**Academic Entrepreneurship for Medical and Health Scientists •
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Resources at Academic Entrepreneurship Centers

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Published on: Sep 23, 2019

DOI: 10.21428/b2e239dc.470d1213

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Topic Relevance by Timeline

Summary

- Universities harbor numerous resources for academic entrepreneurs.
- Academic entrepreneurship centers differ: the more comprehensive ones provide an array of services that support innovations at all stages of development.
- Universities often have educational programs to teach faculty about entrepreneurship; usually offered in business schools, they are increasingly being offered in engineering and medical programs.
- Entrepreneurship education increasingly involves experiential learning.
- Other entrepreneurial support at academic institutions includes: incubators, accelerators, mentoring, business plan competitions, and other programs that support the creation and maturation of startups.
- University seed funds can help early-stage startups breach the funding gap and attract new investors.
- Technology transfer offices (TTOs) focus on intellectual property (IP) protection for innovations stemming from university research, and increasingly provide other services and linkages that support the commercialization of innovations.

Introduction

Universities, as the epicenters of academic exploration, are a key site for the creation of innovations. However, the road between discovery and commercialization often is one fraught with complications. Academic institutions are replete with resources to support entrepreneurs along this journey. They often provide cross-department collaborators, educational resources, seed funding, IP services, and entrepreneurial centers to help startups ([Figure 1](#)).

Figure 1
What Academic Institutions Offer.

Classroom Education

Although it may seem daunting for an academic clinician to enter the world of entrepreneurship, many universities provide classroom-based opportunities for a guided introduction to this topic. These courses often provide a broad overview of the principles of innovation and entrepreneurship and are targeted toward individuals with limited prior exposure to the area. Some of these courses are interdisciplinary and involve team-based projects with students of diverse educational backgrounds, thus providing an immersive experience in entrepreneurship.

Northwestern University's McCormick School of Engineering, through the Farley Center for Entrepreneurship and Innovation, provides a course entitled "NUvention: Medical." This course walks the student through the steps required to bring a medical innovation from an idea to the bedside; interdisciplinary teams of students work through the intellectual property, regulatory, and business processes that bring a medical innovation to market (see the chapter "[Intellectual Property: Commercializing in a University Setting](#)").

The Stanford Biodesign Innovation Fellowship is perhaps the most established training program that focuses on health technology innovation. It centers largely on experiential learning rather than classroom-based activities. Selected fellows are split into interdisciplinary teams that identify an unmet clinical need through immersion, generate a device concept, and develop a business strategy over a ten-month period (see the chapter "[Identifying Unmet Needs: Problems that Need Solutions](#)"). Projects initiated during this fellowship have spawned over 40 health technology companies since 2001 with an aggregate of \$713 million in raised funds ([Wall et al.](#)).

University Collaborations

Universities are often staffed with domain experts scattered throughout the various schools and academic departments. Through collaboration, entrepreneurs can leverage this abundance of expertise to form multidisciplinary teams that successfully advance new enterprises ([Figure 2](#)).

Medical schools with associated hospital partners can provide critical assistance to healthcare entrepreneurs. Medical school faculty are often content experts and researchers who focus on specific diseases and have an in-depth knowledge of their specialties. These faculty members can provide invaluable feedback to entrepreneurs on clinical needs and critique early stage innovations. Hospital systems that are affiliated with universities can offer entrepreneurs access to many end users of potential products, whether they be patients or providers.

Business schools provide access to students and faculty with expertise and interest in entrepreneurship, small business development, and marketing. These schools often have an extensive network of alumni working in diverse fields who can provide advice and guidance. Some business schools have created mentoring networks available to entrepreneurs across the university and beyond. Often entrepreneurship centers are found in or affiliated with university business schools, and they sometimes sponsor

class projects that involve faculty and students helping startups, sponsoring business plan competitions, and providing direct services.

Engineering schools are invaluable to an entrepreneur seeking to develop a medical device or a digital health platform, as their faculty might have expertise in biomedical, electrical, mechanical, or computer engineering. Bringing such experts on board as collaborators is both helpful and often necessary, depending on the nature of the venture being developed. Engineering undergraduate students also often have design projects during their senior years as a requirement for graduation; these students may be eager to work on new and interesting ideas with practical ramifications. An important benefit for entrepreneurs working on new devices is access to university engineering facilities. Collaborations can provide access to equipment for prototyping and iterating.

Beyond university departments, student groups and events can be immensely helpful in the early stages of idea development. Universities often host design competitions or “code-a-thons” in which teams of students rapidly, often over the course of just a few days, turn ideas into new medical device prototypes or software. These competitions often seek out ideas and assistance from people with clinical experience.

University Division	Offers
Medical Schools	<ul style="list-style-type: none"> • Knowledge
Business Schools	<ul style="list-style-type: none"> • Network • Entrepreneurship Education • Business Development Expertise
Engineering Schools	<ul style="list-style-type: none"> • Collaborators • Testing • Technical Analyses/ Feedback • Instrumentation/Fabrication
Student Groups	<ul style="list-style-type: none"> • Help for Idea Development • Market Assessments
University Hospitals	<ul style="list-style-type: none"> • Testing • End Users

Figure 2
Services That University Divisions Offer.

One particularly important benefit of university collaboration across schools and within schools is that, in most cases, collaborators within a university operate under the university's IP policies. This allows for free discussion among colleagues who are

also covered by the university's IP policy without the need for a nondisclosure agreement (which is often recommended when disclosing IP to external individuals not covered by the university's IP policy). Such dialogue can substantially enhance the internal exchange of ideas and accelerate the product development process. Further, the Bayh-Dole Act, which allowed universities to pursue ownership of IP that resulted from federally funded research, allows for the findings of productive research collaborations to be developed and used for the public good (e.g., technology transfer that leads to commercialization). The university's technology transfer office will handle related patent and licensing activities and arbitrate disputes/disagreements between coinventors. It is important to talk to the technology transfer office to better understand how nondisclosure agreements operate in regards to internal and external advisors (see the chapter "[Working with the University Technology Transfer Office](#)"). Also, it is very important to document discussions with collaborators in a lab notebook or an invention notebook so that it is clear which components of the invention came from which person.

Innovation Centers

Some universities have formed entrepreneurial or innovation centers dedicated to providing support services to budding entrepreneurs (see the chapter "[I-Corps as a Training Tool for New Technology Development](#)"). Some of these centers do not only provide services but also act as bridges between academic researchers and potential collaborators within the university and externally. They often employ staff who can help during all stages of development and can assist in registering intellectual property rights.

The Harvard i-lab, part of the Harvard Innovation Labs, provides Harvard students and faculty with both physical and intellectual resources ([Harvard Innovation Labs](#)). They have office hours with experienced entrepreneurs, legal partners, venture capitalists, and faculty mentors who can assist with moving ventures forward. Additionally, the i-lab holds numerous workshops that instruct entrepreneurs on the fundamentals of innovation while providing opportunities for networking. This center also hosts the Venture Incubation Program, which provides accepted ventures with access to intensive advising and numerous resources over a 12-week period. There are a number of similar innovation centers at leading medical institutions and universities throughout the country, including the Brigham Innovation Hub ([Brigham Digital Innovation Hub](#)), the Penn Center for Innovation ([Penn Center for Innovation](#)), the

University of Michigan Fast Forward Medical Innovation Unit ([Fast Forward Medical Innovation \(FFMI\) — Innovation Lives Here](#)), and others.

Some universities have also formed separate nonprofit research foundations or institutes that serve a technology transfer function, and sometimes provide additional entrepreneurial and commercialization services for academic entrepreneurs. These affiliated but independent non-profit institutes are usually established to keep a legal distance from the university.

Seed Funding

Many universities have opportunities for small seed and pre-seed grants that are targeted toward startups very early in their development. Universities are uniquely positioned to provide financial support when startups are early in their development for a number of reasons. Early-stage startups often face a funding gap when they have an idea but lack the resources to develop prototypes or processes to a sufficient stage where they can attract external funding. In recent years, more universities have been willing to provide researchers and academic entrepreneurs with small amounts of seed funding to develop innovations stemming from university research. An added benefit to universities seeding startups is that the original funding is more likely to leverage additional external funding. Funders are often more apt to seed startups that have already received funding from other sources. Federal early-stage capital (provided primarily through grants from the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs) are more likely to be approved if projects have already obtained such funding commitments ([Herber et al.](#)) (see the chapter “[SBIR/STTR Grants: Introduction and Overview](#)”).

There are numerous examples of university seed programs. The University of Chicago has a [\\$20 million innovation fund](#) that provides grants or investments in the range of \$25,000 to \$100,000. [The Horizon Fund](#) at the University of Texas similarly invests in startups founded at the university with awards of \$100,000 to \$2 million.

Technology Transfer Offices

University TTOs provide indispensable assistance to academic entrepreneurs (see the chapter “[Working with the University Tech Transfer Office](#)”). The TTO’s main function is to protect IP through invention disclosures, patents, and licenses to existing firms or startups. They serve as intermediaries between university-based scientists and external private entities and can assist in commercialization. The TTO’s function has shifted somewhat in recent years. Traditionally, TTOs were focused on licensing

intellectual property to existing companies ([Siegel et al.](#)). More recently, university TTOs have begun to support the formation of startups by university students and faculty ([Baglieri et al.](#)).

Clinical Research Support

Universities associated with medical centers are ideally positioned for the initial testing of innovations that are targeted toward patient care. The NIH provides funding for universities for the development of innovative medical discoveries through its Clinical and Translational Science Awards (CTSA) program (see the chapter on “[Clinical and Translational Science Awards](#)”). Through this program, many academic medical centers have opened Clinical and Translational Research Centers (CTRC) that have expertise in the performance of small early-phase clinical trials as well as larger studies. These CTRCs can provide academic entrepreneurs with study design support, physical infrastructure for the enrollment of study subjects and tests, lab specimen processing, and other services for testing innovations. Academic centers may also have affiliated veterinary medicine schools that can provide assistance with preclinical research (see the chapters “[Preclinical Animal Models](#)” and “[Development Strategies for Animal Medical Therapeutics](#)”).

Conclusion

Universities are in many ways the ideal homes for the creation and development of innovations. By design, they are multidisciplinary hubs that are filled with discovery-minded and motivated staff. Additionally, universities have a financial incentive to encourage their students and faculty to innovate; intellectual property yields through licensing and startup development can be lucrative. As a result, support structures like technology transfer offices and innovation centers have been created at universities to shepherd academic entrepreneurs through the development process and meet their obligation to ensure that their research is developed and used for the public good. Universities do this by supporting the product/process development and commercialization, and by supporting academic entrepreneurs who will create startups to disseminate research and development results.

Resources

The Impact of Postgraduate Health Technology Innovation Training: Outcomes of the Stanford Biodesign Fellowship ([Wall et al.](#))

- This article details the design and impact of a well-established and successful educational program focusing on innovation.

University Seed Capital Programs: Benefits Beyond the Loan ([Herber et al.](#))

- This resource details how both early-stage startups and universities benefit from seed capital programs.

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