New Companies to Commercialize IP: Should You Spinout or Start-up?

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ABSTRACT

Universities are eagerly seeking ways to commercialize their innovations. The recent success of spinout companies has made that commercialization option more popular, but commercialization may not be the most efficient approach for research institutions. The risks must be weighed, as well as the benefits, and this chapter offers an overview of the hidden costs of setting up a spinout. Exploring the necessary supporting conditions that can improve the potential for success, the chapter also considers start-ups and incubation centers as potentially better options.

1. INTRODUCTION

Since the late 1990s, a great deal of attention has been focused on how new companies can commercialize technology from research institutions. This route is seen as an attractive alternative to the licensing of technology to an existing company. Even within large R&D-intensive firms, "corporate incubation" has become a trend. By forming new companies, large companies have begun trying to generate value from technology that is not considered core to their existing business.

The attraction of new companies to the owners of the technology and to those concerned with regional economic development is compelling. The venture capital boom of the late 1990s created the impression that forming a new company was the route to rapid wealth for the founders because it enabled a company to go from spinout to an Initial Public Offering (IPO) in a few years. To those concerned with economic development, the formation of new, successful, high-tech companies is considered a route to local economic development: it creates high-paying, high-tech jobs, as well as a number of other jobs (three for every one high-tech job[1]) supported by high-growth, new technology spinouts. Many countries have specifically tried to support this trend by forming "business incubators" and science parks to create a supportive environment. This chapter will explore the advantages and disadvantages of bringing new technologies to market by creating new companies. The chapter also will explore the necessary supporting conditions that can improve the potential for success.

This chapter does not specifically address how to deliver direct public benefits to developing countries from technologies via spinouts.[2] Technology spinouts typically depend on venture capital, which is predicated on high rates of return through profit growth or through the growth of capital through increases in share price. A typical return expected by a venture capital investor is likely to be around 30% at exit, and such expectations leave little room to substitute social outcomes for profits and company growth. A profitable market is therefore key to obtaining the necessary venture funding in the first place. Such markets may exist in developing countries,

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and it is important for individuals in developing countries to assess how spinouts might help address public health needs.

Perhaps more importantly, the creation of spinout companies has indirectly been a major economic driver, as new businesses and local jobs create public benefits. This trend of generating new companies from academic research began in the United States, partly because of the contributions of universities to national defense during World War II. That experience of early spinouts emphasized the need for a strong commitment to partnerships and linkages among industry, academia, and government-research sectors. The value of university research in this respect was first recognized by Vannevar Bush, the science policy adviser to President Franklin D. Roosevelt in the 1940s.[3] Bush saw it as a vehicle to enhance the economy by increasing the pool of knowledge that industry—supported by government—could use. Likewise, the story of Silicon Valley and its legendary spinout successes was enabled by the contributions of universities.[4]

Currently in the United States, there is a lot of spinout activity. In the financial year 2000, some 500 new companies were formed to exploit the technology based on academic discoveries made in the 121 universities that responded to the Association of University Technology Managers (AUTM) survey. Notably, for 80% of these companies, each was based in the university's home state. The more than 600 licenses to these new companies accounted for 14% of the total number of licenses reported. An additional 50% of all licenses were to small companies (those with fewer than 500 employees). Similarly in the U.K., a recent report on U.K. universities showed that licensing income fell in recent years, possibly because public authorities have been pressing for the creation of more spinouts.[5]. In U.K. universities there are signs of a more-balanced approach developing. Still needed for successful inception and growth of spinouts are increased recognition of market conditions, internal and external support, and management and intelligent early-stage finance. This is reflected in a wider range of metrics being adopted by central government for assessing knowledge transfer performance.

2. NEW COMPANIES AS THE APPROPRIATE ROUTE TO MARKET

Given the major worldwide interest in the formation of new companies to commercialize technology, surprisingly little systematic work has been published on the circumstances conducive to their success.

A number of perspectives should be taken into account when deciding whether to form a new company to commercialize a piece of technology. However, there can be little doubt that from the perspective of successfully introducing a new product to the market, the new company route is higher risk than a traditional out-license to an existing company. In general, the circumstances that favor establishing a new company to develop products and take them to market are those in which the same "offer to market" cannot be made by licensing the technology to an existing company. Conversely, where such a licensing arrangement is available, a new company is unlikely either to generate the same value for the owners of the technology or to succeed in making the product as available as it would have been through a licensing arrangement.

In most circumstances, an existing company with the necessary infrastructure already in place (such as channels to market, facilities, commercial management, sector knowledge, and an existing contacts network) is likely to be a lower risk. However, where the new technology is disruptive and/or where it is far from the market (as is the case for university research-based technologies), then creating a new company may be the only realistic alternative. In addition, the political priority for new jobs and local economic development brings additional pressures and benefits from the new-company route.

Nonetheless, universities find it hard to build such companies from the ground up, especially when new markets have to be created. Marketing expertise needs to be in place to position new product categories in crowded markets, and carrying out these tasks is costly. Moreover, figuring out how to meet the university's social mission to deliver public sector benefits may become critical in deciding whether or not to form

a new company. For example, making products available in developing countries may be one social consideration that universities could take into account when considering the route to market. If this were the prime consideration, then establishing a new company would not be realistic. Markets in the developing world are unlikely to be sufficiently robust to persuade investors to commit enough funds to support establishing a new company. When a potential market for the product and the licensing arrangement is unavailable, a new company may be the only available route to market. This could be because the market or product category is completely new. In this case, a qualified licensee (one with a better package of expertise and infrastructure than could be developed with the required speed by a new company) might not exist. However, the costs for developing new markets or marketing new product categories are very high. Adequate resources have to be put in place, and the time-to-market and to significant sales and revenues might be long. These factors need detailed analysis so that initial funding needs can be calculated with a suitable break-even outlook and a realistic picture for investment returns. Such considerations are rarely systematically assessed in a university situation, because the institution's wish to meet its political goals and the inventor's wish to make money frequently override fundamental economic analysis.

3. NEW COMPANY FORMATION ROUTES—START-UPS VERSUS SPINOUTS IN A UNIVERSITY CONTEXT

For the purposes of this chapter, a start-up[6] is a company created by people outside of a research institution. A start-up is built on a license for one or more technologies, but draws its other resources (such as management) from elsewhere. In contrast, a spinout company is created when an institution invests its own resources to form and incubate the company up through the first round of venture capital investment. The creation of a spinout usually involves the transfer of existing university staff into the new company, either on a permanent or on a secondment basis. A special case of the start-up modality is that practiced by the partnerships between some universities in the U.K. and the IP Group[7] in which resources are made available to universities under package agreements giving access rights to IP. We have yet to establish the extent to which such agreements might have negative affects, for example on the university's wider missions or their research agenda.

Opting for a spinout may lead to the underexploitation of the economy's intellectual assets and may be a drain on the experienced resources of a university. Research institutions are normally limited in terms of staff resources and capabilities that can be devoted to commercializing technology. It follows that such institutions will be able to create fewer businesses using their own resources, particularly when compared to the number and the quality that they could deliver by attracting resources into the institution. Forming a start-up company by attracting new resources to the institution is likely to be more efficient, not only in terms of the use of scarce resources, but also in terms of the available experience that can be applied to developing and managing a commercial business and company in a limited timeframe.

3.1 *Risks and rewards*

From a university's perspective, the choice may be based on balancing risk and reward. A university setting up spinouts will retain a higher percentage of equity in new companies because the university builds the value in the company before seeking external investment. Using the start-up approach, the university will have had to cede founder's equity to the incoming entrepreneur; effectively, it will have merely adopted a license for equity role. On the other hand, when building a spinout in-house, the institution is using its fixed resources (people) and trading off their time for high equity stakes. In the 1990s, the markets might have indicated that this was indeed a good risk/reward balance. However, two issues should encourage universities and research institutions to naturally prefer obtaining licenses to building spinouts. First, experience has shown that rather than the technology per se, the management of a new company is the

critical element for success. Spinouts formed with inexperienced management are more likely to fail, so start-ups are preferable when managers are inexperienced. Second, the high level of risk associated with high-growth–new-technology businesses (where investors plan for nine out of ten to fail), suggests that universities would be more certain of a return from their commercialization activities if they adopted a portfolio approach. Universities should ensure that as much technology as possible is made available for licensing—whether to established firms or to new companies built by external managers. Acquiring smaller equity shares in a larger number of companies would be a safer investment strategy than using high levels of fixed resources to create one or two major spinouts. Universities have fixed and limited resources to undertake technology transfer, and so from a conventional capital appraisal, it is difficult to see how spinouts can be justified when alternatives are available, either from an economic-good or a social-good perspective.

3.2 *Economic and social return*

The intensity and challenge of managing several spinouts through to venture capital investment can be exciting and may also seem to offer greater control for the hosting institution. But given an institution with limited, fixed resources available for technology transfer, the achievement and eventual realization of value created by individual projects has to be set against the growing value of an expanding portfolio of underexploited technology that would have accumulated while resources were focused on selected projects. In fact, from the perspective of the economy and the lost opportunity for creating a social return from the use of the technology, the contrast between the economic value and the social value is likely to be far greater. The value to the economy is measured by the number of jobs or the number of quality companies created, not by the equity retained by the university. And the social return is a factor of the public benefit created (for example, making new health care products available and having used the available funds wisely and optimally). Focusing research institutions' resources on managing their financial resources optimally is of even greater importance than the subsequent decision as to whether a limited number of spinouts is created or a potentially larger number of start-ups facilitated. The ultimate objective is to ensure that technologies have the best opportunity to come to the market. Current pressures on research institutions to become the engines of economic growth in their local regions tend to emphasize the number of new companies created rather than the successful commercialization of technologies. Too often, universities have confused objectives and a multiplicity of performance targets, all of which drive technology transfer efforts toward inefficient commercialization. Indeed, the policy of the institution needs to be clear on whether commercialization is undertaken primarily for public good or for institutional profit.

4. CONDITIONS THAT CONTRIBUTE TO SUCCESSFUL, NEW TECHNOLOGY COMPANIES

The creation of new companies from research institutions can benefit from a virtual company phase. This phase can last for a long time using the spinout approach from universities, and indeed there have often been companies, solely within universities, existing without clearly defined boundaries. The virtual phase can be useful in preparing the company for a stand-alone existence. In times of volatile venture-funding for specific technology sectors, the virtual phase may allow new technologies to be brought closer to market without the burdens of a formal legal existence. In the U.K., under certain economic-development seed funding (for example, the Scottish Enterprise Proof of Concept Fund[8]), the virtual model is a condition of funding. However, companies must take on a separate existence in due course, and they are typically legal entities (corporations) in their own right established to conduct a business. Whatever way a business is conducted and whatever legal form it takes, some key aspects (given in Box 1) are essential for the business's viability and success.

Box 1: Critical Success Factors for New Companies

Experience has shown that the following factors are critical to success or failure:

Technology.
A technology that provides a substantial but incremental improvement over an existing product category (as opposed to a platform technology) is most likely to be effectively licensed. Existing products have existing markets with existing channels and customers, and it is risky to compete with existing products. Companies will be in competition for the market, and those who are second or third, in terms of market share, will be eager to exploit innovations and take market share from the leader. Although in most cases the market leader is best positioned to turn a product/technology into maximal value, the leader might risk cannibalizing its existing market and try to keep a new product out. In such circumstances, any license to the market leader would best be supported with strong performance clauses (milestones).

With regard to platform technologies (which enable a range of different products to be produced, possibly for different markets), forming a new company will frequently be the way to get the best value and ensure that the technology is fully exploited. This may or may not address the markets directly, depending on the marginal costs and benefits arising from the technology. Platform technologies are often attractive to investors, because the range of potential markets that can be developed offers a greater security of return if the initial intended application fails. Likewise, there is an implicit chance of greater returns than with a single product technology.

Market Development.
An existing market (defined as the sales of products of a particular type to a defined group of customers) is most likely to be served by entrenched competitors with existing customer loyalties and established distribution channels. The circumstances are likely to be similar to those in which the technology is an incremental improvement, which suggests that the best option will be close to the licensing end of the spectrum. Conversely, when a market is new, the licensing route may be unavailable or will have higher marginal costs for a prospective licensee. Accordingly, forming a new company may be a better option financially, provided that potential market demand exists.

Product, System, or Component?
If the intended product is a complete system, then it will be theoretically possible to form a start-up or spinout to take it to market, because the company may be capable of providing a solution to end users. If the intended product is a component of a larger system, then the product will need to be channeled via established companies in the field who will embed it in a complete system.

Management Availability.
Developing a technology relies heavily on capable management. This is one of the potential advantages of start-ups as opposed to spinouts. By marketing the technology well (presenting it in the context of its compelling benefits in product form), the technology assets can be used to leverage these management resources from the marketplace. Conversely, attracting management to a proposition proves difficult, this may be because the other requirements for forming a new company have not been met. Choosing a licensing route effectively co-opts the management of existing companies into a new product's channel to market.

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BOX 1 (CONTINUED)

Market Concentration.
A concentrated market has the majority of its value in a limited number of customers. A diffuse market has its value dispersed in a large number. It is easier to locate and access a limited number of large customers than to locate and sell to a large number of small ones. Exploiting an existing distribution channel via a distributorship arrangement may be the only economical way of addressing the latter, even if there is genuine new product or company potential.

Complexity of Sales Task.
If the sales task is complex and the type of product is unknown to the customer and the benefits unproven—which it may well be for a new product concept—only perhaps the originators can describe the product's features adequately and work with innovative customers to prove its utility. In such circumstances, the best option is to work with a capable marketer and adequate training mechanisms to enable the marketer to present the product correctly.

Availability of Investment.
For development that goes all the way from technology to market, investment may be unavailable for the complete project because of the high costs and risks involved. A licensing route or license to develop may be the only way that investment can be made available. If feasible, then the other factors that favor licensing are also likely present. The classic example is the drug development and marketing process, where the costs of clinical trials and regulatory processes may be over U.S.$100 million, and the attrition rate higher than 90%.

Complexity of Delivery.

If the delivery of a product or service is highly complex, the undertaking may require detailed knowledge of the technology underpinning the product and the services of a coordinated team. Such a situation, which is common, for example, in software development and in the installation of health technologies in their infancy, may argue for a more extended period of in-house development, at least in the early stages of market introduction.

New companies intending to exploit biotechnology are entering an environment that requires collaboration. There are many different processes needed in a complex value-chain, running through target identification, compound design or synthesis and screening, and drug development and market. A supporting infrastructure is needed that might include the production of animal models of disease, bioinformatics, gene sequencing, chemical synthesis, combinatorial chemistry, drug delivery, formulation and manufacturing, clinical trials management, biostatistics, and managing regulatory approvals.

The interdependencies of different skills and specializations mean that producing a start-up company to develop and market its own products is unlikely to succeed. Moreover, the global pace of scientific advance makes it hard to simply keep up-to-date with relevant discoveries. Interpreting their implications for existing projects or new opportunities is even harder. For example, the sequencing of the human genome has generated more potential disease targets than even the largest pharmaceutical company can handle. These circumstances together make collaboration essential. Through collaboration, large companies can increase their project pipeline, and small companies can obtain the resources they need to develop their products.

The ability of research institutions to collaborate and access resources in other companies is a competitive capability in its own right, and it follows that new biotech companies should plan their strategy around developing this ability. Early in their development, companies should identify potential partners. This requires an openness and a readiness to work with other companies to identify potential collaborative projects. At the same time, a high degree of professionalism is needed to protect commercial interests. This includes the protection of commercially sensitive information and materials under Non-Disclosure and Materials Transfer Agreements, and, above all, the protection of IP through the filing and prosecuting of patent applications.

5. BUSINESS INCUBATION FOR NEW COMPANIES

There is a growing trend for new, technology-based companies to be supported by incubators that are located often in close proximity to research institutes. No discussion or presentation on spinout or start-up companies would be complete, therefore, without some consideration of business incubation and incubators. Some internationally renowned research institutes, such as the Massachusetts Institute of Technology (M.I.T.) and the University of Cambridge (U.K.), are surrounded by an environment that strongly supports the development of new business. It provides a local pool of management talent, funding, professional support (such as patent agents and attorneys), and a cluster of existing companies that may act as potential collaborators. The importance of such an Innovation Ecology, has been documented in a recent publication[9] detailing the case histories of some 30 companies in and around Oxford. Where this kind of environment does not exist, a more studied and deliberate approach may be made to provide the benefits of such an environment through specifically designed incubators.

Incubators provide to a new company a number of potentially valuable services that can enable management to focus on running their core business. The best incubators also provide access to a network of contacts whose expertise can be leveraged to develop the businesses. Government and other public sector agencies often see investing in incubators as key to stimulating knowledge-based economic development. In fact, incubation can provide the facilities, resources, and expertise that may be difficult to access during the early stages of a business. Such access may have a critical part to play in ensuring that the business achieves early commercial success. But incubators should *not* be seen as a long-term source of support for businesses that, perhaps because of a lack of market opportunity, are unlikely ever to be more than marginal.

The critical business-acceleration aids that an incubator can provide include a rapid

introduction to a network of individuals who may include those with relevant market and management experience. Some of these individuals may be able to guide and mentor inexperienced management either formally (perhaps as employees of, or consultants to, the incubators) or informally. Other individuals may include business people with customer contacts who might themselves assist in turning the technology around to "face the market" and in shaping the business to achieve its first revenues. Just as important are contacts with potential early-stage funders, especially those "added value" funders who can help by shaping the business, identifying and fulfilling its investment potential, and sourcing the potential members of a growing commercial team. These key functions of the virtual incubator are well described in *Networked Incubators: Hothouses of the New Economy*.[10] The best incubators also provide access to a network of professional support services (often provided pro bono), such as basic advice on patenting, incentive agreements for employees, and licensing agreements.

Incubators may also be formed to develop and accelerate business in specific market sectors. In the case of biotechnology, for example, a key contribution is made by obtaining access to an international network of contacts, which includes potential research or product development collaborators in the complex drug-development value chain. These may provide useful regulatory advice and guidance. Additionally, they may include access to very high-cost capital equipment, such as scanning electron microscopes and nuclear magnetic resonance machines.

Incubators can also assist by providing basic business and office support facilities and services, such as accommodation, payroll management, bookkeeping, and high-bandwidth Internet access. A lack of these facilities and services can steal attention from the management of a business, especially since such matters may be unfamiliar to those with a predominantly technical background.

Incubated companies will expect to pay lower-than-market rates for the services they receive from incubators, at least in the early stages of incubation. These lower rates are made possible by one or more of the following:

- Achieving economies of scale by combining the otherwise uneconomic provision of professional and business support services for a number of smaller customer companies in the incubator
- Public (for example, local or regional government) subsidies made in anticipation of economic development
- Incremental occupation and service charges that are lower at the outset and increase progressively as the company obtains commercial success
- Paying for a proportion of the occupation and support charges in the form of equity (a key strategy in the case of for-profit incubators)

A number of successful incubators operate using the model described here, but many do no more than provide accommodation. These latter incubators have been severely criticized in the United States.

6. CONCLUSIONS

There are many success stories about start-ups and their impact on the growth of local economies, such as in Silicon Valley, California, and Route 128 on the East Coast of the United States. This chapter, however, has pointed to the complexity of developing a successful start-up enterprise. Choosing the route to market strategy for new technologies requires making a set of complex decisions that many universities and research institutions are not specifically equipped for. The conventional licensing route for technologies may not only involve lower risk for the institution, but may also deliver more technologies from the institution's scientific research. Universities and research institutions with the primary mission to deliver social and economic goods rather than investment returns should carefully consider how to achieve this mission most effectively. Establishing spinouts that disproportionately consume their in-house resources might not be the best approach. The

current pressure from governments to create new companies and new local jobs from university research should not be accepted without the new resources to support this activity.

Once created, new companies face many challenges to achieving sustained growth and successfully delivering value to shareholders. Technology alone is rarely sufficient to reach this goal. Good management, awareness of market forces, and a good supporting environment in the early stages are all more important. Still, while failure rates are high, for those companies that succeed, the returns to the founders, the institutions, and the local economy can be significant. ■

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1 Patrick O'Brien. Member of Canadian Parliament. Spoken presentation on a visit to the U.K. in March 2001.

2 See, also in this *Handbook*, chapter 13.4 by T Cook.

3 Bremer H. 2003. Technology Transfer: The American Way. International Patent Licensing Seminar, Tokyo, Japan.

4 Lewis M. 2000. *The New New Thing: A Silicon Valley Story.* Penguin Books: London. See also by the same author The Valley of Money's Delight, in the 27 March 1997 issue of *The Economist*; and Know Thyself in the 28 October 1999 issue of *The Economist*.

5 *Annual UNICO/NUBS Survey on University Commercialisation Activities*. 2002. Nottingham University Business School: Nottingham. See also www.unico.org.uk and www.hero.ac.uk/uk/business/archives/2002/spinouts_pick_up_speed2872.cfm.

6 There are some differences in the way the terms *start-up* and *spinout* are used in this *Handbook* and indeed in the technology transfer literature. In this chapter, we have used a definition of *start-up* similar to one used in the U.S. *AUTM Licensing Survey*™. Other authors have used "spinout" to include the kind of company described here.

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