

Complex Strategies for Rich Technology Platforms

ADVANCED ORGANIZER

SUSTAINABLE COMPETITIVE
ADVANTAGE

ECONOMIC BARRIERS IN
TECHNOLOGY PARTITIONING

STRATEGIC PLAN

CONCLUSION

Advanced Organizer

In Chapter 3, the concept of the commercialization strategy was introduced and suggestions made regarding how to develop a sound strategy for bringing a product to market. When a company has a rich technology platform, an additional dilemma arises. Specifically, when many product options are possible:

- ▶ Where should the small firm focus its limited resources?
- ▶ What type of commercialization strategy(ies) should it pursue?
- ▶ With whom should it partner?
- ▶ How should it decide what constitutes a good deal?
- ▶ How can the firm grow rapidly and still remain intact?

The answer to these questions lies in maintaining the company's *sustainable competitive advantage*. By the end of this chapter, the reader should be prepared to develop a strategic plan that addresses the commercialization of a rich technology platform.

Sustainable Competitive Advantage

To grow and flourish, a company must have a sustainable competitive advantage—that is, an advantage that will give the company staying power over the long haul. The types of things which provide a company with such an advantage include:

- ▶ Intellectual property: patents, trade secrets, copyrights, trademarks
- ▶ The uniqueness of the technology and the limited number of people who have expertise in this area (hopefully, many of them are employed by the company)
- ▶ Cost of entry
- ▶ Strategic allies and champions
- ▶ Marketing and sales capabilities, access to distribution networks, and the quality of the work done
- ▶ The company's record with respect to selecting successful new products or technologies, as well as its ability to keep to development timelines

In developing an ATP proposal, submitters are asked to identify multiple applications. The challenge in the post-award period is to make those possibilities a reality.

This chapter focuses on how to assess the possible applications of a rich technology platform and on how to combine this assessment with decisions and actions which will assure that your company is appropriately developing those aspects of sustainable competitive advantage associated with its particular technology.

FIGURE 4-1: WHEN A RICH TECHNOLOGY PLATFORM AFFECTS MULTIPLE INDUSTRIES

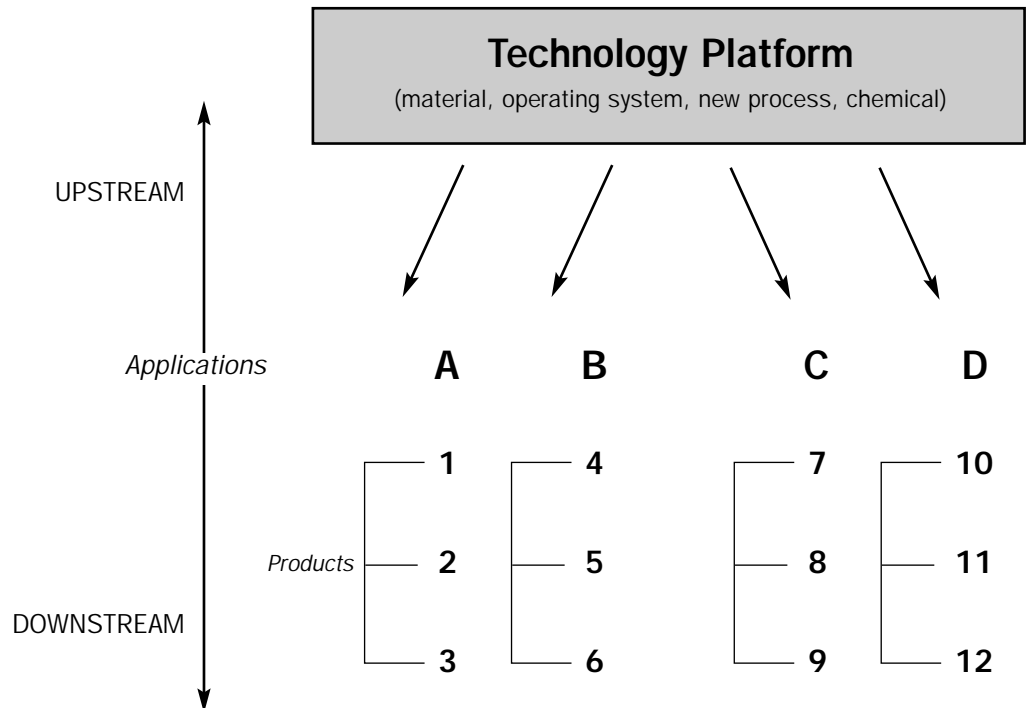


Figure 4-1 depicts the possibilities presented by a rich technology platform, such as a new composite material. The properties of the material make it ideal for use in a wide variety of applications as diverse as leisure (golf clubs) and spacecraft (shielding). The dilemma for the small firm is how to effectively exploit all these possibilities. The answer is that a small company can't—on its own. Limitations of time, money, and resources make it infeasible for most companies, large or small, to fully exploit all the possibilities presented by a revolutionary technology. In such situations, a company must consider implementing a constellation of strategies, and decide which application it will pursue on its own and which it will pursue in combination with others. Figure 4-2 is a shorthand way of representing which strategies to consider. Such considerations are made as a function of the number of possible applications to be pursued and the amount of financial resources required to exploit them.

FIGURE 4 - 2: FINANCING OPTIONS AS A FUNCTION OF APPLICATIONS AND RESOURCES REQUIRED

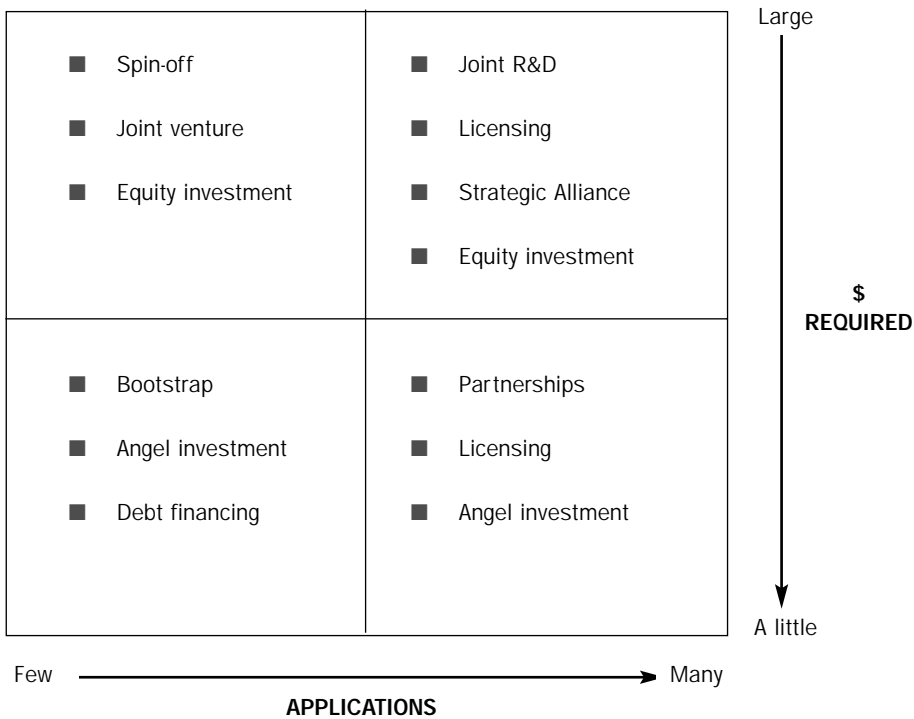


Figure 4-2 represents financing options to consider as a function of the number of applications for the technology, as well as the perceived financial resources required. For example, if a technology has few applications and requires limited resources for successful commercialization, the firm should be able to realize this opportunity on its own, by bootstrapping. However, even with limited applications, if significant funding is required, one should consider seeking direct investment in the company, a joint venture, or a spin-off. If the technology has many possible applications, then one should consider a wider range of strategies, involving a larger universe of potential partners.

Most new technology entrepreneurs don't have a good basis for knowing how much money it takes to bring a product to market, so it is important that this figure be examined. For example, "The R&D costs to generate and maintain the technology required for each new chemical entity is now greater than \$100 million and increasing. ...To maintain the 10% pace of investment, each new chemical entity would have to generate, on the average, \$1 billion in sales over its lifetime, assuming no inflation." This is obviously not a task a small company can tackle on its own.

The implications are very clear. A company should assess whether it or other entities can best exploit various options. For example, if it truly won't take a

lot of money to complete production and bring the product to market, the small company may be the best candidate to do it. However, as the amount of money required and the number of possible applications increase, the universe of commercialization strategies to consider also expands.

When trying to determine the constellation of strategies to pursue, you should simultaneously consider three issues:

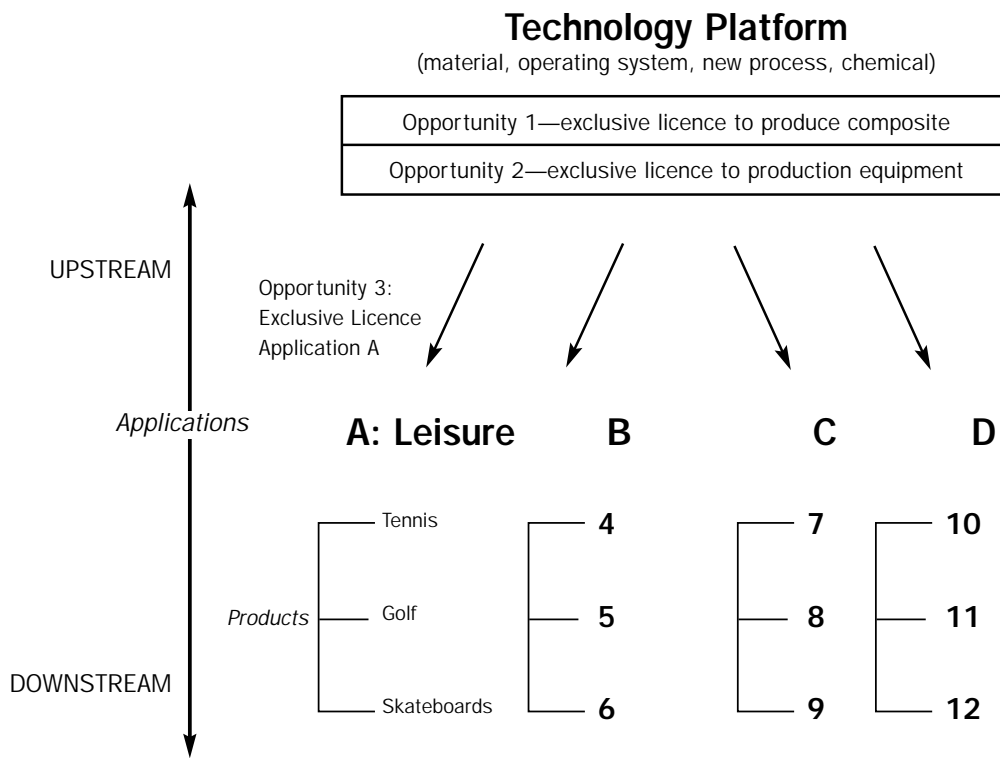
- (1) How can the basic and application R&D be expeditiously completed?
- (2) Which firms/investors will make the best partners to fully exploit the technology?
- (3) How can you assure that your company maintains an essential role in the commercialization of the technology it originated?

Completing Research and Development

To maintain a substantial lead, firms developing pioneer technologies must assess not only what research and development needs to be accomplished, but also which partners may be good to involve in “upstream” activities (Heuss and Jolly, 1990). The greatest flexibility comes from strategic alliances, including consortia and joint ventures that are structured to preserve organizational autonomy and individual incentives (Teece, 1991).

Before deciding which firms/investors to approach regarding the *downstream* applications of your specific opportunities, you should assess the structure of the industries and the extent to which the opportunities can be partitioned. Partitioning of multifaceted opportunities is usually the result of intellectual property protection and economic barriers. In the example represented in Figure 4-3, the company has developed a portfolio of intellectual property that protects the process for creating the material as well as the devices used to produce the composite. These both fall within the category of *upstream* applications. The company has also developed downstream, application-specific intellectual property it can license separately. A company interested in application-specific licenses would have to purchase the composite material from the Licensee that holds the exclusive patent on the production of the composite—or, if economically feasible, should consider trying to obtain an application-specific license or sublicense for its own production needs.

FIGURE 4-3:
STRATEGIC MIND MAP FOR A RICH TECHNOLOGY PLATFORM



Partitioning—dividing the domain of possible products and imposing or utilizing intellectual property or economic barriers.

Economic Barriers in Technology Partitioning

The economic barriers that can be used in partitioning an opportunity are not actually created by the licensee, but rather are leveraged by him or her. With economic barriers, one is really taking advantage of the downstream infrastructure and the position of the dominant players within it. In other words, the goal is to prevent others from entering that market by making use of the existing infrastructure and relative positions of the key players.

When looking at the dynamics of various industries, one consideration should be to examine each industry relative to the presence of a *dominant design* (Teece, 1991). This is essential, according to Teece, since clever market entry strategies will keep innovation imitators at bay. Building on the work of Abernathy (Abernathy and Utterback, 1978), Teece maintains, “In the early stages of development of many industries and product families, designs are fluid, manufacturing processes are loosely and adaptively organized. ... Competition among firms manifests itself in competition among designs.” This is evident in products and

Economic barriers:

- ▶ **industry cohesiveness**
- ▶ **dominant players**
- ▶ **distribution channels**
- ▶ **dominant or emerging design**
- ▶ **certification & regulatory requirements**
- ▶ **competitors**

protocols such as Apple vs. IBM computers, Netscape vs. AOL, VHS vs. beta, and the like. Prior to the emergence of a dominant design, a company can position its product to become an industry standard and/or should “hang loose” and resist becoming too tied to a design which may ultimately “lose.” Teece recommends that if a company has the ability to promote a dominant design, it should do so. However, if it lacks this capability, the firm should wait for the dominant design to emerge.

Once a dominant design has emerged, the emphasis shifts to more evolutionary innovations capable of driving down costs. At such times, it is often advantageous for a company (large or small) to team with other players with complementary assets and products. If a company has bet on the wrong horse, it is still possible to participate in the new design regime by forming strategic alliances through technology swaps, joint R&D, co-development, or sharing of complementary assets. Teece clarifies what he means by complementary assets by drawing the distinction between what a customer perceives as a product and simply a device. An item that fully meets a customer’s defined need will tend to be viewed as a product. For example, an optical scanner sold with a range of software, cabling, and customer support is likely to be viewed as a product—whereas a scanner sold without software is likely to be viewed as a device. A company which provides only part of a solution to a customer need should look to producers or providers of complimentary products, components, and services as potential strategic allies.

Other industry characteristics that are important to consider when deciding upon the commercialization strategies to be pursued include:

- ▶ Cohesiveness of the industry
- ▶ Premarket testing, certification, and regulatory requirements
- ▶ Product liability issues
- ▶ Channels of distribution

When an industry is fragmented, the formation of a strategic alliance is often an advantageous commercialization strategy to pursue. When significant capitalization is required for pre-market testing or to address product liability issues, significant investment will be required by a potential licensee, strategic ally, or equity investor.

An understanding of the dynamics within the various industries to which a rich technology platform can be applied is important before beginning the process of mapping out the commercialization strategies to be pursued. Finally, the company needs to consider how to structure relationships so that the originating company will maximize its participation in the financial benefits that result from commercialization of the technology.

Maximizing Financial Return

Before determining how to maximize financial return from the commercialization of the technology platform, you must begin by generating a list of possible applications for the technology. Once this has been accomplished and you have examined the structure of each related industry, the company must decide where in this panorama it wishes to “hang its hat”—the place Heuss and Jolly refer to as the *center of gravity*. It is impossible to determine how best to maximize your return from other relationships before deciding where in this panorama you wish to play.

Determining your center of gravity is a function of your interests, your vision, and other considerations which allow you to maintain a degree of control over the evolution of the technology.

The progenitor’s relationship to a newly created technology is unique. The inventor brings a heightened desire and commitment to see his or her technology utilized. Therefore, if you have a strong vision for your technology, you should carefully consider how far down the commercialization path you wish to proceed. As the progenitor, you are more likely to pursue a given path longer than others will. (According to Heuss and Jolly, licensees may drop a line of pursuit earlier than a progenitor.) Thus, if there are areas of technological risk which you feel would be difficult for others to navigate or to which they would be less committed, you should consider staying with the technology development course longer, before handing it off to another entity for the final stages of commercialization. The progenitor’s commitment is a double-edged sword, however. Although persistence has its value, an inventor also needs to know when to let go. Nevertheless, in all cases, the more technology risk is decreased, the greater the return you can negotiate.

To remain attractive to potential partners, the technology entrepreneur should keep his or her technology in the spotlight, even going so far as to develop trademarks to help accrue goodwill. As Heuss and Jolly point out, developing trademarks “offer the potential to prolong market acceptance even after the underlying technology rights expired” (Heuss and Jolly, 1990).

Strategic Plan

An outline for a strategic planning document is included here. It is intended to be a proprietary, internal document used by ATP-funded companies that have a rich technology platform. Such companies often need to develop a constellation of commercialization strategies to fully exploit their given technology.

Remember, the value of a company’s technology lies in the decisions made and actions taken to realize an opportunity! A strategic plan starts with analysis but must end in action in order to be of any real value.

STRATEGIC PLAN

1.0 Technology Platform

1.1 List possible upstream roles by industry. These usually will be associated with production of raw material or equipment to be used across downstream applications.

1.2 List possible downstream application areas by industry and products nested within each industry. If possible, represent this in graphic form, similar to Figure 4-3.

1.2.1 Industry 1

Specific product or process 1

Specific product or process 2

Specific product or process n

1.2.2 Industry 2

Specific product or process 1

Specific product or process 2

Specific product or process n

1.2.3 Industry 3

Specific product or process 1

Specific product or process 2

Specific product or process n

2.0 Intellectual Property

In this section, map out your intellectual property strategy for partitioning the available opportunities, differentiating between base patents and application patents. Be sure to pay appropriate attention to other forms of intellectual property—copyrights, trademarks, trade secrets, and know-how—and how these can be used to increase the dependence that potential partners will have on you.

2.1. Patents

Clarify which patents are pending and which ones have been awarded. Indicate which other innovations you are likely to patent during the process of commercializing the technology.

2.2. Trademarks

Clarify which trademarks you have already registered, which ones you are using in interstate commerce and are not yet registered, and how you can use copyrights to your advantage *vis a vis* potential partners.

2.3. Trade secrets

Indicate whether you have or will institute appropriate procedures to assure that certain types of information are maintained as trade secrets. Indicate by broad category which types of information fall into the trade secret area.

2.4. Know-how

Clarify which types of information you have opted to maintain as “know-how”—and determine whether this information could potentially be of value to allies.

3.0 Research and Development Timeline

Draw upon your ATP proposal in completing this section. Provide an indication of key research and development milestones, as well as the approximate timeframe required to complete this work. Be sure that this section addresses the upstream and downstream applications indicated previously.

4.0 Industry analysis

This section requires considerable accomplished industry analysis. For each industry referenced in section 1, indicate the following:

4.1. Industry 1

- ▶ cohesiveness of industry
- ▶ dominant players
- ▶ channels of distribution

4.1.1. Relative to specific product

- ▶ dominant or emerging design
- ▶ premarket testing, certification, regulatory requirements
- ▶ product liability issues
- ▶ competitors

Not a Straight-jacket!

All of the suggested outlines in this document are intended as a guide, not a straight-jacket. Please feel free to vary the format to suit your needs. The emphasis is on the content and NOT the form.

4.2. Industry 2

- ▶ cohesiveness of industry
- ▶ dominant players
- ▶ channels of distribution

4.2.1. Relative to specific product

- ▶ dominant or emerging design
- ▶ premarket testing, certification, regulatory requirements
- ▶ product liability issues
- ▶ competitors

4.3. Industry 3

- ▶ cohesiveness of industry
- ▶ dominant players
- ▶ channels of distribution

4.3.1. Relative to specific product

- ▶ dominant or emerging design
- ▶ premarket testing, certification, regulatory requirements
- ▶ product liability issues
- ▶ competitors

5.0 Center of Gravity

In light of the preceding, and in consideration of your personal vision, which business functions do you wish to reserve for yourself? What is the mission of your company?

5.1. Mission

In this section, clarify the business functions you will perform.

5.2 Intellectual property

In this section, list the intellectual property rights you wish to retain exclusively for your firm, i.e., those you will not share with a partner.

5.3. Industry/market focus

In this section, clarify the industry, or more specifically the market, you need to tackle on your own.

5.4. Commercialization strategy

In this section, clarify how you will fund the commercialization of what you have carved out as your center of gravity.

6.0. Strategies and Partners for Commercializing Related Opportunities

In this section you will map out how you will exploit other opportunities. The timing associated with the unfolding of this plan will be driven by the research and development timeline clarified/outlined in Section 3. Start by developing a list of upstream and downstream opportunities sequenced according to when the R&D would be complete. Then, conduct another sort of the information, based on the difficulty associated with bringing the product to market. Consideration should be given to factors such as premarket testing, certification, and regulatory requirements. Finally, indicate whether there is a dominant or emerging design; also, the relative size of the market opportunity. In addition, note the amount of money required to commercialize the technology. The clearest way to do this is to represent this information in tabular form.

For example:

In light of the industry information presented earlier, your consideration of your intellectual property strategy, your R&D timeline, and your center of gravity, indicate with whom it would be best to partner.

	Application 1	Application 2	Application 3
R&D readiness	1st	3rd	2nd
Market responsiveness	L	H	H
Emerging or Dominant design	D	E	E
Market size	\$50 million	\$500 million	\$750 million
Finances required	\$3 million	\$10 million	\$20 million

The value of your technology does not lie in the possibilities—but in the decisions that you make and the actions that you take to realize the opportunity. A strategic plan starts with analysis—but must end in action in order to be of any value.

Conclusion

Many ATP-funded companies are developing rich technology platforms that have the capability of having a profound impact on multiple industries. The purpose of this chapter has been to introduce the reader to ways of partitioning an opportunity for maximum exploitation, as well as ways of deciding which constellation of strategies to use with each of the upstream and downstream opportunities identified. Choice and sequencing of strategies requires careful consideration to the trends and structure of each relevant industry.

The aim of the next three chapters is to provide the reader with more advanced, in-depth information on three strategies: licensing, R & D partnerships, and equity investment. ATP-funded firms are often quickly confronted with the need to make a choice regarding financing options, so the objective of these chapters is to better prepare the reader for the types of considerations required.