CATALYZING THE NEW YORK DEEP TECH ECOSYSTEM

Hosted by The Think Bigger Innovation and Technology Hub

(Faculty Director, Sheena Iyengar. Executive Director, Kevin Erixson)

by

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About the authors

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1. Overview

Deep tech represents innovation that requires a significant level of technological investment. Deep tech startups create value by solving complex technological uncertainty. Rather than focusing their full efforts on the lean learning, experimentation, and customer adoption that characterizes software and internet startups, deep tech startups invest in developing new technological inventions, which may often take years to create, and where it is uncertain whether the technology will work. Some of the most significant innovations of today, such as artificial intelligence, mRNA vaccines, quantum computing, uncrewed space travel, and targeted drug therapies, are deep tech startups. Given the fundamental role that technological invention plays in the development and growth of regional clusters,[i] local deep tech entrepreneurship and technology transfer—i.e., the invention and use of

new technology, and not only the application of existing technologies—is critical for regional competitiveness in the innovation economy.

New York City is the largest city in the world in terms of economic output and is one of the largest by population. It is the international center of finance, media, publishing, and fashion. Manhattan has one of the highest levels of education per capita in the U.S., and multiple New York City boroughs rank as some of the most diverse counties in the country. Following the Great Recession in 2007, New York's economy has been rebalancing from the significant focus of Wall Street to include technology and innovation. Google, for example, employs over 14,000 people in New York and recently opened a new regional headquarters at the historic St. John's Terminal. Amazon similarly opened a large office space on Fifth Avenue, expecting to house an additional 2,000 employees.

New York has also been on an upswing over the past decade in terms of becoming a hub for deep tech startups, especially in life sciences and financial technologies, but increasingly in advanced materials, climate, advanced computing, and other areas. Nonetheless, we believe there is even more that the New York City and State deep tech community could do to accelerate our growth as a startup and innovation ecosystem.

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2. The Think Bigger Deep Tech Ecosystem Meeting

As part of Columbia Business School's Think Bigger Innovation Hub, and in partnership with Columbia Technology Ventures, we convened a meeting of high-powered stakeholders throughout New York City to consider the challenge of accelerating New York's deep tech ecosystem. Building on the Think Bigger framework[ii], a problem-solving approach pioneered at Columbia that takes advantage of sensemaking, creativity, and actionable plans, and regional innovation thinking that seeks to develop shared stakeholder assessment and strategic planning,[iii] we target three interrelated goals. First, creating a shared understanding of the deep tech entrepreneurial ecosystem across six critical stakeholder groups – government, academics, tech transfer, entrepreneurs, corporate, and risk capital. Second, building on this shared assessment, develop actionable strategies that take into consideration the interest and buy-in of these stakeholders, and where they may potentially want to be involved. Third, through a shared consensus on some potential high-value add strategies, we hope to create alignment on effort, initiatives, and shared expectationsin a way that promotes additional investments.

2. Attendees and Format

2.1. Attendees.

Our meeting hosted individuals invested in the development of regional innovation ecosystems, including those from Federal, state, and city governments, venture capitalists, entrepreneurs, non-profits, incubators and accelerators, technology transfer, corporate, and academics.

- Government attendees included Erwin Gianchandani, Director of the new TIP Directorate at the National Science Foundation; Eric Smith, Director of the Tech Hubs Program at the Commerce Department; Aaron Charlop-Powers, Senior Advisor to the NYC Deputy Mayor for Housing, Economic Development and Workforce; Cecilia Kushner, Chief Strategy Officer at NYCEDC; Jonathan Schulhof, EVP and Head of Innovation Industries at NYCEDC; Maria Mitchell, Senior Vice President, Life Sciences, Empire State Development; Liz Lusskin, Executive Vice President, Small Business and Technology Development, Empire State Development.
- Venture capitalists included Misti Ushio, Managing Partner at Digitalis Ventures; Carlo Rizzuto, Managing Director, Versant Ventures; Sean O'Sullivan, Managing Partner and Founder, SOSV.
- Entrepreneurs included Joe Ellis, CEO and Co-Founder of Vidrovr; Ryan McManus, Founder, techtonic.io; Vishal Misra, Founder of multiple AI and software startups
- Non-profit included Jonathan Bowles, Executive Director at the Center for an Urban Future; Maria Gotsch, President of the Partnership Fund for NYC; Frank Rimalovski, Executive Director, NYU Entrepreneurial Institute.
- Incubators included Fernando Gomez-Baquero, Director of the Runway Startup Postdoc and Spinout Programs at Cornell Tech; Tim Rowe, Founder and CEO, Cambridge Innovation Center; Mike Norsen, Principal, Alexandria Venture Investments & Head of LaunchLabs @ Columbia - NYC at Alexandria LaunchLabs; Glennis Mehra, Director, Biolabs@NYULangone.
- Technology transfer included Orin Herskowitz, Senior Vice President for Applied Innovation and Industry Partnerships for Columbia University; Erik Lium, Chief Commercial Innovation Officer at Mount Sinai Innovation Partners; Dmytro Pokhylko, Director of Strategic Projects and Lab-to-Market (L2M) Accelerator Network at Columbia Tech Ventures; Maria Rahmany, Director of Business Development at Columbia Technology Ventures.
- Corporates included Nick Donofrio, IBM Fellow Emeritus; Doug Maine, Senior Advisor to Brown Brothers Harriman & Co.
- Academics included Jorge Guzman, Gantcher Associate Professor of Business at Columbia Business School; Sheena Iyengar, S. T. Lee Professor of Business at Columbia Business School; Dr. Muredach Reilly, the Herbert and Florence Irving Professor of Medicine and Director of the Irving Institute for Clinical and Translational Research at Columbia University and New York Presbyterian Hospital; Helen Lu, Senior Vice Dean of Faculty Affairs and Advancement; Shari Loessberg, Senior Lecturer at MIT Sloan School of Management.

2.2 Format

The meeting was held under Chatham House rules, meaning that attendees could refer in public to anything said in the meeting but without attribution to specific people. After introductions, we began by hearing from academia and government at all levels about the logic of regional innovation clusters, the existing state of the New York ecosystem, and the ongoing efforts to improve deep tech

entrepreneurship across agencies. This provided all attendees with the opportunity to understand the current state of innovation in the region.

Then, with this information at hand, the organizers asked each and every one of the remaining attendees to mention, in their view, what were the key opportunities for New York's deep tech entrepreneurship, while the organizers kept track of each comment on the groupings of them across themes. By the end of this activity we had obtained a shared sense of the core issues and opportunities for New York.

We organized each of the issues into six working groups focused on different topics, such as opportunities for talent, the improvement of local connectivity across institutions, etc. Each working group spent an hour in independent tables trying to develop and brainstorm solutions to their topic area, after which they reported specific initiatives that may be a solution to the problem presented.

Finally, we asked attendees to offer their time at that moment: What initiatives would they be willing to participate in and help out with, in any capacity?

3. Core Take-Aways and Potential Next Steps

We identified dozens of ideas that could help New York accelerate its growth as a deep tech startup hub. Some of these are listed below, by way of example. Over the upcoming months, the collected stakeholders (including Columbia) will be working together to further analyze and prioritize these opportunities and drive many of these as possible to implementation. .

- *Develop additional early-stage capital for deep tech in New York City.*
  Many participants noted that the most vulnerable stage for many deep tech startups is in the so-called "valley of death", wherein the innovation is no longer eligible for the basic research funding and support that Federal research agencies provide, but is also not quite derisked enough for the private venture capital market to confidently engage. The Federal government has created resources to address this gap via the Federal Small Business Innovation Research (SBIR) programs, but those programs can only support innovations that have already created a startup and exited the university.

  One idea that captured enthusiasm was to build on the success of SBIR grants,[iv,v] to consider creating an SBIR-like initiative to support emerging technologies through the city and state government. New York City could create a mechanism to provide similar SBIR-like supports (small dollar funding, coaching & mentoring, cohort building, etc), with the goal of allowing these startups to mature to a stage where they would be ready for venture capital financing and Federal SBIR. This idea is interesting due to research that shows that SBIR awards have been more successful at promoting deep tech entrepreneurship than other efforts that simply augment financing through vehicles such as angel tax credits.[vi]

  A difficulty with this approach relative to the Federal SBIR program is that SBIR technology areas are directly selected by Federal agencies – such as Department of Defense, NASA, or

the Department of Transportation – based on their own technology needs. This has several benefits for new startups, including both certification that a government agency believes the technology to be useful for government problems and the possibility of eventually selling it to U.S. government. To be effective, the proposed New York SBIR would need a similarly demand-driven selection mechanism.

- *Developing new ways to connect people to ideas in New York City.*

Several attendees also remarked that there was an absence of clustering and connection of different groups across New York City. As many attendees emphasized, New York is just too big. Traveling from Columbia's medical campus to Brooklyn may take an hour on the subway, and visiting the pharmaceutical corporations in New Jersey even more. Many of the largest scientific institutions of New York, Memorial Sloan Kettering, NYU, Rockefeller University, Columbia University, and Cornell University are not close to each other either. True organized collaboration appears difficult.

Yet, from research, we know that a tech cluster, to be successful, must provide a way to connect multiple startup inputs in one narrow geography so that better ideas are born, developed, and grown.[vii] For example, through physical proximity, there are better and more specialized matches between investors and entrepreneurs; high demand for engineers and scientists that enables them to find work for which they are specialized; and proximity to customers and corporations allows faster product development and collaborations, including a tendency of corporates to acquire new technologies which they then add on to their commercialization capabilities. These ingredients create the potential for new high-performing startups, often born through the commercialization of science developed in universities. In research, the benefits of locating in a cluster have been shown to be substantial.[viii,ix]

Participants talked about the importance of creating convening hubs, but also recognized the challenges of doing so in a city with so many centers of gravity. Existing startup hubs such as the ones at Alexandria Life Sciences (both on the East Side and next to Columbia's medical center), Newlab in Brooklyn, Harlem Biospace in West Harlem, Biolabs @ Langone, and Indie Bio near Penn Station have greatly helped New York's life science cluster form stronger bonds. Continuing to invest in life science infrastructure while also creating similar centers around materials, climate, and advanced computing innovations, will no doubt be helpful.

A second promising proposal focused on creating more episodic opportunities for investors, entrepreneurs, and technologists to connect, regardless of location. The City and State can leverage their convening power to bring together the entrepreneurial and business talent, capital providers, and scientific innovators regularly, to help overcome NYC's dispersed geography. While this solution is less permanent than developing a single neighborhood, it is

easier to implement and can occur without finding and developing physical space, and implemented much faster.

- *Promoting the brand of New York City as a deep tech innovation hub.*

   Furthermore, while the committee recognized the areas of opportunity for the New York innovation ecosystem, there was also consensus that the 'brand' of New York as an innovation hub was lower than the actual ecosystem quality. That is, many people did not know New York for all it was. This not only impacts external perception but may also result in lower levels of in-migration from promising startups, early-stage capital sources, and talented technologists.

   Research shows that migration is fundamental to promoting the growth of tech clusters.[x] Attracting talented entrepreneurs, and not simply developing them, is typically core to developing a regional competitive advantage. For example, three of the six largest tech companies today, Amazon, Meta (Facebook), and Microsoft, trace their original idea and company development to the East Coast before moving to Seattle or California to develop and grow the firm.

   Our group proposed addressing this problem by creating or enhancing at least one conference that can become a central point of presence for New York City in an important industry, such as a narrow biotechnology or health subsector. Inspired by the anchoring role of South by Southwest on the development of consumer software startups in Austin, Texas, and taking advantage of the fact that New York is already a central transportation hub, there was consensus that with some government involvement, it may be possible for New York City to become a central presence in deep tech in ways that would support its development.

   Other ideas in this category focused on more clearly branding New York City as a startup hub and celebrating the many successful startups that are starting and growing in the city: celebrating our successes in a coordinated manner.

- *Enhancing entrepreneurial training for graduate students and postdocs across New York City's campuses*
   New York has an abundance of natural resources in our many top-tier research institutions, with thousands of graduate students and postdocs working on potentially transformative science. While many of our institutions offer significant training in translational science and entrepreneurship, our group noted that more could be done to ensure that all of NYC's researchers have access to outstanding training, mentorship, and coaching as they pursue their innovations.

- *Encouraging a stronger culture of innovation and entrepreneurship at New York's academic research institutions*
   Building on the idea above, many of NYC's academic research institutions already prioritize real-world impact via innovation and entrepreneurship, alongside the traditional academic missions of teaching, research, and community engagement. However, there is an opportunity to do more to ensure that faculty and student researchers feel encouraged and

supported should they choose to pursue a startup, with policies and procedures in place on campus to ease their path.

- *Creating financial incentives for creating more startups and startup infrastructure in New York*
  Many of the participants noted the prior successes achieved by New York City and New York State in providing funding to catalyze innovation resources in the region, whether via the New York State Biodefence Commercialization Fund, many incubator programs funded by NYCEDC or the Partnership Fund for NYC, or others. More of these programs could be launched (and some are already underway) as public / private partnerships in emerging areas such as climate, materials, and advanced computing. For certain deep tech fields in particular, easily accessible prototyping resources and equipment can be hard to find or nonexistant. Participants encouraged creative thinking in areas such as tax incentives or loan guarantees in high-priority areas as well.

4. Future Steps

Our work was just the beginning, but the success of the entrepreneurial ecosystem depends both on planning and on action. Our group brought together multiple stakeholders and developed a shared assessment of the strengths and opportunities of the New York City deep tech entrepreneurial ecosystem. The discussion was stimulating, marked by a clear interest in the development of the New York entrepreneurship cluster and the economy as a whole.

Our opportunity is now taking these ideas into implementation and developing initiatives that can fundamentally help New York City. Succeeding in these efforts is the change to improve the city we all love and benefit the livelihood of the 20 million residents in its metropolitan area.

[i] Bloom, N., Hassan, T. A., Kalyani, A., Lerner, J., & Tahoun, A. (2021). *The diffusion of disruptive technologies* (No. w28999). National Bureau of Economic Research.

[ii] Iyengar, S. (2023). *Think bigger: how to innovate*. Columbia University Press.

[iii] Guzman, J., Murray, F., Stern, S., & Williams, H. (2024). Accelerating Innovation Ecosystems: The Promise and Challenges of Regional Innovation Engines. *Entrepreneurship and Innovation Policy and the Economy*, *3*(1), 9-75.

[iv] Howell, S. T. (2017). Financing innovation: Evidence from R&D grants. *American economic review*, *107*(4), 1136-1164.

[v] Myers, K. R., & Lanahan, L. (2022). Estimating spillovers from publicly funded R&D: Evidence from the US Department of Energy. *American Economic Review*, *112*(7), 2393-2423.

[vi] Denes, M., Howell, S. T., Mezzanotti, F., Wang, X., & Xu, T. (2023). Investor tax credits and entrepreneurship: Evidence from us states. *The Journal of Finance*, *78*(5), 2621-2671.

[vii] Kerr, W. R., & Robert-Nicoud, F. (2020). Tech clusters. *Journal of Economic Perspectives*, *34*(3), 50-76.

[viii] Moretti, E. (2021). The effect of high-tech clusters on the productivity of top inventors. *American Economic Review*, *111*(10), 3328-3375.

[ix] Guzman, J. (2023). Go west young firm: The impact of startup migration on the performance of migrants. *Management Science*.

[x] Ibid.