Career feature

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Increasing the success potential of promising biotech companies

Biotech startups benefit society by solving unmet scientific and medical needs, but more can be done to move their technologies to market more quickly.

The recent SARS-CoV-2, monkeypox, poliovirus, and RSV outbreaks remind us of the importance of agile biotechnology companies. We need to reduce the hurdles and time it takes for future BioNTechs and Modernas to find their flow[1–3]. Successful biotech startups will continue to benefit society by solving formerly intractable scientific and medical problems, but only when they can deliver a viable business model. How can we move more of these technologies to market more quickly?

There are two primary pathways to biotech product development. In the more common route, pharmaceutical companies or venture capital (VC)-backed entities led by entrepreneurs license academic discoveries (Table 1). The greatest challenges at this early stage are attracting investment based on technology maturity and development risk. The second pathway, our focus here, is an inventor-led startup.

Life science companies require substantial outside investment to progress, for which they usually turn to VC. Venture investors make decisions primarily based on the market, the team and the technology. Rightly so, they expect a thorough roadmap for the next one to two years — one that addresses market size and dynamics, competitive advantage, business model, team and advisors, intellectual property protection, regulatory and reimbursement strategy, milestones progressing proof of concept, budget, funding strategy and future exit possibilities, whether by merger, acquisition or public offering. The venture capital route is highly selective and few companies successfully gain funding. VCs tend to be risk averse; they look for evidence of market demand, a strong founding team and a clear path to meaningful milestones.

The private sector has created a mechanism to progress startups to become more investor ready: startup accelerators, which support early-stage, high-potential ventures in building out their business and product plan.

Table 1 | Biotechnology commercialization approaches

	I-Corps bootstrapping	Post I-Corps acceleration	VC-created
Targets	Academic innovators	Top-tier I-Corps companies	Acquired technology
Guidance	Instructors, mentors	Mentors, advisors	VC internal team
Stage	PMF to prototyping	Business model validation	Development milestones
Capital	Self-financed	Non-dilutive funding	Equity
End goal	Complete I-Corps	Investment	Step-up in valuation

The best accelerators are competitive programs providing intensive mentorship, focused training, a peer group of startup founders and exposure to investors. Sixty to 70 percent of graduates from top-tier accelerators receive private funding.

Perhaps the best-known accelerator is Y Combinator, a Silicon Valley startup itself founded in 2005 that gave rise to the current accelerator wave. Of the estimated 3,000 accelerators operating globally, backed by private, university, corporate or government resources, many focus on technology startups; only a small number concentrate on life sciences and healthcare. Between a limited supply of life science accelerators and insufficient capacity to absorb qualified startups, promising ventures can be left behind.

Inventor-led startups are an important pathway to innovation

The alternative approach to biotech company development is that of bootstrapping academic-led startups (Table 1). Academic innovator–led companies succeed best at institutions most willing to transfer exclusive intellectual property rights to the academic entrepreneur[4]. The Lean Startup movement, adopted by the US National Science Foundation, National Institutes of Health and other agencies under the umbrella of Innovation Corps (I-Corps), has gained national traction as the first step to validating business viability by assertively vetting commercial prospects[5]. NSF I-Corps reaches almost every university throughout the United States. For biotech companies, the I-Corps at NIH program[6], based on the Life Science Entrepreneurship model from the University of California San Francisco[7,8], is the most relevant paradigm.

I-Corps has achieved notable success, helping to launch 1,377 startups that raised $1.5 billion over nine years[9]. The I-Corps approach has been groundbreaking, popularizing the idea that having better technology alone was not a sufficient predictor of success. In the I-Corps process, solutions to real problems validate the market. Technology is useful only if its application answers a need for the user or buyer. I-Corps teams focus on 'product–market fit' (PMF). After conducting 100 targeted interviews over seven weeks, teams determine whether they have a product that the market will demand, and gain an initial understanding of the business model. They report whether their project is a 'Go' or 'No go'. No go projects are celebrated as examples of disciplined hypothesis exploration resulting in an informed decision that avoids wasting resources. But then, the I-Corps training is over. What happens to the Go projects, the promising startups sourced from this program? Completion of I-Corps is just the end of the beginning.

Proposal for a post-I-Corps accelerator

I-Corps alone cannot provide sufficient guidance for its potential startups. We propose the creation of a Post-I-Corps Program (PIP) modeled on the top academic and private sector accelerators, dedicated exclusively to

I-Corps graduates. Consider again Y Combinator: accepting only 2.3 percent of applicants, it is more selective than Harvard University. Its 'bio track' currently provides $500,000 for seven percent of equity with a six-month program duration. The combination of seasoned Silicon Valley mentors, capital, connections, corporate partners, peer support groups and experts primes the startup for investment. The intensity of the program, with pressure to progress tangible results over a short timeframe, access to a network of top investors and expert coaching for a pitch event with an audience of 1,500, are its hallmarks.

A government-sponsored accelerator for I-Corps' highest potential alumni would mirror the successful elements of private accelerators — with the exception that, like most academic accelerators, it will not hold an equity stake in the startups. Its mission would be to attract seed and series A venture capital investment to fund I-Corps life sciences ventures. I-Corps alumni represent a potential goldmine of startup companies. Government agencies should be eager to invest in this vetted population to increase its return on investment.

The PIP would be resource-intensive, offering high-touch guidance from experienced mentors. Modeled on private accelerators, it would provide dedicated mentorship, selective training, a peer group, network connections and exposure to capital sources. The threshold for application would be a validated product–market fit established during the initial I-Corps program. I-Corps faculty could recommend outstanding teams from their cohorts. Industry executives and investors would select participants in PIP through a competitive process.

The PIP accelerator would enable its selected I-Corps graduates to quickly define an action plan, mapping out its main business development activities, the near-term resources it needs and the cost of getting to the next value inflection point. This robust plan should include team building, intellectual property strategy, reimbursement strategy, regulatory pathway considerations, board composition, scientific and business advisors, partnerships, budget, timing and an investment strategy.

The PIP process would begin with a company evaluation and 'reality check', performed by a national biotechnology mentor network leveraging the existing NSF I-Corps Industrial Mentors network[5]. The program would be time-limited to four to six months, requiring companies to focus on a value inflection point that increases the likelihood of private investment.

As our proposed PIP accelerator would aid in generating and retaining needed high-quality jobs in the biotechnology sector, federal, state and local economic development agencies should be motivated to support it. Earlier this year, New York's Empire State Development launched a program that contains aspects of the proposed PIP process, where academic life science teams and very early-stage companies are provided with grants for business development that require mentorship from experts in the local ecosystem[10]. A broader national program would enable us to assertively shepherd promising biotech companies through development phases.

We recommend establishing a PIP pilot program to validate our proposal.

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Competing interests

The authors declare no competing interests.