

The Benefits and Challenges of Industry - University Startup Collaboration for Product Development

R. Silveston-Keith

RSK Consulting on behalf of the University-Industry Demonstration Partnership (UIDP), 1211 Connecticut Avenue, NW Suite 650, Washington, DC 20036, rbsilveston@gmail.com

ABSTRACT

This presentation examines the dynamic interaction of industry with a university startup (and its parent institution) over the life of a startup. This report shows when, why and how to align expectations and strategies for risk management to maximize the intended outcome for the technology, solution or service that the university startup and its parent institution will provide. Examples are given of the partners' different motivations and modes of interaction, regulatory and policy issues, financial mechanisms, and metrics to evaluate the collaboration. This presentation will help partners navigate such collaborations to their mutual advantage.

Keywords: startup, collaboration strategy, industry, academia, technology transfer

1. INTRODUCTION

There is an emerging trend for industry to engage with university startups [1] for the purpose of bringing innovative products, solutions and services to the marketplace while shrinking internal R&D staff. At the same time, public, and a number of private institutions, have a new or expanded mission of economic development, added in accordance with the Bayh-Dole Act, which enabled universities to take title to inventions resulting from federally funded research. Universities are increasingly involved in business startups as a means to commercialize their nascent technologies, provide additional revenue to the university, and support local job creation.

The industry employees involved are not only R&D but also include technology scouts, those in venture capital arms of large companies, and the legal and intellectual property managers in the firm. From the academic side, those involved include compliance, technology transfer, legal counsel, faculty/student entrepreneurs, and founders/ CEO/ CTO. While not all new businesses are spun out of academia, there are many that result from academic institutional activities [2]. For the purposes of this document, the term startup means those new businesses that originate in academia. In most cases the startup engages bi-directionally with industry or academia which can impact the third partner's ability to maximize the collaboration benefits. These three-partner collaborations present a unique set of

challenges. For that reason the (UIDP) interviewed thirty representatives from industry, academia and startups to gather current insights about different collaboration strategies into an upcoming UIDP report. This paper is a subsection of the report and recognizes contributions of the many UIDP members who compiled this information.

2. MOTIVATIONS FOR INDUSTRY - STARTUP COLLABORATIONS

Gaining an understanding of a given partner's motivations for engagement can help in selecting the best approach(s) for a productive interaction. For each partner, the aims typically encountered are listed without implying any relative frequency or importance among the options.

2.1 Industry motivations for working with startups

An industrial company's motivation for working with startups is normally rooted in two key drivers: Engaging with the startup will provide *profitable growth* or will *further the industry's interests* by shaping the startup to best fit the industry's direction, standards, and its value chain partners.

The profitable growth can be technology driven, motivated by access new or emerging growth categories, or a radical renewal of an existing market category. Industry may be seeking to exploit and influence the development direction of the startup's technology, so it integrates successfully into the company's own product development through acquisition of the startup, ownership of IP or ownership of startup equity. Collaborating with startups can be an effective means of testing new technologies, and reducing the risk for uncertain technologies, since the startup is farther down the path to commercialization than the basic science done in academia. This is a strong motivator for industries that traditionally have a high rate of failure like the pharmaceutical industry involved in costly exploratory research. On the other hand, industries with short lifecycles, e.g. electronics and computing technologies, work with startups to be at the forefront of disruptive technology. This is a defensive strategy for acquiring a startup that could otherwise impact the company's market share. Another growth strategy is to acquire a startup outright for profitable gain later by selling or transforming the investment position. Alternatively, growth could result from not acquiring the whole startup but by hiring the startup's employees, including students experienced in the technology's

development. Another motivator is to extend the capital industry can invest in new technology by leveraging others' money, like the government-funded university research or Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs that went into the basic science before it became a startup. However, limiting risk is not just a matter of leveraging cost and validating technical performance. Often the startup is helping solve the bigger uncertainty of the market size, the degree of acceptance/barriers to adoption, and ability of the technology to compete with those currently in the market.

Examples of furthering the industry's interest include cultivating a new breed of supplier or even a business-to-business customer, depending on whether the startup's technology addresses the corporation's supply chain or route to market. For example, in highly regulated industries, like defense and aerospace, industry may turn to suppliers to help the startup negotiate the regulatory concerns and leverage this outside support to help the startup meet and pay for certification needs. Alternatively, the IT industry may aim many years in advance to influence policies, or establish a favorable industry standard or norm, which can have far reaching impacts on internal organizations, suppliers and external customers. Here ownership can be superfluous.

2.2 Startup motivations for working with industry

The startup is motivated to work with industry by its end game aspirations and its operational realities. The startup will fall into four general categories based on fundamental goals or "What does it want to be when it grows up? and "What sort of transactions will generate the startup's revenue for the long term?" The first category is startups that seek to become for-profit independent *foundation companies* interested in growing through ongoing transactional sales of goods and services to lead or dominate a market category. Second, startups that seek to become *high potential ventures* interested in demonstrating just enough long term value potential to encourage acquisition by a larger entity that will grow the technology. Third, startups that seek to demonstrate the proof of concept in a commercially relevant setting in order to *license the technology* and business concept to others. Finally, startups that seek to develop technology in a cost/revenue neutral mode are *lifestyle firms*. The latter may resist being forced into a growth mode by industry.

While the end game directs the path to profitability, meeting daily operational needs directs the urgency and motivation for interacting with industry. The startups' need to source skills, develop technology, meet contractual/financial milestones, and expand employee payroll may manifest in days, rather than weeks, months or years. Industry partners can lose an opportunity by not reacting quickly enough. Aside provide goods and services to generate capital; startups are motivated to interact with industry in order to:

- better understand how the market fit of the technology
- get access to expertise for market and customer research, specialized testing services, and scale-up capability,

- determine the key players in the value chain for materials, production and marketing of the startup's product.

The motivations and funding provided by academic institutions, Venture Capitals, Angel Investors and Foundations, play a significant role in the various stages of the startups; these fall out of the scope of this document.

3 MODES OF INDUSTRY - STARTUP COLLABORATIONS

There is no one-size-fits-all mode of engagement. Multiple modes are presented without implying any relative frequency or importance among the options. Selecting the right mode depends on aligning the motives of the players and limiting the risk against the return on investment.

3.1 Industry modes of engagement with startups

Companies can maximize their return by varying the mode(s) of engagement to help the startup successfully get through the various phases of its race for survival. The startup's strategic, financial, business, and development plans are fluid. How they plan to make money today can change tomorrow as they adapt to market pressures.

In general, the industry engagement involves direct financial aid or time outlay. The former will be discussed in the next section. The latter involves multiple arms of the industrial organization from R&D technology scouting, to marketing, to legal, to corporate venture arms. These arms help accelerate the startup and garner the internal support for the activity. Industry can provide skills and resources to the startup, access to regulatory experts to help the startup through complex federal certification, routine material analysis, scale up capabilities, market research services, supplier base for the startup's input materials and services, customer or brokerage base for the distribution and selling of its products and services, and so forth.

3.2 Startup modes of engagement with industry

As a startup transcends its life stages, its operational needs drive its modes of engagement. Industry should be aware that in the early life stages the startup may have several of its operational needs (telephones, mail services, office space, personnel needs, students, etc.) satisfied by co-locating, perhaps in an academic research park or an incubator. Academia may allow de minimus use of its resources, but seeks to avoid private use issues as defined by Internal Revenue Code (IRC) Section 501(c)(3). As the startup shifts to being a professionally managed business it starts to operate independently of the university and deliver to its stakeholder community. Thus at later stages, the startup may engage with industry to provide a service, satisfy deliverables, or some of its market and financial needs. Soliciting industry funding with the same process as was used to secure federal monies, by recycling federal grant applications as proposals to industry, will not resonate.

Industry is looking for the value proposition for the investment of their time and resources in a short executive summary, and business case.

4 REGULATORY, POLICY, ETHICS AND BEHAVIOR

The collaborations that occur between industry and startups are governed by a multitude of rules placed on the partners by legislative bodies, regulatory agencies, organizations, as well as best practices methods for compliance with the rules and differences in ethics/culture of the organizations.

4.1 Industry perspective on the regulations

While industry partners are familiar with the regulatory environment in their specific sectors or fields of technology, their startup partner may not be. For instance, the health care, medical devices and pharmaceutical industry is heavily regulated by the FDA, and human and animal testing may also be regulated by the Public Health Service, or other federal agencies. Information the startup derived from human subjects may be regulated within the university hosting the startup, and passed through to the industry partner by way of a contract. *It is equally important to verify the startup's compliance with the field specific regulations while vetting the startup technical capabilities to avoid regulatory pitfalls and wasted efforts.* For example, the defense, aerospace and military industry and various aspects of the electronics, telecommunications, and information technology (IT) sectors are particularly concerned with export controls. The bedrock of export control regulation [3] is that U.S. companies may not do business with startups owned in whole or in part by individuals who are citizens of an embargoed country, even if they are in the U.S. and even if a university student. The IT sector tends to copyright software as opposed to granting an exclusive license. This kind of practice may be not be possible without a government waiver if the software includes potentially patentable underlying algorithms that were made at a university with the use of federal funds. In intensive regulatory environments, like defense and aerospace, industry can manage risk by leveraging their suppliers to vet the startup's compliance. Alternatively, industries in fields with intense government certification and resource intensive needs, like biomedical, pharmaceutical and medical devices, may opt instead to purchase the startup once it has passed the regulatory hurdles. As a result of the complex and changing regulatory environment, best practices suggest that industry partners make no assumptions and ask:

- How well does the startup understand its regulatory environment?
- What procedures are in place to address regulatory issues?
- Are there export control warning flags?
- Where is the startup research taking place?
- Is the “end-game” sufficiently important that industry assistance in regulatory matters is warranted?

4.2 Startup perspective on the regulations

In general, faculty startup founders, hereafter called founders, are not experts on regulatory compliance. Close collaboration with the university technology licensing office and compliance offices will save the startup valuable time in its early stages by helping it avoid regulatory pitfalls and wasted efforts. Founders that remain as university employees/researchers/educators can face conflicts of commitment as they grow their startups. For example, independent funding like an SBIR grant requires the founder to be employed at least 51 percent by the startup, and the project to be conducted in space predominantly owned or controlled by the startup. As the founder reduces their academic effort to 49 percent or less, they may lose healthcare or other benefits if they cannot meet all of the required effort for their federally sponsored projects, teaching and mentoring students. Students can pose unmanageable conflicts of interest if they are reporting to the founder as an employee of the startup, while simultaneously reporting to the founder as a university graduate student. Furthermore, the financial interests of the founder in the startup technologies it has licensed from the university could be viewed as creating conflicts of interest with their ongoing university research. Finally, founders may or may not be allowed to use university resources (e.g., space, materials, personnel) for startup activities pending IRC regulations. If mismanaged, these conflicts can result in serious consequences including termination, lawsuits, punitive actions by authorities, jail time, damage to good will, and loss of funding and/or licenses.

5 FINANCIAL MODES IN INDUSTRY-STARTUP COLLABORATIONS

5.1 Industry perspective on financial modes of collaboration

There are multiple ways industry can provide financial support to match the needs of the startup through its life stages through its multiple arms from R&D to Venture Groups. Direct industry funding can be in the form of transactional purchases, financial aid, seed funding, grants, consortium and venture capital funding. Equity investment and ownership is a speculative investment given the high uncertainty of the startup and creates exposure to competitors and when an industrial company does not own a large portion of the startup technology. For the startup this mode provides needed capital at the cost of losing control of the technology. Risk-averse industries sectors are likely to use a gated process for the venture capital model and begin with seed investment, progress via a minority equity position, to licensing, a joint venture and end with outright acquisition. Licensing provides industry the rights to use the technology in its products. This mode limits risk and the cost-to-play while market variables are proven, with built-in options to some form of acquisition by focusing on rights for

its desired field of use or geographic market. This leaves the startup to negotiate with others outside these boundaries. Smaller ownership is preferred in some industries like pharmaceuticals to spread the risk for both partners. The startups' ability to secure new funding is compromised if a major industrial owner pulls out due to a change in business strategy regardless of their confidence in the technology. Hosting as opposed to owning provides industries (such as in agricultural products) interested in process development or technology access a way to manage risk. Increased financial commitment is contingent upon meeting technical and market performance milestones. Alternatively, industry can hire the startup scientists as consultants, infusing the startup with needed capital at a relatively low cost, but this may muddy the intellectual property ownership. Collaborative development offers a mean to share the costs, and is viable as long as the technology does not have a long and expensive path to commercial realization. Finally industry can leverage the startup's funding sources outlined below. The modes chosen, however, can impact future investments, the viability of the startup and the industry's expectations of profitable growth.

5.2 Startup perspective on financial modes of collaboration

In general, the financial modes chosen by the startup are tied to its end game. The two largest forms of funding, Venture and Angel fall outside the scope here. The remaining modes of securing funding may start with sweat equity based on the founder's sunk costs in time and energy, showing future equity investors that they have 'skin in the game'. Debt financing follows, where the lender is entitled to repayment regardless of the success of the startup. Industry leveraging these modes delay and lower their financial input, but the startup retains ownership of the technology. Excessive debt from multiple parties, such as banks, private people, federal and state programs, may make future funders less interested as they are bargaining with disparate parties. Competitions provide a low cost way for all partners to get access to the best and brightest minds to attack real world problems. Startups get quick market feedback by exposing their ideas to large audiences; however IP patentability and exclusivity may be compromised in this mode making the startup unattractive for industry. Crowd funding provides startups multibillion dollar funding sources, and market validation, but also open themselves to risks if any of that money was illegally obtained. However, industries will be concerned whether the IP was compromised and how to deal with hundreds or thousands of investors.

6 METRICS IN INDUSTRY-STARTUP COLLABORATIONS

Understanding who each partner reports to, what metrics they use, and why those measurements are used can help facilitate collaboration and ensure that contracts are structured to benefit each partner in a meaningful way aligned with their objectives.

6.1 Industry metrics for working with startups

Industry reports internally to its shareholders, board of directors, CEO and C-suite executives and externally to the SEC, creditors, and the general public. Industry uses a variety of metrics to vet the startup before partnering including the cost of engagement vs opportunity cost and whether this activity poisons its internal R&D efforts. They also review/evaluate disclosures, co-inventors, sources of funding, field of use restrictions, IP provenance (to assure that it can obtain the freedom to operate within its preferred field of use), and complexity or whether the startup (or the parent institution) has the authority to negotiate contracts and who to work with. Once engaged, the ultimate metric for the collaboration is the return on investment. This encompasses the usefulness of the technology, cost savings generated, additional revenues generated, new markets captured, maintenance of market share, new products and new businesses with competitive superiority and the increase in market share accruing from an acquisition.

6.2 Startup metrics for working with industry

Startups report to the board of directors, shareholders accelerators, incubators, etc. Their metrics are related to their financials: the revenue generated, cash flow, and investment received. Notable exceptions are companies who are primarily interested in being acquired (e.g., some pharmaceutical startups), where their main metric may be investment generated through a level of clinical trials, combined with technical validation milestones. On the other hand, a startup commercializing a software-as-a-service technology and seeking industry partners (with no objective to be acquired by them) is going to be looking at revenue generated, number of customers, and the like.

7 CONCLUSION

Industry-startup collaborations offer mutually attractive potential despite the many challenges. The key takeaway for both partners is to get to know each others' motivations, needs at various stages, end game aspirations and how success is measured in order to effectively manage risk in the collaborations.

References

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