Business tools for technology transfer

Apply these guidelines for best communication between technology and business fields

J. B. Ayers, CGR Management Consultants, Playa del Rey, California

Introducing new products is becoming less a technical process left to the product R&D department. Currently, there is an increasing focus on marketing, finance and operations. Also, many technical employees lack business skills; this usually leads to communication barriers between technology and business arenas. The author presents useful business tools that can help bridge this gap. Value is thus added as company distribution, production and marketing costs are more accurately planned.

Product development. The new products arena is as much about marketing, finance and operations as it is about developing a new technology or upgrading an existing platform. Of course, if someone is inventing the breakthrough "mousetrap," the world will beat a path to his or her door. But if not, success may depend on how early and how well that individual tackles business issues.

There is much material written about the impact of design on the subsequent costs of production. The common theme is that much of the cost of a product or service is "built in" when that product or service is designed. After introduction to the market, the organization loses much of its control over the cost. Unfortunately, many of these same organizations fail to address costs adequately in the early stages of product development. Often, the focus is on solving the technical problems associated with the product. This is not necessarily bad, except when neglect of business needs jeopardizes the long-term returns from the project.

The consequence is that the product is launched and then runs into profitability problems. Perhaps at least part of this could have been avoided with better planning. The advent of competition on the supply chain level makes planning even more important. Product development literature describes many ways to reduce costs at the point where they are the most controllable—that is, at the design stage. Typical examples include the following:

- *Increased cooperation between designers and producers.* In manufacturing companies, this takes the form of "concurrent engineering" or joint product development teams. Here, the teams work together to shorten product development lead-time and cut costs. The teams are not just engineering groups any more but also include marketing, procurement, manufacturing and distribution.
- *Design for manufacturing analysis.* In companies making discreet part products, design teams use analytical tools to reduce the number of parts in the product and make assembly processes faster and cheaper. Similar opportunities, no doubt, exist in process and other industries.

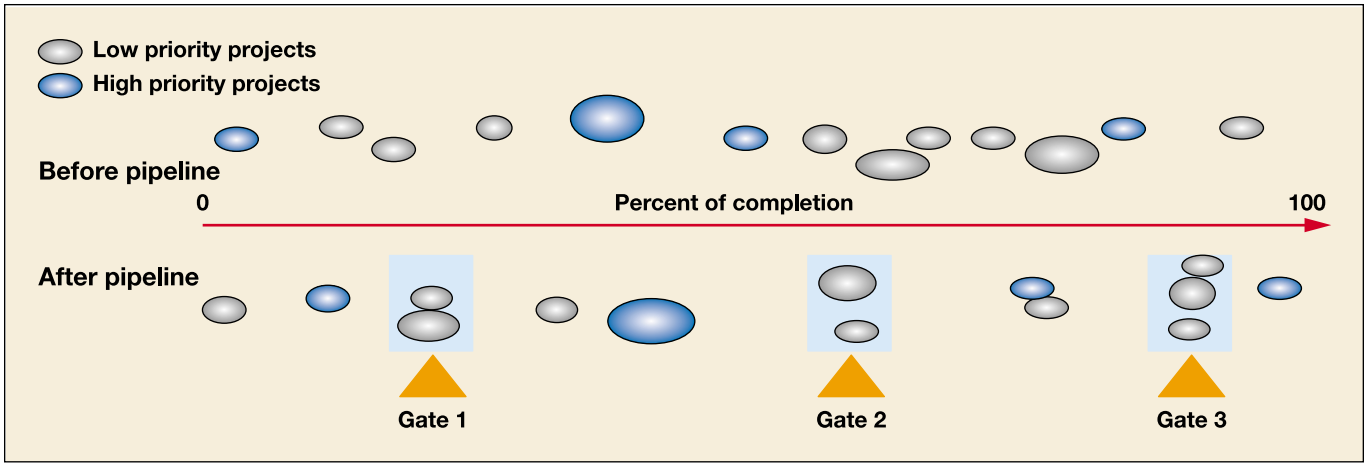

Fig. 1. Schematic for business tools for technology transfer.

Table 1. A generic stage/gate model

Stage or gate	Supply chain deliverables
Ideation: developing product concepts	
Gate 1. Initial screen	Determine what technologies need to be employed to successfully produce the product. List needed supply chain changes. Assess whether the existing supply chain is appropriate for the product or process.
Stage 1: Preliminary investigation	
Gate 2. Second screen	Find sources for required technologies; estimate the resources needed for their development. Forecast product margins. Decide whether innovative or functional product. List requirements for a new supply chain if it's needed. Identify supply chain partners to be involved in development process.
Stage 2: Detailed investigation (business case)	
Gate 3. Decision on business case	Assess technology risks. Perform conceptual design of new supply chain (if applicable). Prepare first cut, discovery-driven planning model.
Stage 3: Development	
Gate 4. Post-development review	Prepare detailed work plan for implementing supply review chain requirements.
Stage 4: Testing and validation	
Gate 5. Precommercialization business analysis	Test early discovery-driven planning assumptions.
Stage 5: Full production and launch	
Post-implementation review	Measure performance against assumptions.

• *Early supplier involvement.* Designers bring their suppliers aboard early to ensure an adequate supply of high-quality, often custom-designed components.

• *Measure new product cash flow.* Many major companies measure how long it takes for new products to break even. The focus on a financial return increases the visibility and focuses developers' attention on the importance of meeting cost and revenue business goals.[1]

These approaches have great value for both the individual company and supply chain application. There are two tools that will find particular value for product developers who focus on the issues surrounding supply chain management; so we have selected these for more in-depth description here.

Discovery-driven planning. This tool sets up a set of economic assumptions concurrently with the introduction of a new product. The tool is described in an article in the *Harvard Business Review*.[2] It gains its name by virtue of the process involved, and it is especially applicable in cases where there are no existing supply chains for products. It can also work to establish initial assumptions regarding technology and its expected application. If the product is to be introduced into an existing, mature supply chain, there is little need for the approach. But if this is not the case, then discovery-driven planning should play a role in introducing the product.

In essence, planners establish assumptions about the costs, revenues and profits of a new venture. In this process, they must make forecasts about the structure and performance of the supply chain, including elements within and external to the company. They then set milestones for the implementation process. At these milestones, they measure actual results against the assumptions. The outcome is anticipated in planning and then "discovered" through this process. Contingency plans should be at the ready to react to the realities as they unfold.

Discovery-driven planning can also apply to the technical aspects of the project—in addition to the business aspects. The process requires four documents: a reverse income statement; pro forma operations specifications; a checklist of key assumptions; and a planning chart that shows significant milestones. It is in the preparation of operations specifications that the technique has particular application to supply chain management. Here, planners must elucidate their assumptions regarding distribution, production and marketing costs. The following steps briefly describe the process.

► *Step 1: Prepare a reverse income statement.* This is a financial plan for the product. It's "reverse" because one starts with the desired profit from the product or product line under development. Based on this goal, the planner works in reverse to complete the income statement. The income statement establishes what level of sales and costs are needed to ensure the product's viability. It starts with "required profits." This forces planners to work backward, to the required costs and revenues, to meet the profit objective. In doing this, they arrive at needed costs for manufacture, materials and distribution.

An important assumption in this process will be whether the product is functional or innovative. The reverse income statement should reflect this belief about the new product. If the product is innovative, the planning approach should also estimate the market mediation costs. These are the costs that arise from mismatches between supply and demand. For example, shortages cause loss of contribution from sales—one type of market mediation cost. Overstocking can lead to product markdowns—another cost.

► *Step 2: Lay out pro forma functional activity specifications.* With the financial statement, one has to determine the operational performance needed to fulfill financial goals. This requires defining the supply chain activities needed to run the venture or introduce the

A gate, according to the source stated, has inputs, decision criteria and outputs. The deliverables are developed in the previous stage. This approach can complement other tools like discovery-driven planning. One such deliverable could be updated assumptions using that technique. The gate design should specify deliverables for each gate along the product development path. The gate design should also include criteria for decisions regarding whether the project will proceed, be canceled, or be held back until resources are available.

In this instance, the gate decision has two parts. The first part decides whether the project is sound or not. This is performed as if the project is the only one under consideration. Soundness encompasses the product technology, the process technology and the business case. Assuming the project is sound, the second part decides the project's priority. This requires an evaluation of resources and priorities to determine if the project should proceed.

A generic stage/gate model with five stages and gates is offered. This model is shown in Table 1 to illustrate the application. The shaded rows are stages; the unshaded rows are gates. For each gate, there is a brief description of supply chain deliverables that might be appropriate at that gate.

The recommended process described in the table calls for early consideration of needed supply chain changes, as well as required technology. The initial assessment at Gate 1 is whether a supply chain change is needed at all. At Gate 2, developers should know what type of product it is in the case of a new product situation. At this point, candidate partners should be identified. The business case at Gate 3 should produce a discovery-driven plan that requires documentation of supply chain assumptions.

LITERATURE CITED

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James B. Ayers *is a principal with CGR Management Consultants, Los Angeles, California, e-mail: jimayers@cgrmc.com. He has consulted in strategy and operations improvement for 28 years, including projects addressing processes for product and process development. He has authored numerous articles and has presented workshops on product and process development. He is finishing a book titled* Handbook of Supply Chain Management *to be published mid-year 2000 by St. Lucie Press. Jim holds a BS, with distinction, from the U.S. Naval Academy, and MBA and MS Industrial Engineering from Stanford University. He held partner-level positions with Theodore Barry & Associates, Coopers & Lybrand and Ingersoll Engineer. As a Naval officer, he served on nuclear submarines. Jim is a member of the Society of Manufacturing Engineers and Council of Logistics Management. He is a certified management consultant (CMC) by the Institute of Management Consultants.*