

Building a Biotech Start-up: A Case Study

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Case Study Introduction

Transforming disruptive new technologies into novel cutting edge products and services can be both challenging and exciting. The prospect of transforming a market or application space brings with it enormous potential, but realizing this potential requires critical technology and business development strategy and implementation. Thus, the transformation of nascent technologies into new products or services brings with it a two part challenge:

1. Development of the raw technology into a product or service vehicle that will allow you to move from the lab space and into the market quickly
2. A sound business strategy and subsequent execution plan is necessary to overcome the barriers to market entry and to capture sufficient market share to keep the company viable until growth and suitability can be achieved

Each of these contains numerous contributing steps each fraught with their own challenges and rewards. However, taken together, these steps can lead to the successful commercialization of novel new products or services that may significantly transform the market and yield substantial financial success.

We will begin this case study in new technology development and commercialization by first introducing the company we will be highlighting. Following this, we will review their technology and outline the general challenges associated with commercialization of this new technology. Next, we will describe the technology development strategy that was employed to move the technology from the research space and to transform it into a commercially viable product. From there, we will highlight the business strategy and implementation plan developed to move the novel product into the market. Lastly, we will highlight some of the ensuing pros and cons of the business development strategy as well as lessons learned, and conclude with future directions.

The Company Client

The company we will be focusing on for this case study is Neurosilicon, Inc. Neurosilicon was founded in 2005 and develops novel therapeutic solutions for neurologically related unmet healthcare need. Initially, the company sought to apply their core technology towards the development of neuro-centered medical devices suitable for transplantation. The goal was to create a new class of transplantable medical devices that would serve to reintegrate degenerated and/or damaged neuronal tissue to restore lost nervous system function. The company was initially composed of a small multidisciplinary team of PhD level life science researchers and engineers as well as serial entrepreneurs.

Neurosilicon was founded using an equal combination of grant funds and seed funding. Access to academic laboratories and other resources served to greatly reduce overall initial capital expenditures. The company's intellectual property (IP) portfolio centered on a core technology and covered a broad expanse of developmental and application processes. Their IP portfolio was complimented by a small but robust contingent of peer-reviewed academic publications that highlighted the application of their core technology.

The Core Technology

The company's core technology focused on the application of a well known physical phenomenon called photoconduction. Briefly, photoconduction is the process by which the conduction of an electrical current in a given material is altered or biased through the direct application of electromagnetic energy, particularly visible light. This well established phenomenon is the basis for the development of the company's photoconductive stimulation technology. In short, the founders sought to develop a non-invasive, highly targeted, and reproducible process by which they could stimulate excitable cells, such as neurons, using electric currents. Through their photoconductive stimulation technology, they developed a process that allowed for the rapid induction of action potentials in neurons grown in culture. Further, the technology allowed for the application and reproduction of a user defined excitation pattern allowing for complex long term excitation of neurons, a valuable capability in excitable cell research and potentially drug discovery.

From these early applications, the founders were able to publish a series of high-impact peer-reviewed science publications describing the basis for their technology and its successful application in a number of research applications. The challenge going forward was how to successfully commercialize the technology and its application. Early on, the founders realized the inherent potential (*and thereby value*) of their technology being applied by other researchers in different areas of excitable cell research. Thus, an initial strategy was developed by the company to continue focusing on the research and development of future therapeutic applications for their technology while developing research applications/products for immediate commercialization.

Our primary challenges in working with Neurosilicon were assisting them toward:

1. The further development and refinement of their early production line photoconductive stimulation device or (PSD)
2. The development and implementation of a commercialization strategy for entering their target market, the life science academic research market
3. Creating the marketing and sales infrastructure that would enable and support the commercialization of their PSD product line

Building a Better Mouse Trap: Creating a Technology Development Strategy

The first step in this process was working with Neurosilicon to intimately familiarize ourselves with their technology, its capabilities, and its potential applications. Next, we sought to rigorously review their existing prototype and develop a comprehensive capabilities/functionality list that would become the basis of the value proposition and core marketing specifications for future customers. Further, we needed to conduct a rigorous market analysis of their target market to give us a better sense of the market landscape and aid us in developing a viable commercialization strategy. We were particularly interested in defining the company's strengths while identifying all relevant weaknesses and relating them to potential threats while correlating their core capabilities to potential market opportunities. Given the founders experience and expertise in academic research, and the relatively lower barrier to entry into the academic research market, as compared to the industrial applications market, the strategy to enter the market through positioning their technology as an academic life science research tool was well supported.

Several key factors further reinforced this strategic decision. The first was the company's limited resources. Secondly, given the existing relationship between the founders and key segments of the academic life science research market, greater traction could be gained quickly in this market. Additionally, industrial scientists have historically looked to the academic research space as a guide for adoption of new technologies. Looking forward, successful adoption of Neurosilicon's technology into the life science research market could potentially be used as leverage to move the technology into the larger industrial market.

Considering Alternative Directions

When considering alternative directions, the market size and value of the industrial market as compared to the academic market was an important consideration. Following an early initial angel round of financing, coupled with matching founder investments, it was felt that some "*proof of concept data*" would be needed with regard to the technology's commercialization potential before further funding rounds could be successfully pursued. Noting the higher barriers to entry and subsequent additional capital needed to penetrate the industrial market, Neurosilicon made an early decision to gain early adopter traction and sales revenue by pursuing the academic research market. Further, the differences in customer requirements (*and new product expectations*) between academic and industrial users made the academic market a great entry point for a new technology to gather valuable customer feedback and beta testing opportunities that could then be directed toward further optimization of the technology before launch into the industrial market. Lastly, the name recognition of the founders in the academic space, particularly the area of neuroscience, would help marketing efforts and the introduction of the company's vanguard product the Photoconductive Stimulation Device or (PSD).

The Road Map: Building the Business Development Plan

Operations and Manufacturing

The next critical step was building the conduit to connect the company with customers. This required the development of internal infrastructure that would encompass operations, manufacturing, marketing and sales. Each of these would play a critical role in the development and commercialization process, and integration across all of these would be important to successful strategy execution. Starting with the back end and working our way to the customer, we worked with the founders to optimize their build of materials, focusing on cost of

goods sold and pricing. The goal was to create a pricing model that would support early adoption of the new technology while maintaining production quality.

Operationally, we developed processes that would allow us to capitalize on the company's existing production capabilities which would serve to meet an initial low to moderate demand for the product. Looking ahead, we began to use early sales and beta testing of the product to gain optimization feedback that we could then feed into streamlining the production process for future manufacturing outsourcing. Outsourcing the production process to a qualified build house would not only be cost effective but would also give the company the necessary production ramp up capabilities when needed.

Building Sales Channels

With production in place, we next needed to develop the message and the messengers that would drive early sales. The traditional sales representative model employed by many of the larger life science research technology companies would be cost prohibitive in this case. To address this problem, we developed a novel virtual representative strategy that would allow us to represent the company nationally while keeping costs low. This strategy entailed identifying key regions based on target customer density and recruiting researchers (*particularly MS/PhD level scientists*) in those regions to serve as the company's sale representatives locally. The success driven compensation structure allowed us to deploy sales representatives locally in key regions covering all of the United States and Canada while keeping cost contained.

Through virtual connectivity tools, support, and ongoing training/coaching, Neurosilicon was able to deploy a sales force that could readily reach out and convey their value position to target customers. Further, by working within a familiar geographic area, the virtual sales representatives were able to employ their existing channels and networks to further their outreach efforts. Additionally, by coupling the efforts of the sales team with a dedicated lead generator also intimately familiar with the target market (*a PhD level scientist*), we were able to generate highly targeted customer lists based on the capabilities of the PSD and its value proposition to researchers (*and their individual research needs*). Taken together, the virtual sales team was able to provide localized high touch customer outreach, education, and support while keeping sales costs low.

The second prong of our sales strategy was to compliment the efforts of the virtual sales team by maximizing overall exposure of the technology and products by developing strategic relationships with reseller partners in the United States and Europe. Through developing these partnerships, we were able to align the PSD with complementary technologies and capitalize on our partner's vast marketing channels while increasing Neurosilicon's overall company visibility. Together, this strategy of internal virtual sales team and external strategic reseller partnerships worked to maximize exposure of Neurosilicon's message and products to a large number of potential customers.

Transforming the Message into Marketing

Our next challenge was to create the appropriate message that would resonate with customers and transform them into early adopters. Given that our target market was comprised of research scientists, we decided that the marketing campaign would be based on key motivators such as capabilities, cost, time to adoption (*ease of use*), and application precedent. We began the marketing process by first educating our internal virtual sales team as well as our reseller partners as to the general value proposition of the technology, but more specifically as to the

major competitive advantages of the product. Our goal was not to displace existing technology in the space, but rather to position the product as complementary tool for excitable cell research that would provide a significant competitive advantage to researchers. In addition to the general technical capabilities of the device, ease of use and rapid implementation were also important in gaining early adoption from users that critically value the time to new data generation in the laboratory. Secondly, although we did not want to position the product as a commodity, cost was kept within an acceptable range to customers, putting the product within reach of more potential early adopters. Lastly, we emphasized integration wherein the PSD could be readily integrated with existing laboratory equipment and resources. Through this rigorous education process, our sales assets would not only be best positioned to reach out and connect with target customers but would also serve as a valuable repository of information or content marketing for Neurosilicon.

As with the Neurosilicon's other efforts, marketing was also tackled in a lean and dynamic fashion. The challenge here was how to reach out to and connect with as many target customers as possible while still working within the lean company structure. We began our marketing strategy by building on the core of peer-reviewed scientific publications that highlighted the PSD technology. Researchers, our core target customers, would readily recognize these sources and would recognize the validation of the technology through the peer-reviewed publication process. We then built a cadre of digital and print materials highlighting these publications and presenting the value proposition of the product and its capabilities. To facilitate visualization of the PSD process, we developed a digital user manual and application videos that would give customers a firsthand "*feel*" for the capabilities and application of the technology.

We coupled these with the company website and a modest complimentary social media marketing effort that together provided a core set of marketing collaterals that the virtual sales team, as well as the reseller partners, could readily apply. Additionally, we sought to bring Neurosilicon's message to potential customers by employing some traditional approaches such as attending scientific meetings and conferences. This gave Neurosilicon an opportunity to interact with customers first hand, answer questions, display the product, and generate leads.

Look Back Analysis: Lessons Learned

During the course of this project, we had the opportunity to interact with Neurosilicon on a number of levels, from supporting technology development to assisting with the creation and implementation of their business plan. This project encompassed a number of very interesting challenges from the introduction of a novel technology into the market, creating sales channels and marketing resources for that product, to supporting the overall operations and management team as an integral part of the organization.

Working within the company's lean dynamic structure and limited resources created an environment where creativity, resourcefulness, ingenuity, and hard work were important to the successful commercialization of this exciting new technology. Additionally, the severely depressed economy further accentuated the necessity for aggressive, forward thinking application of novel marketing and sales strategies during the course of this project.

The development of the virtual sales force proved to be a valuable tool given that we could cover a vast sales region with limited capital costs, but it was not without its challenges. The virtual nature of the sales team brought with it connectivity challenges when conducting meetings and training sessions. Also, special care was

required to foster and grow camaraderie and team spirit as well as cohesiveness given that team members were geographically dispersed. These challenges were readily mitigated by strategic “*in-person*” team meetings at target team member locations that would allow for “*face to face*” interactions.

The success driven compensation model was also a valuable tool, but again brought with it certain challenges. Given that we were introducing a new product into the market, the product sales cycle was still indeterminate and sometimes quite stochastic, which made forecasting sales challenging. This often discouraged the virtual sales team members leading to a substantial turnover rate. Going forward, a multi-tiered compensation strategy including some type of base compensation rate based on outreach metrics coupled with sales commissions could serve to stabilize the virtual sales team model and allow it to reach its maximum potential. Once stabilized, this powerful tool could be effectively applied to allow young companies to maximize their early outreach efforts while working within a limited budget.

Coupling the virtual sales team with the strategic reseller partnerships offered a great deal of synergy with regards to maximizing sales channels. The strategic reseller partnerships developed provided Neurosilicon with a level of exposure and outreach that could not be achieved using the virtual sales team alone. However, these partnerships required substantial cultivation, given the early stage of the company, as well as substantial ongoing training and support. Despite these challenges, the combination proved viable and complementary particularly given Neurosilicon’s resource constraints.

In retrospect, I believe that a greater emphasis on marketing through non-traditional channels as well as the novel application of older marketing strategies (*such as print media*) may have had an additional impact on accelerating product adoption. Strategic application of the founders’ scientific publications and research could have also served as a nucleating point for creating a stronger social media marketing campaign geared towards our target customer. Younger researchers, such as graduate students and postdoctoral fellows, who are the life blood of research laboratories, openly embrace social media as a viable way of sharing and transferring information. In the future, tapping into this network could further extend Neurosilicon’s outreach capabilities, increase sales leads, enable and support lead education, and positively affect the overall sales cycle towards increasing sales volume. Also, attending key meetings and conferences where the company actively displays posters, puts on oral presentations, and presents workshops or symposia would serve to further capitalize on this marketing outlet.

Together, the strategy of coupling novel virtual connectivity resources and tools with well established marketing and sales channels and processes proved to be a powerful combination toward introducing the PSD technology and product line into the market and specifically to customers. Further, developing a concurrent and complimentary sales strategy that employed the virtual sales team and well known national and international resellers, maximized our sales outreach and capitalized on our marketing efforts while keeping capital expenditures manageable.

Looking Ahead: Building on the Present for the Future

Once start-ups have penetrated the market, the next challenge is how will they grow, capture market share, and ultimately become profitable. In this regard, one of the most valuable things a new company can do for themselves is create options, lots of options. Is the company poised for growth, partnership, acquisition or ideally all three? Successfully growing a start-up can open up all of these potential options thereby maximizing

the return on investments to the founders/investors through varied viable growth options. The combined virtual sales team/reseller partnership strategy could serve to position the company for growth and an increased share of their target market. Nothing says success like success and the continued adoption (*sales*) of the PSD technology would serve not only to increase revenue but also to position the company for further potential investment and/or partnership opportunities down the line.

Explosive growth requires capital and this capital can come from a variety of sources at various costs. Of the many options available to start-ups, let us consider equity investment, partnership, and exit via acquisition. Large infusions of capital, often necessary for significant growth, usually come at the expense of equity (*unless considering debt financing which we will not consider here*). This can be a difficult decision, as founders are often hesitant to give up large percentages of the company they have worked so hard to build. Also, attracting and securing investment capital is by no means an easy task, as investors are looking for investment opportunities with both great potential (*which can be realized over the course of the investment timeline*) and the lowest possible risk. The burden of presenting a strong investment opportunity is shouldered squarely by the venture seeking investment capital, thus having a strong business plan AND a track record of success (*such as sales revenue, grants received, strategic partnerships developed, to name a few*) is critical not only to securing investment capital but to doing so with the best possible terms.

If successful, and leveraged strategically, the infusion of capital, coupled with the other resources that investors can bring to start-ups (*expertise, experience, access to network contacts, others*), can be an invaluable resource to moving beyond market penetration and onto significant growth and capture of market share. Although the revenue generated by sales can also serve this purpose, usually, at least for start-ups, the time and resources necessary to generate the level of sales revenue required, coupled with a variable sales cycle, will tend not to create the in-time capital necessary for truly explosive growth. With that said, generating sales revenue early and often, even as early as pre-orders, will serve as a strong demonstration of a start-up's commercialization potential thus making it one of the elements to overall success.

The next potential avenue for growth is development of key strategic partnerships. Partnerships can offer a wealth of valuable advantages from capital through access to necessary resources, to expertise and experience needed by the company. Although not necessarily as "*liquid*" as investment capital, the resources acquired through partnerships can still be quite valuable and may not dilute company equity to the extent that investors will demand. As with investors, partners must be chosen wisely to ensure that the company gains the specific competitive advantages they require to move forward while not to giving away too much in the process. In a "*cash-strapped*" economy where investors are holding onto investment capital tightly, partnerships are emerging as ever present solutions to companies large and small seeking to maximize resources and create new opportunities for growth. Further, strategic partnerships can often serve to accelerate sales thereby serving not only to create vital revenue but to support future commercialization potential and overall company value.

Lastly, as larger companies seek to expand and diversify their technology and/or product lines they are now more than ever looking toward emerging start-ups as targets for licensing opportunities and/or all out acquisition. As with the other options discussed, choosing appropriate buyers is just as important as choosing appropriate investors or partners to any company strategy. Again, it will be important here that the founders have a clear vision of what they are looking for in an exit strategy through the sale of the company (*do they want to retain the rights to any of the IP, do they want residuals, what price are they looking for, how can they increase the perceived/actual value of their company*). Having an exit strategy from the company's inception

(which of course will be continuously evolving as any good business plan must) will be an important part of a start-ups overall business plan. Presenting a clear future value for the company and its technology (*through a clear and comprehensive market analysis and business plan*) as well as some track record of early success (*such as key partnerships, licensing deals, and early sales*) will serve to increase the number of viable suitors for potential sales deals while also increasing the company's overall potential value and final sale price.

Looking ahead, Neurosilicon and its photoconductive stimulation technology are well positioned to grow by pursuing any of these potential strategies (*some others not discussed here*). Each opportunity for growth discussed has its inherent risks and rewards. As a technology start-up, Neurosilicon possesses all of the elements necessary for success such as a dynamic team, a powerful new technology, innovative and forward thinking leadership, and a strong desire to succeed. There are still challenges ahead as Neurosilicon continues to work towards positioning itself for the best possible growth opportunity. Having emerged intact from the significant challenges of the recent economic recession, the company is set to capitalize on their current position and to catapult themselves towards the future, which by all indications looks bright indeed.