Transferring Technology Successfully

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A successful technology transfer assessment is a business process that assesses technology within the context of a business, not within the context of technology.

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The technology transfer process begins when a company specifies a technology it would like to have, and it ends with successfully bringing the new technology to market. Whenever and wherever an "acquiring" company finds technology, it must go through an assessment process to see whether the technology is worthy of investment. Unfortunately, many companies often end up with poor opportunities for investment because they compromise evaluations through the use of inappropriate or poorly defined criteria, inexperienced evaluators, and inadequate work processes. Obviously, if the assessment is faulty, it does not matter if you complete the process successfully—the end result will be unsuccessful.

Companies should try to model their technology assessment process after the one venture capitalists use to analyze potential deals that begin as technologies or even as mere ideas. But to set up a dedicated group and make it a true "new venture" office is resource-consuming, and requires extensive education in the methodology venture capitalists use to conduct analysis. Most companies cannot afford the cost of establishing such an office or of training personnel given the normal corporate turnover. There is, however, a simplified analog of the venture capital model that companies can follow without much specialized training.

PLACES TO FIND TECHNOLOGY

There are many sources for potential new technologies. Within a company, new product ideas come from R&D, as well as from marketing and other employees. Many more ideas come from outside the company, from customers, suppliers, individual inventors, and commercial and government laboratories. Most large companies have designated a point of contact to handle communications with those who submit ideas and to route the ideas.

Most smaller and mid-sized companies are in more of a "react" mode, accepting ideas in a haphazard fashion.

Unfortunately, most companies, even large ones, do not have teams designated to assess new ideas. Some companies have an individual assigned to do a first-pass read of the proposal, but this is usually merely to route it to the department that has a good technical understanding of the idea. The resulting review is likely to encompass only the technological issues. Individuals reviewing ideas usually have no formal training in business analysis and are often only barely conversant with the company's strategy.

Successful technology transfer requires a process; an orderly series of activities performed by people with appropriate skills, knowledge, and information about company strategy. And a successful technology transfer assessment process is a business process that assesses technology within the context of a business, not within the context of technology. (The process is sometimes called screening and evaluation rather than assessment.)

Within our simple venture-capitalist analog process are four steps: sorting; screening; evaluating; and management review of the potential technology to determine if the technology is appropriate to the company's long-term strategy.

This generic technology transfer assessment is a framework that each company must customize for its business culture, and even for each situation. Successful technology transfer does not come about simply by instituting a process, but rather by tailoring the process to be compatible with the cultures of the two organizations involved in the transfer; be they the R&D and marketing arms of a single company, or two separate business entities.

Some argue that the culture issue is evident only in transfer of technology from company to company or lab to company. However, it is increasingly evident that the cultures of research and development, product commercialization, and business management within a company are also often very different, and possibly even incompatible. Therefore, a selection and transfer process that is sensitive to cultural differences is imperative, even if the potential technologies are all coming from an internal R&D group.

Most companies, even large ones, do not have teams designated to assess new technology ideas.

CONSTANT IDEA FLOW ENHANCES CHANCE OF SUCCESS

Another important point to realize, before the actual construction of a screening and evaluation process, is that volume increases the chances of selecting a successful idea. Often, companies believe that "deal flow" must be small, in order to give each and every idea the time required to do an extensive analysis. However, experience shows that a large and constant flow of ideas, combined with a staged approach to analyzing those ideas where many are discarded as soon as possible, using broad criteria, and where each of the three stages—sort, screen, evaluate—serves to "narrow the funnel" is better for moving truly good and commercially potential ideas into position for in-depth analysis.

The probability of finding a truly worthwhile technology increases proportionately with the size of the deal flow. Many investors have lost substantial sums of money by accepting a business offer without considering any others. The often-heard expression "the deal of a lifetime" is often the result of not having other potential deals for comparison. Moreover, large deal flows force companies to realize that they cannot expend substantial resources on looking at each one in depth. If one uses the venture capitalist model, it is imperative that those examining potential technologies be judicious with expense of resources examining deals. This forces a first-level "gut reaction" type of sort, rather than a detailed analysis at the first level of the assessment.

THE ASSESSMENT PROCESS

At the outset, it is important to realize that technology assessment is an art, not a science. Because it's an art, experience counts for a lot. Companies should maintain a team of technology prospect

evaluators, rather than creating ad-hoc groups to assess various sets of proposals.

Growth, revitalization, and replacement of fading business lines require companies to "pull" new technology into the system, while those who have the technology (the R&D lab, the potential joint venture partner or licenser or seller) are trying to push technology into your system. There are more technology orphans than there are appropriate homes for them; companies must look for technologies that are more than merely cute but rather fit with the company's strategy.

This thought process involves two tricks of the trade:

1. Look at the potential piece of technology in the context of a business system. It might be the basis for a new business. Keeping this in mind, one can begin by asking what difference this idea will make.
2. At each step of the assessment process, simulate the viability of the enterprise.

Remember, experience shows that many technology initiatives fail because companies adopt them on the basis of faulty assessment. It is the right technology for the wrong company, or it was not proven and could not be made to work, or any one of a host of other reasons. Applying the discipline of an appropriate and well-defined process for sorting, screening, and evaluating technology for potential transfer, within the context of the particular company's culture, can reduce technology transfer failures by at least half and probably close to 80 percent.

THE CASE: A LACK OF PROCESS

MedEx (not the company's real name) is a global company best known for its innovation and leadership in small medical orthopedic products. The company has revenues of about $200 million; 40 percent of revenues come from its US. operations; 20 percent from Asia; 25 percent from Europe, and 15 percent from Latin America.

The company has three strategic business units, linked by core competencies and applications that focus on bio-mechanical functions and reconstructive applications through the use of various materials. The company has considerable capabilities in processing, forming, and manufacturing techniques for difficult-to-work-with materials such as ceramics and titanium.

You should maintain a team of technology prospect evaluators, rather than creating ad-hoc groups.

In a typical year, the company receives approximately 300 proposals for R&D programs, new products to develop, and new technologies to move from R&D to production or to buy in from outside. These proposals come from customers, academic institutions, research centers, and companies, as well as from individuals and groups within the company.

Company executives believe that in any year fully 75 percent of proposals have no value. About 2 to 3 percent, they estimate, have significant value to the company in terms of new business or technical know-how. The other 22 to 23 percent have marginal value; often what the company calls "customer relations" value, in that they are requests from customers for materials valued at $2,000 to $5,000 on which the customer can conduct clinical experimentation.

It's important to note that company officials' estimate of the percentage of projects that have real value is exactly the rate at which venture capitalists fund proposals, two to three out of 100.

Proposals come into the company through any number of avenues, usually through the individual with whom the proposer has the most contact. They are then rerouted, often numerous times, until they end up with the research committee, which acts on proposals on a monthly "rolling" basis. Feedback to the proposer is haphazard, because the individual within MedEx who initially received the proposal often hands it off into a "black hole."

The rolling nature of the research committee's work means that if the company commits money early in the year to projects, more worthy projects that enter the pipeline later in the year often go unfunded. In addition, some proposals are short-

stopped and funded by one of the company's SBUs without going to the research committee. All in all, this makes for a haphazard process of determining which technology to transfer from outside the company or from the company's R&D to its product line. Decisions are made absent any long-term strategic basis.

THE SOLUTION

MedEx is probably like many, if not most companies, which often end up evaluating technology for transfer, either internally or from outside sources, by a host of competing concerns, few of which have to do with the company's explicit strategic intent and strategic goals.

Here are a few simple guidelines to increase the probability of finding and selecting a worthwhile idea for investment:

1. Consider ideas in a "batch" mode rather than individually. This enables the assessor to use the batch approach to have an implicit competition among the ideas. This batching can be monthly, bimonthly, or at least quarterly. In order to avoid funding too many ideas too early in the budget year only to leave good ideas on the table for lack of funding later, divide the budget for technology transfer evenly into the number of initial sorting and screening cycles.
2. Accompany each submission with a more formal "business plan/proposal."
3. The company should have an established protocol for evaluators to use in assessing the business opportunity or technology. Ideally, there should be a team that assesses all ideas and business prospects. The team would refine its skills as it does more assessments. The team could call in experts in particular technologies to work on a "consulting basis" rather than turning over the assessment itself to a technical expert, who may not have a firm foundation in the company's business strategy.

To keep focused on the key objectives of this new business assessment process, ask three questions at each step of the process:

1. Do we want to do it?
2. Can we do it? (Do we have the technical capabilities?)
3. Should we do it? (Do we have the economic wherewithal to do it, and do it right? Do market conditions justify such spending?)

Table 1. Assessment Activity

	Do we want to do it? (Strategic Compatibility)	Can we do it? (Technical Feasibility)	Should we do it? (Economic Feasibility)
Sort	Preliminary Judgment		
	Route		
Screen	Considered Opinion		
	Preliminary Plan		
Evaluate	Formal Analysis		
	Definition Phase/Design Plan		
Management Review	Formal Review & Approval		

Table 1 shows the three steps—sorting, screening and evaluating—as well as the overarching questions.

Before looking at the three analytical steps in a little more detail, it's important to understand who should be on the team that carries out this three-stage analysis and how to choose them.

The new business/technology assessment team should include non-technical business people. These people must be high enough in the organization to be intimately involved in the strategy development, and high enough that the CEO and his or her direct management team respects them.

The team can bring in technical expertise on an as-needed basis, after conducting the initial sort, in order to provide a considered, informed opinion at the screening stage. The team can bring in additional technical expertise for the more detailed evaluation.

It's important to remember that, throughout, the decision must be a business decision as to the appropriateness of the technology to the business, not merely a decision as to whether the technology is feasible or potentially profitable.

Sort. The "sort" results in a binary decision, yes or no. Sorting answers a basic question: Should we be interested?

A short review of the material that matches key criteria as conditions for continuing the assessment can answer this question. The criteria for accepting any idea as a candidate for further consideration should be easy to answer.

Table 2 shows the level of detail that the three key questions should go into. Clearly, this is a management decision, not a technical decision. You can see by the way the questions are posed at this stage that if there is too much emphasis on the specifics of the technology, the group can get bogged down at this stage of the process.

A single individual could make the decisions and rely on a second opinion for a few cases. In this way, a well-managed sorting effort undertaken by a small team should be able to go through all of the ideas submitted on a quarterly basis within a couple of days, choosing no more than 15 to 20 percent of ideas that will go to the second level, the screening.

Screen. This is the stage where the experts weigh in for the first time, adding their perspective to the three questions: Do we, can we, should we. In addition to technical expertise, which provides expert pronouncement on technical feasibility and whether the technology supports implementing strategy and/or solves a problem, financial expertise provides a first-order-of-magnitude financial analysis of cost and benefit, and whether the project will satisfy the company's hurdle rate or threshold.

The evaluator reads the "prospectus" to elicit the high points that would commend the idea for further consideration. In this phase, information extracted usually concerns product features and uniqueness, market characteristics, projected revenues, and required investment. The screening should whittle away about half of the proposals that made it through the sort, in a day or two for each one.

The key question to move on from here is: Should we make an in-depth evaluation? Table 3 shows the level of detail to undertake in this phase of the analysis.

Evaluate. The evaluation phase is the comprehensive analysis, where you define critical success factors, work out cost and revenue estimates to determine ROI and other metrics, and estimate resource requirements. It is also the point at which the key term—risk—enters into the equation. Table 4 shows all of the detailed questions under the three main headings.

Table 2. Sort (Preliminary Judgment)

Do we want to do it? (Strategic Compatibility)	Judgment: Strategic Fit and/or Problem Solution
Can we do it? (Technical Feasibility)	Judgment: Doable?
Should we do it? (Economic Feasibility)	Judgment: Appropriate Cost/Benefits?

Table 3. Screen (Considered Opinion)

Do we want to do it? (Strategic Compatibility)	Expert Prounouncement: • Implements Strategy and/or • Solves Problem
Can we do it? (Technical Feasibility)	Expert Pronouncement: Technically Feasible
Should we do it? (Economic Feasibility)	Initial Estimate: • Cost • Benefits vs. Threshold

SOME RULES OF THE ROAD FOR THE EVALUATIVE PROCESS

Once you've set up the process, you are more than 50 percent of the way to choosing appropriate technology to transfer from either your internal R&D organization or from outside organizations. Still, there are some rules of the road to follow when undertaking the activities encompassed within the analytical process. These include:

1. Sort every potential technology twice, in order to eliminate bias from a particular individual who did the initial screening.
2. Validate the data. Too often people think anything written is right, but independent data validation, first using a "sniff test" of common

Table 4. Evaluate (Formal Analysis)

Do we want to do it? **(Strategic Compatibility)**	**Define & Test Success Factors:** • Consistent with Strategy • Expands Market • Maintains Leadership • Improves Competitive Position • Solves Problems
Can we do it? **(Technical Feasibility)**	**Define:** • Resources Required/Availability • Resource Quantities • Schedule • Risk
Should we do it? **(Economic Feasibility)**	• Is Definition Complete • Project Revenues • Estimate Costs • Calculate Cost-Benefits e.g. ROI vs Threshold

sense, then actually crunching a few numbers, can find flaws in the reasoning of those who are trying to push the technology.

3. Finally, if you uncover a weak point, probe it as much as necessary to get a satisfactory answer. If you can find no satisfactory answer, determine if the weak point is a deal breaker. More than likely, it is.

It's important to keep in mind when undertaking the process a couple of laws of data analysis: (1) The quality and quantity of data are worse the further away the market reality is; and (2) not all criteria are equally applicable to all technologies at all phases of their development.

Remember, keep the perspective of a sophisticated outside investor, regardless of the idea's source. Unfortunately, the further the evaluator is from the source and control of the money, the less likely that person is to ask the hard questions independent, private venture capitalists ask. Implicit in this entire discussion is the concept of opportunity costs—what else could you do with the funds and what would the return on those alternative investments be?

A proper system of sorting, screening, and evaluating uses ever-finer criteria to narrow the funnel through which ideas and technology go before they fall onto the plate of those within the company who will commercialize the technology. The process must be integrated, customized to the company's culture and organization, and have management commitment if it is to function effectively and efficiently in arriving at conclusive results. ●

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