to produce information about the following:

- Material suitability and costs
- Processing costs and skills
- Investment prerequisites
- Training needs for production personnel, reject percentages and costs, and quality control requirements
- Material uniformity from suppliers
- Processing specifications, run time, and maintenance
- Early data about these factors will improve performance and cost estimates during full-scale operations. In one case, entrepreneurs who were pilot testing a new process to be licensed for the manufacture of a frozen food product aimed at the traditional market for such products—the food service market—discovered that the product was physically more durable than anyone had thought it would be. By making a point of asking themselves what new opportunity this difference created, the founders identified the possibility of consumer marketing. Because the product was robust enough, they could automatically produce it in small packages and give it high product visibility—something that had never been achieved before in this product category. The planners had assumed that the new product, like the old, would be fragile and would require exorbitantly expensive manual packaging. Company executives revised the marketing plan to include consumer as well as food service marketing.

Fortunately, the executives had also decided not to enter any licensing agreements until they had learned all they could from the pilot studies. Now they could raise projected royalties without potential clients accusing them of reneging on prior agreements.

**Milestone 5 – market testing**

The first truly demanding challenges of the venture’s basic mar-
ket assumptions occur at this milestone. The questions managers ask themselves now are:

Have customers demonstrated that they'll buy the product? Why are they buying it? Why are they not buying it?

Is it really different from and superior to the competition?

Are the pricing assumptions still valid, considering emerging information about costs?

Does the product perform well in varying field applications? Where do the problems lie and why?

How should we modify estimates of achievable market share and size and target markets?

Are our servicing requirements assumptions accurate?

What impact does this information have on plans and timing?

A group of people who had developed a new electronic device for amateur band musicians decided they could build a worthwhile small business. The first step was to produce a few hundred units for market testing. The entrepreneurs decided to make no commitment to fixed costs until they had learned from market tests at what volumes the product would sell. So they subcontracted all tasks and proceeded to test market with virtually no overhead. Test market results showed the business potential to be marginal, and the inventors dropped the project with a negligible loss.

Milestone 6—production start-up

The first successful production run tests the revised assumptions generated from pilot operations. The first runs are likely to reveal a host of problems that need solving. Most important, project planners will learn the true costs of producing a steady flow of the product and of meeting the quality requirements. Unfortunately, entrepreneurs consistently miscalculate the time this process takes and its impact on the timing for future events—especially plans for expanding the marketing effort and financing requirements.

Selling and making delivery commitments in anticipation of plant production can lead to extreme pressure to get the product out. Attempting to squeeze product out of a plant that is running into start-up problems can result in compromises in product quality along with production at enormous rejection rates, both of which give rise to customer dissatisfaction and waste huge amounts of resources. This vicious circle can destroy a new venture.

In the start-up of a baked food business, a new plant scaled up from a pilot operation ran into quality problems from trying to produce too much too soon. Because the owners had already made significant delivery commitments to customers, many of whom had in turn employed sales forces to sell the product, the new business found itself operating at full scale with rejects at 20 times the planned level. The owners needed months to solve the problems and years to recover from the losses.

Planners can best manage production start-ups by making up a separate critical-path milestone plan for them and by providing for inventory accumulation before shipments begin.

Milestone 7—bellwether sale

In the industrial market, this is the first substantial sale to an expected major account. In the consumer business, this is the first important sale to a significant distributor. Achieving this sale is likely to give the new business a big push forward; failure to achieve it can become a stumbling block to sales growth. Entrepreneurs learn the following from this milestone:

- How their product compares with the competition in the real world rather than on a limited test basis.
- Whether the product is functional.
- Whether to continue or alter the initial selling method.
- Information about service requirements on a continuing basis.
- Additional data regarding quality controls and specifications.

Milestone 8—first competitive action

It's obviously impossible for entrepreneurs to know in advance how competitors will respond to a new product or service. It is possible, however, to plan alternative responses to possible moves and study these moves to learn what rivals' true competitive position is.

Consider the case of an instrument company that in early 1984 developed a highly innovative microprocessor-based device. Its entire marketing campaign depended on how close a significant competitor was to coming out with an equivalent product. The top executives reasoned that if the competitor were close, the response to the new product would be to cut the prices of its existing products to reduce inventories. On the other hand, the competitor would likely first attempt to defend share by increasing its sales promotion, advertising, and other marketing efforts if it weren't ready with a similar new product. When the competition did not cut prices, the instrument company moved aggressively into the market and by late 1984 it still had the market to itself.

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In another instance, a leading travel wholesaler introduced a series of tours to the Middle East but hoped to discourage its biggest competitor's standard follow-the-leader reaction. The wholesaler deliberately held off from its largest advertising and promotion activities until the competitor acted. The wholesaler figured that if the competitor entered the market in a tentative manner by offering only one or two tours, that would signify only half-hearted commitment. If it entered on a grander scale, it meant business. When the competitor offered only one tour, the wholesaler responded with a blockbuster marketing campaign, which appears to have scared the competition off permanently.

Milestone 9—first redesign or redirection

Entrepreneurs may discover at any point on the milestone path a need to redesign the product or alter the target market. This redirection may recast prospects for the entire venture or, at the other extreme, create whole new areas of opportunity by defining follow-on product or market needs. At this point, entrepreneurs learn the differences between what they have offered and what the market needs.

The redesign or redirection decision is a time for reexamining all the basic assumptions concerning market size, segments, investment requirements, pricing, and financing [both needs and availability]. A dramatic example is the design and marketing of Apple Computer's Lisa to combat the IBM PC with enhanced features and capability. Although greatly admired for its technical aspects, Lisa sales lagged, and Apple discontinued it. The company did notice, however, a potential market in the personal computer arena for many of Lisa's features. Apple incorporated several of them into its Macintosh at a much lower price and reached a mass market.

Another case involves Thermo-Fax, which failed when 3M introduced it for researchers in copying library documents. The company redesigned the product for the office market and it became highly profitable.

[Continued on page 196]
Milestone 10—first significant price change

New venture planners must base all their pro forma activities on assumptions regarding prices, costs, and competition, but the true value of a product or service is difficult to know until the company launches it in a competitive environment. Changes in competition, technology, and costs may force a large price revision, which, because of its direct effect on the bottom line, can make this milestone the most important in determining whether to abandon a project or redirect it. Entrepreneurs need to ask themselves at this stage:

- Will the price change be permanent or temporary?
- Is the business viable if this change is permanent?
- If not, what can we do to restructure fixed and variable costs to make it viable?
- Can we isolate the price change to a particular market segment?

In one case, the managers of an electronics business wanted to supply digital switching gear to the telecommunications field, but they encountered strong price resistance from telecommunications companies when they offered the equipment for sale as a unit. The price assumptions had been wrong because an insufficient incentive existed for replacing the existing product. Management offered to install the equipment and charge on a per usage basis but still had no success. Their price assumptions were still wrong because the new charge would be too high for the companies’ clients. Finally, management unbundled the services and offered standard switching at a low per usage cost for the direct customers and specialized switching options (such as automatic disaster or other emergency signals) for the customers’ clients on a monthly rental basis. This approach succeeded.

Milestones, milestones, or tombstones?

Milestone reviews are pointless unless managers use them for making decisions. The decisions help planners determine what they can do to ensure success or reduce the cost of failure.

Each new venture has its own set of milestones. Descriptions of these important events should include a statement of the significant questions that managers need to ask to test their assumptions at each stage. Such a design forces planners to learn as well as to replan on the basis of what they have learned. The milestone approach satisfies the dual need for planning and flexibility and makes obvious the hazards of neglecting linkages between certain events.

Decision choices at each milestone are not limited to either pouring more money in to make the highly improbable occur or aborting the project altogether. Equally feasible possibilities include slowing down, speeding up, trying something to learn more, redirecting, changing scale, or postponing or resequencing certain actions. The point is that milestone planning takes entrepreneurs at the lowest possible cost to the next important stage, where they can make informed decisions rather than blunder along adhering to a fixed plan that out of ignorance they have based on faulty projections.

In summary, we recommend that new venture managers adopt the following procedure when developing a business plan:

1. Identify the most important events or actions that must occur to achieve your objectives.
2. Determine which events are prerequisites to others, that is, the necessary sequential links between events.
3. Develop a critical-path milestone chart that graphically displays the sequence.
4. Identify the significant assumptions on which the venture’s success depends.
5. Ask if an event on the milestone chart will test each assumption.

If not, design such a step and insert it. Specify what information will replace the assumption and how you will obtain it.

As each event occurs and replaces assumptions with information, review the planned future events. Where necessary, change their sequence and nature. Evaluate the business based on evolving and changing projections. Ask yourself along the way: Do the upside gain, downside risk, and feasibility assessment still justify moving ahead?

Establish a review schedule that relates to event completion as well as time factors. Evaluate performance based on what you have learned and what you can apply.

Rather than argue about whether results met projections, design financing rewards—and resource allocations and rewards—based on the results achieved.

Elsewhere in HBR

In the Getting Things Done feature, Benson P. Shapiro analyzes implementation aspects of the marketing mix concept in his article, “Rejuvenating the Marketing Mix.” And the challenge of integrating purchasing departments into the process of new product development is examined by David N. Burt and William R. Soukup in “Purchasing’s Role in New Product Development.”

In a Special Report, Sumer C. Aggarwal analyzes the sometimes confusing assortment of manufacturing systems designed to improve production efficiency; his article is “MRP, JIT, OPT, FMS?” And Jeffrey G. Miller and Thomas E. Vollmann evaluate the striking impact of overhead manufacturing costs in their article, “The Hidden Factory.”
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