Experimentation in Academic Technology Commercialization

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1 The Joan and Irwin Jacobs Technion-Cornell Institute Experiment

Technology commercialization is now one of the cornerstones of the experience in the academic environment. Universities and colleges are now highly dedicated to understanding and giving priority not only to creating new technologies but also to commercializing them. To do so, a university doesn't necessarily have the right skills, people, or resources. So, the question is not how a university can understand how to perform commercialization better, but rather how it can achieve it in the first place. And the answer seems to be the same way that start-ups battle the challenge of growth: through systematic experimentation.

In 2010, the *City of New York* issued a competition for institutions around the world to propose a new applied sciences and engineering campus in New York City to expedite the growth of NYC's tech sector. *Cornell University* and the *Technion-Israel Institute of Technology* jointly submitted a proposal, as did 27 other institutions from eight countries. In 2011, Mayor *Michael R. Bloomberg* announced the Cornell/Technion consortium as the winner of the competition. The winning proposal outlined plans to establish a new entity, Cornell Tech, comprised of a new campus on Roosevelt Island in Manhattan, several innovative graduate programs in the applied sciences, and the *Technion-Cornell Innovation Institute*. This early iteration of the Jacobs Institute created an academic partnership between Cornell and the Technion intended to directly foster technological innovation in key New York City industries. In 2013, Dr. *Irwin Mark Jacobs*, Founding Chairman and CEO Emeritus of *Qualcomm*, and his wife, *Joan Klein Jacobs*, announced a

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$133 million gift to expand and rename the Technion-Cornell Innovation Institute as the *Joan and Irwin Jacobs Technion-Cornell Institute*. Since then, the *Jacobs Institute* has fostered experimentation at the intersection of research, education, and entrepreneurship (Jacobs Technion-Cornell Institute at Cornell Tech, 2022).

In this chapter, I will describe some of the experiences and empirical evidence that we received as we were building the *Runway Startup Postdoc Program*[1] at the Jacobs Technion-Cornell Institute at Cornell Tech (hereafter referred to as the Jacobs Institute). These experiences can help other universities and licensing professionals improve the way that they do technology commercialization. Each university and technology transfer office should consider through the lens of the community their own values and their own incentives so that they are able to more effectively apply learnings from our program to the design of their own commercialization endeavors.

2 The Problem of Entrepreneurship in Academia

Academic entrepreneurship has changed from being deemed an activity unrelated to the pursuit of research excellence to a key component of an academic curriculum. Even further, studies now consider commercial work by academics to be drivers of important advances in science (Fini et al., 2021). Although seeing a university as a place of fundamental entrepreneurship is not new and can be traced back to the 1990s (Clark, 1998; Zucker & Darby, 1996), seeing entrepreneurship as the role that the university should play in an emerging entrepreneurship society has only been considered since the 2010s (Audretsch, 2014). It is not uncommon now to see universities creating incubator programs, fostering academic commercialization, and even using a *triple helix* model for their incubator operations (Nerva Blumho, 2021).

It is now understood that entrepreneurship requires an active behavior and not just intentions (Adam & Fayolle, 2015), a set of actions that motivates both institutions and entrepreneurs to act to create the new companies that are part of the necessary entrepreneurship journey. This means that universities are now challenged to experiment and intentionally create to be able to fulfill their aspirations as drivers of entrepreneurship and economic growth. And doing so requires engaging faculty, staff, and most of all alumni. There's evidence to suggest that a recent graduate (at least in science and engineering degrees) is twice as likely to start a business than a professor (Åstebro et al., 2012). It has also been reported that greater success in the incubation of start-ups from the academic environment is achieved when academic inventors are engaged during the development phase (Agrawal, 2006).

Not all academic engagement with industry has the purpose of entrepreneurship. Studies have also shown that academics can engage with industry motivated by furthering their research and not by commercializing their knowledge (D'Este &

[1] Selected content in this chapter has been used from https://tech.cornell.edu/programs/phd/startup-postdocs/. Used with permission

Perkmann, 2011). Even in some cases the main motivation can be of academics trying to enhance their academic position and standing (Fini et al., 2008). Therefore, it's not a given that having an academic incubator or starting an academic entrepreneurship program would yield the desired outcomes or would enhance the academic ecosystem.

Previously, our team at the Jacobs Technion-Cornell Institute had reported on an experimental program called the *Runway Startup Postdoc Program* (Haan et al., 2020). This program is aimed at filling an unmet need from a well-known academic population (postdoctoral researchers) and is in essence an experiment that could have failed. But experimentation should be a core activity of the academic endeavor, not just in the interest of science but also in the pursuit of entrepreneurship excellence. This is the same as with start-ups, which necessarily experiment to succeed. We can draw from the field of technology management (Rancic Moogk, 2012) to ascertain that to achieve a successful academic incubator minimum viable product (MVP), universities need to experiment. In this chapter, I will draw upon our experiences in the *Runway Startup Postdoc Program* and other incubator programs to recommend some areas in which experimentation might be beneficial for academic incubators and technology transfer offices.

Runway Startup Postdoc Program at Jacobs Technion-Cornell Institute at Cornell Tech[2]

The *Runway Startup Postdoc Program* is part business school, part research institution, and part start-up incubator. Based at the Jacobs Technion-Cornell Institute, Runway ushers recent PhDs in digital technology fields through a paradigm shift – from an academic mindset to an entrepreneurial outlook. These postdocs arrive with ideas for unproven products and markets that require time and specialized guidance to develop. These start-ups demand more than a few months to launch. They need a bit of a "runway." That's why our program lasts 12 to 24 months and incorporates academic and business mentorship. The Runway Startup Postdoc Program provides an impressive package valued at $277,000 that includes a salary, research budget, housing allowance, space, and more in the first year. In addition, each postdoc receives significant benefits, perks, and corporate support valued at $300,000. ◄

3 Experimentation

Experimentation in technology transfer requires three major phases (see Fig. 1):

[2]The content of the Runway Startup Postdoc Program example section has been used from https://tech.cornell.edu/programs/phd/startup-postdocs/. Used with permission.

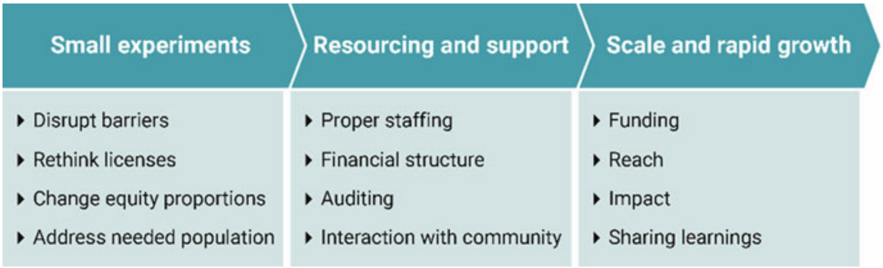

Fig. 1 The three phases of creating an experiment in technology commercialization include small experimentation, resourcing the program, and finally scaling up (author's own figure)

1. An initial phase where small but significant experiments are targeted to disrupt barriers in the traditional tech transfer process or are aimed at building a base for new tech transfer programs.
2. A phase where successful changes are maintained in time through proper resources and support from the academic environment.
3. A final phase for scaling and rapid growth, where changes and experiments become the norm and the drivers of entrepreneurship growth.

In this chapter, I will draw from our experiences at *Cornell Tech,* the *Jacobs Institute,* the *Israel Institute of Technology*, and from the literature on other incubator/accelerator academic programs to organize the process of experimentation and provide useful recommendations to successfully achieve meaningful change in technology transfer systems.

3.1 Hiring

The most basic experimentation in the process of academic entrepreneurship should be a commitment to rethinking the way we hire in an academic setting. Building a successful academic entrepreneurship system already requires us to rethink the roles and incentives of each actor involved, such as faculty, students, transfer officers, and postdocs (Siegel & Wright, 2015). But most universities never think of changing their hiring habits, which is fundamental to the population and skills that you will require for a successful entrepreneurial academic population. Studies have suggested that academics with a more entrepreneurial personality can only be recognized by a person-oriented approach rather than a variable-oriented trait approach (Obschonka et al., 2019), meaning that we have to start using models like the "big five" personality traits, not to understand our current faculty but rather to decide our future faculty. A university that wants to be successful in creating a new model of technology commercialization should start by changing hiring practices of academics and working with university management to establish new criteria for entering faculty and staff (Obschonka et al., 2012).

Of course, such change at an institutional level is easier said than done. At the Jacobs Institute, we initially focused on postdocs because it's a population that has a more accepted variety in hiring requirements. We focused on keeping the standards for academic excellence and scientific background, requiring that any postdoc be as good as if they were being considered for a postdoctoral position in any other unit of the university. But we also added entrepreneurial traits and personality profiles to the application process (Jacobs Technion-Cornell Institute at Cornell Tech, 2022). These traits comprise two out of five of the critical requirements for being hired as a Runway Postdoc, making entrepreneurial personality a large component of the selection process. Further experimentation will be done on the weight of these traits, on personality profiling, and skill assessment. But changing the established thinking on who was hired has been an immensely relevant component of the success of a novel tech transfer endeavor.

3.2 Licensing

Licensing practices and technology transfer offices (TTO) in universities have been extensively studied (Thursby et al., 2001). The traditional tech transfer and licensing approach follows, more or less, a defined series of events:

1. Faculty/staff disclose a technology to TTO.
2. TTO studies the feasibility of such technology and potential for commercialization.
3. TTO informs faculty of intention of pursuing patenting.
4. TTO and faculty pursue patenting (provisional stage).
5. TTO evaluates commercialization avenues, potential royalties.
6. TTO negotiates licenses, including royalties and equity participation.

This system of licensing has been predominant since the introduction of the *Bayh-Dole Act* (Mowery et al., 1999). And there's evidence that this system has not necessarily increased the creation of new technologies but has driven universities to more technology marketing activities which were not a previous focus (Thursby et al., 2001). From our experience, this series of licensing steps is unnecessary and uncorrelated with the creation of new technologies or new spinouts. In our experiment, we focused on the entrepreneur as the driver of the commercialization potential and flipped the script on tech transfer activities to create this new process (see Fig. 2):

1. Postdoc (staff) receives a blanket license for any technology created during the fellowship. License is standard, equal for every postdoc, and contains no royalty payments.
2. License is signed in a day.
3. If a postdoc has a technology to patent, no disclosure is necessary. Preliminary patent application is drafted using a selected IP patent law firm.

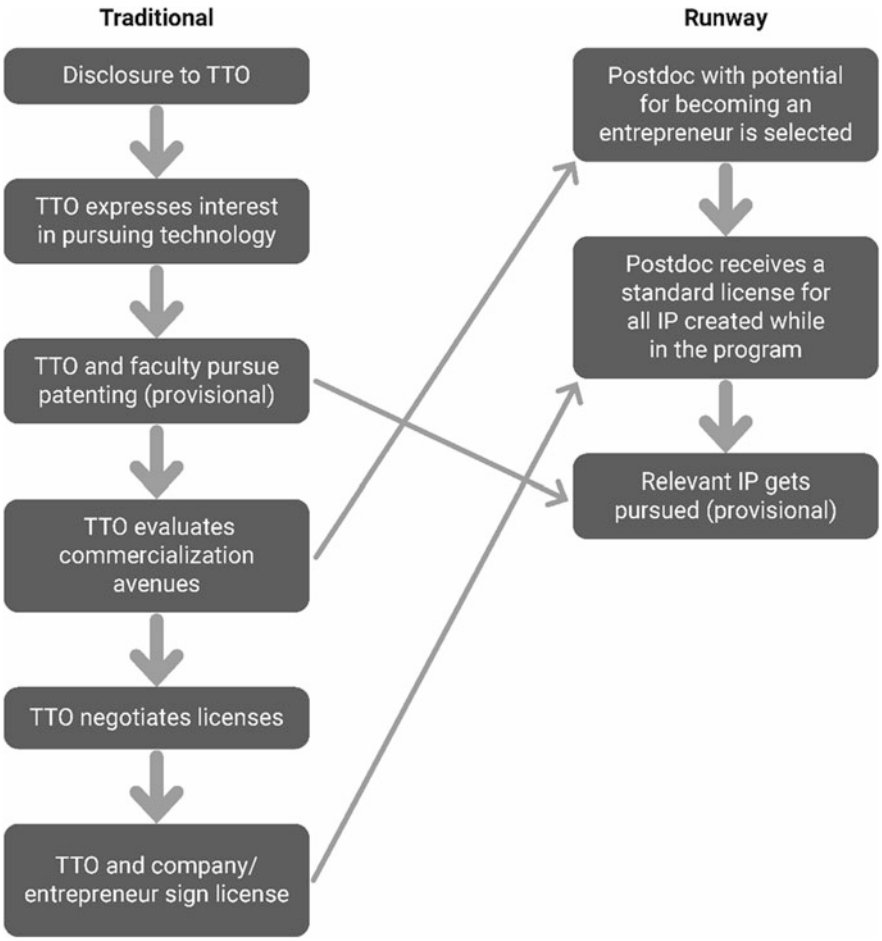

Fig. 2 In the *Runway model*, some steps of the traditional tech transfer process are eliminated, some are simplified, and the order is reversed, giving priority to find the entrepreneurs that will be the vehicle for commercialization (author's own figure)

This experiment was done to eliminate the complexity of trying to understand optimal royalty agreements or payments in early-stage companies. Although many studies have tried to understand patterns in university licensing (Thursby & Thursby, 2007), it was not clear to us that we could have accurately predicted the revenue potential of such early technologies. Therefore, we eliminated those royalty calculations and focused on licenses where the university would share in equity of a new start-up created by the postdoc. We believe over the long term, the resulting return on equity will be the relevant component in a successful commercialization effort. Adopting a standard license model is now becoming a norm in university systems. Fast-track licenses are appearing (Cornell University, 2012) in recognition that early-stage ventures are difficult to predict, and that speed in licensing might be more beneficial for a start-up to succeed. Changing the process also yields an immediate benefit for key performance indicators (KPIs) of TTOs: In our model, 100% of technologies are licensed. TTOs could adopt similar experiments in licensing and shift resources to systems that train and guide academic entrepreneurs.

3.3 Patenting

Patenting has been not only a long-standing practice of universities even before the Bayh-Dole Act (Mowery et al., 1999) but an integral part of their goal of creating and protecting what would be considered "profitable" discoveries (Coupé, 2003). Nevertheless, there are studies that have found little or weak correlation between the act of patenting by universities and technical change (Pavitt, 1998). So, should an experiment in technology transfer focus on patenting? We believe yes, but only by providing incentives to patent useful knowledge and by reducing the barriers to patenting from start-ups. In our *Runway Startup Postdoc Program*, we decided to experiment with two components that would reduce the barriers to patenting:

1. We introduced the cost of one patent into the equity received by the university upon licensing. The cost of a patent was determined to be $25,000 and was to be included in the amount of the simple agreement for future equity (SAFE) (YCombinator, 2022).
2. We created a vehicle by which the *Jacobs Institute* can pay for patent costs in return for an additional $25,000 SAFE instrument.

These two experiments had an interesting effect. First, academic entrepreneurs understand that they are giving equity to the university and don't want to lose the opportunity to file for intellectual property that is already included in the license agreement. The result in our program was that 37 postdocs have filed for 48 patents, a 1.3 patents/postdoc average. The second experiment helps reduce the burdening costs of patenting for early start-ups. In our program, we had a single entrepreneur file for five patents that were required for a strong IP position (for a medical device), which would likely be a prohibitive cost for an early start-up with early-stage angel funding.

Incubator programs should work closely with TTOs to create similar experiments that motivate academic entrepreneurs to create useful patents and to build strategic IP positions necessary for commercial success. In fact, there are studies that show that strategic patenting has been positive in increasing the market value of software firms and that this type of approach does not lead to excessive or unnecessary patenting (Noel & Schankerman, 2013).

Case: Shade

In 2014, *Dr. Emmanuel Dumont* came to the Runway Startup Postdoc Program right after finishing a PhD in Biophysics. In France, he had worked understanding the effect of radiation in human tissue and wanted to explore entrepreneurship in this field. The Runway Program helped in ideate and find the right market. In 2015, Dr. Dumont founded *Shade*, a company that has invented the smallest and most powerful UV sensor that can help people with immune diseases like lupus reduce and control their exposure to sunlight. *Shade* works with renowned hospitals including *Northwestern Medicine* and the *Hôpital Européen*. The Runway Program supported the filing of seven patents that were needed to build the hardware and the IP position of *Shade*. Without the ability to file such a wide portfolio of patents, *Shade* would have been a non-starter. The Runway Program took additional equity participation in the company and paid for the patenting costs. This allowed *Shade* to build a strong IP position that has been necessary for their commercial work. Under the traditional IP model, a company like *Shade* would have been constrained by too little initial capital, and IP costs would have consumed the company. ◀

3.4 Investment

It is a widely accepted notion in entrepreneurship communities that early investment and access to the right capital are a competitive advantage in the creation of successful academic start-up ecosystems. The important role of early-stage venture is well studied (Jeong et al., 2020), and the emergence of academic venture funds, such as *MIT's The Engine* (MIT, 2022), demonstrates the importance of providing the right early investment to academic teams. But not every university has the resources, connections, or capacity to raise such early-stage venture funds. In our program, we decided that early-stage investment should serve two primary functions:

1. To pay for basic sustenance of the entrepreneur. By providing funding as salary, an entrepreneur is forced to allocate a basic amount to the cost of living, and the stress of basic living expenses is reduced.
2. To give an initial amount of money for basic corporate expenses.

With this in mind, we created a simple incentive table (see Table 1) in which an entrepreneur would have two options between salary and research budget. The idea of this experiment would be to motivate entrepreneurs to choose a lower salary to have more funding per company expenses.

Table 1 Two salary options are used to gauge the commitment of the entrepreneur to allocate capital the right way depending on their product/service

Option	Salary	Research budget	Total
Option 1	$61,000	$46,000	$107,000
Option 2	$80,000	$20,000	$100,000

We found that most entrepreneurs preferred *Option 1*, which gave them more funding for corporate expenses and pushed them to raise venture capital sooner. Entrepreneurs that were building *Software as a Service (SaaS)* companies tended to prefer the higher salary due to low corporate expenses. This experiment did not provide a large amount of capital. Rather, it allocated capital in a way that made the entrepreneur own the choices and plan for future expenses. Most universities will not be able to provide large capital funds to academic start-ups directly, but they can certainly experiment with a simple funding structure that motivates academic funders to seek the necessary capital.

4 Growth

These four areas of experimentation set the foundation for a second stage of growth. Once academic start-ups are provided with that support, the TTO or incubator can begin focusing on experiments that will support the growth of the portfolio of early-stage companies. Table 2 shows the investment progress made at the *Runway Program*, per cohort, and a simple way of how a portfolio can be tracked.

The portfolio manager can track the details of each investment, and it would be optimal to use professional portfolio management software such as the ones offered by *Carta*, *Shoobx*, or others. However, a simple tracking system can have:

- **Cohort:** Tracking by cohort is important to understand market changes and the progression of value of the program through time.
- **SAFE value:** This is the addition of all SAFE instruments signed within a cohort. It includes SAFEs signed for the initial investment and SAFEs signed for other purposes, such as for additional patents.
- **Jacobs equity valuation:** It is the valuation of the equity (preferred stock) that has been received when conversion from SAFE to stock occurs. This is calculated as the number of shares times the share price.
- **Difference:** This is the difference between all SAFEs issued and the equity that has been prices. Since price equity can be liquid in the future, it indicates the potential for return on invested SAFEs.
- **Current company valuation:** The valuation as reported by companies in their latest financing round.
- **SAFEs outstanding:** The value of SAFEs not yet converted into preferred stock. SAFEs are inherently risky, and any unconverted SAFEs can become write-offs for a TTO.

Financial performance is only one part of a successful program. During the growth phase, the right mentoring and staffing are necessary to continue with the experiment.

Table 2 Example of a simple *Runway Program* investment tracking table. Even though more financial information can be gathered, this simple table can be used to track the economic performance of the portfolio

Cohort	SAFE value	Jacobs equity valuation	Difference	Current company valuation	SAFEs outstanding	Difference – no value
1.1.2014	$1,440,000	$1,352,952	$932,952	$149,000,000	$360,000	$(920,000)
1.8.2014	$960,000	$310,000	$150,000	$46,000,000	$235,000	$(650,000)
1.1.2015	$150,000	$ –	$ –	$ –	$ –	$(150,000)
1.8.2015	$570,500	$534,383	$793,520	$8,500,000	$ –	$ –
1.8.2016	$709,000	$1,304,757	$745,757	$49,000,000	$150,000	$(150,000)
1.8.2017	$831,000	$546,045	$269,045	$10,500,000	$554,000	$(554,000)
1.1.2018	$209,000	$1,622,032	$1,413,032	$40,000,000	$ –	$ –
1.8.2018	$1,283,000	$732,431	$28,043	$15,146,068	$831,000	$(831,000)
1.9.2019	$1,018,750	$ –	$ –	$ –	$1,018,750	$(1,018,750)
1.9.2020	$678,000	$ –	$ –	$ –	$678,000	$(678,000)
1.9.2021	$875,000	$ –	$ –	$ –	$875,000	$(875,000)
	$8,724,250	$6,402,602	$4,584,739	$318,146,068	$4,701,750	$(5,826,750)

4.1 Mentoring

Mentoring is a complex process that is composed of interest-based processes as well as altruistic motivations (Yitshaki & Drori, 2018). Good mentoring programs are also difficult to staff, manage, structure, and execute (Sanchez-Burks et al., 2017). Good mentoring networks are perhaps the number one competitive advantage of most sought-out incubator programs, such as *YCombinator*, *Techstars*, *500 Startups*, among others. University incubators traditionally reach out to their alumni networks and close networks to create a mentoring network capable of supporting early start-ups. But this is easier for universities that are around mature ecosystems like *Silicon Valley*, *Boston*, *New York*, and the *Research Triangle*.

In our experimentation with mentoring, we recognized that mentoring has a natural churn or change dynamic. In fact, we expect that there will be a mismatch between mentor and mentee for the simple reason that a mentor relationship is not only based on industry knowledge but also requires a personality fit. While other programs would remove a mentor for a bad fit (Sanchez-Burks et al., 2017), we decided to normalize potential mismatches but provide opportunities for mentors to interact in structured settings such as weekly scrum sessions or quarterly board meetings.

Entrepreneurs are also encouraged to find at least four types of mentors: academic, industry knowledge, venture capital, and practical entrepreneur. While they might not find these four during the initial year of incubation, the structure makes them aware of the complementary skills required in long-term mentoring.

Case: Biotia

In 2015, *Dr. Niamh O'Hara* was working on next-generation sequencing technologies and wanted to find a way of transforming that knowledge into a company that would use the power of sequencing. Dr. O'Hara came to the Runway Startup Postdoc Program and teamed up with *Dr. Chris Mason* at *WCM* to begin creating the largest sequencing database of pathogens in the world. The Runway Program supported her as she explored product-market fit until finding it. Dr. O'Hara is now the CEO of *Biotia*, a company that has raised over $4 million and has sequenced pathogens and viruses swabbed from the subway of New York all the way up to the *International Space Station*. *Biotia* required three years of work to find the right product-market fit. Under a traditional TTO model there would have been no economic support for an entrepreneur for such a long time to continue to build the product. *Biotia* required time and investment to get to the stage where the product was able to be deployed commercially. ◄

4.2 Staffing

Studies in key factors affecting the success of an entrepreneur while inside an incubator program have recognized the assistance provided by incubator staff as one of the five most important success factors (Isabelle, 2013). Staff members that are experienced, are former entrepreneurs, or have extensive networks to an ecosystem of funders, founders, institutions, and strategic partners are necessary for an early-stage academic incubator to succeed (Todorovic & Moenter, 2010). But having staff can also be expensive and ineffective. It is therefore important to understand what the optimal resource allocation can be, especially when constrained by staff budgets.

In the beginning of the Runway Startup Postdoc Program, a staffing budget was nonexistent. The only staff member was the director of the program, making it difficult to provide the level of services required by companies. One experiment that we ran to relieve some of the staffing pressure was to use each cohort as the staff/mentor resource for the incoming cohort. For early-stage start-ups, most of the resources given by staff are access to partnership programs and effectively replying to questions regarding incorporation, funding, partnerships, etc. Alumni founders and even cohort members that are farther along in their entrepreneurship journey can take over some of the roles that staff members play in incubators. This relieves monetary budget pressures and builds cohort unity. The role of early founders, meaning founders in their second or third year of entrepreneurship, is key to building an incubator that is effective even with a low staffing budget.

Proper staffing can also become a key factor in connecting entrepreneurs with relevant capital sources. And staffing requirements may vary significantly depending on the geographical location of the incubator program. For example, a program in *New York* or *Israel* might require staff who are acquainted with the local ecosystem, while a program based in *Thailand* might benefit more from staff members who know foreign ecosystems (Solan et al., 2021).

Case: OneThree Biotech

In 2018, *Dr. Neel Madhukar* was a PhD candidate in Computational Biology and Medicine when he became interested in entrepreneurship. He started by attending the *Bioventure eLab program* and participated in its *Business Plan Challenge*. With the support of *Dr. Olivier Elemento*, *WCM*, and the Runway Startup Postdoc Program, Dr. Madhukar continued to explore the use of computational algorithms developed by him and the *Elemento Lab*. Dr. Madhukar soon founded *OneThree Biotech*, a company that now works with some of the largest pharmaceutical companies in the world (including *AstraZeneca*, *Boehringer Ingelheim*, *Oncoceutics*, and *Jubilant Therapeutics*) to help them improve their drug discovery pipeline, particularly for rare cancer diseases. *OneThree Biotech* has raised over $2 million and is headquartered in New York City. When Dr. Madhukar entered Runway, he knew he needed to license IP that had been generated at *Weill Cornell*. Runway allowed him to have the time and support needed to build the strategy to effectively license IP in the traditional TTO model while simultaneously licensing IP in the new model. *OneThree Biotech* shows that the Runway model can also work with traditional TTO offices and build a path to improving commercialization without changing all TTO practices. ◀

5 Scaling

The last and most critical part for a long-term technology transfer and incubation operation is to achieve scale. There's not a single definition of what output constitutes scale, but with more and more start-ups coming from the academic environment, more attention should be paid to how services and resources can be deployed in a scalable manner. In the same way as for early start-ups, scaling brings challenges in terms of human resources, capital, and general resources (Reypens et al., 2020). Our programs are presently going through this challenge, and we have identified two large areas where experimentation can help our scaling efforts.

5.1 Curriculum

Curriculums in tech transfer programs or incubators can be seen from two angles: They can be thought of as uniquely developed programs (not related to degree-granting curriculums) to increase the success rate of academic start-ups (Wiradinata & Antonio, 2019), or they can be seen as extensions of current degree programs, such as undergraduate and graduate business entrepreneurship programs (D'Cruz & O'Neal, 2003). Both approaches can be optimal and contribute to the success of academic entrepreneurs. Currently, both approaches rely heavily on the curriculum set by the *National Science Foundation's iCorps Program* (National Science Foundation, 2021), and while this curriculum is a good foundation, it does not address all the key success roadblocks of academic entrepreneurs.

In our *Runway Startup Postdoc Program*, we went beyond *iCorps* and focused on developing a curriculum that addressed key aspects that hinder academic entrepreneurs. Through observation, mentor feedback, and data gathering, we recognized a few areas where a targeted curriculum would yield extremely positive results for our entrepreneurs:

1. **Decision-making:** Academic entrepreneurs have years of training on data gathering and analysis. During a PhD program, for example, a scientist can gather vast amounts of information and has months or years to analyze and make decisions about it. But that's not the time frame of a start-up, and academic entrepreneurs suffer greatly from analysis paralysis (Stagars, 2014). We have focused on a specific training using executive coaches that addresses decision-making and gives entrepreneurs a methodology for making decisions (Strauss Einhorn, 2017).

2. **Selling themselves:** Entrepreneurs tend to understate their achievements or hide their achievements in technical jargon. Effective communication of value requires retraining for a technical person, one who has spent many years in academia focusing on technology. We experimented with different ways of providing this training, from hiring marketing agencies or actors to PR consultants. We now provide training with an entrepreneur who specializes in building "irresistible organizations."
3. **Self-kindness:** Entrepreneurship is brutal. It requires relentless commitment and nonstop work. The best qualities of successful entrepreneurs, such as grit, discipline, and commitment, can also be the worst. There is nascent literature on entrepreneur burnout (Sheperd et al., 2010), but it should be a growing area of concern, especially for high-performing TTOs and academic incubators. We have experimented with providing a variety of community-based mental health trainings and resources to our entrepreneurs. Also, we take an empathy-first approach to mentoring where mentors support an entrepreneur in hard times. Universities should have a mental health strategy before starting incubator programs and a strategy that goes beyond the employee resources normally provided to staff and faculty.

5.2 Resources

The last challenge concerns how to scale resources. As mentioned earlier, financial, and staffing challenges arise (Reypens et al., 2020) when these programs start to work with dozens of entrepreneurs per year. The best strategies for resource scaling might have come from learnings from the COVID-19 pandemic: Online tools can be as effective as in-person ones, and hybrid, flexible approaches will be preferred by entrepreneurs moving forward. In our program, we are currently experimenting with transitioning most of our content and trainings to online modules that can be offered as flipped classrooms. We also changed in-person scrums and meetings to a virtual format, and program meeting times to suit the schedules of mentors on the *West Coast*, *East Coast*, *Europe*, and *Israel*. This has allowed us to bring more alumni entrepreneurs into relevant strategic discussions and to build a larger resource and support community. We still have much to learn about the right approach and the limits of full online resourcing, but we are ready to pivot or allocate resources to experiment as new communication technologies become preferred.

6 Learnings and Takeaways

The process of incubation and acceleration in academic settings is analogous to the challenge an early start-up has, one of *building*, *growing*, and *scaling*. Thus, experimenting should be a natural component of incubator programs and the most effective way of producing meaningful change in technology transfer systems that are decades old and that, through university policy, have no motivation to change.

The experience of the *Runway Startup Postdoc Program* at the *Jacobs Institute* has demonstrated that constant experimentation can create small yet powerful changes that eventually permeate through the larger academic institution. Our recommendation to academic incubators and TTOs is to embrace experimentation and build a technology transfer culture that is less concerned about the traditional output metrics (i.e., patents, licenses, revenue) and is more geared toward providing people with the *resources*, *connections*, and *knowledge* they require to create a start-up.

Takeaways

- **TTOs:** Understand that a more effective strategy for technology commercialization is based on finding the entrepreneur who will be the vehicle of commercialization, not in promoting technology disclosures.
- **Start-ups:** Reduce the time it takes to negotiate licenses by agreeing to standard and simple licenses that consider the unknown nature of start-ups. Negotiate simple equity stakes and payments that do not deplete the company of cash early in its life.
- **Investors:** Help TTOs select entrepreneurs, show them your tools to create effective teams, and join universities with funding in the stage of the commercialization process which suits better your investment thesis.
- **Corporations:** Use the same runway or new experimentation model and discover populations within your company (e.g., scientists) that are underserved and have a high potential for becoming new product/company leaders.
- **Universities:** Allow for institutional programs that experiment, fail, and push the boundaries of technology transfer. Motivate these programs to build an ecosystem of mentors that augments the university as a whole.

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