

Deep Tech Renaissance



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THE CHANGING LANDSCAPE

The geopolitical and economic world order that has been supporting the global tech industry in recent decades is changing fast. Trends of deglobalization, increased nationalism, the changing monetary landscape across countries, falling demographics, and significant amounts of debt, will force the venture industry to adjust, at best, or reinvent itself altogether.

The COVID-19 pandemic was a perfect storm, and revealed the vulnerability of important supply chains and critical infrastructure in many countries. The Russian war on Ukraine taught European countries the importance of power, energy diversification and independence, the hard way. Extreme weather events, creating food and water scarcity and leading to potential conflicts, are becoming more frequent.

A [recent report](#) by the National Mining Association shows that despite all the discussion of reducing US import dependence on China, “China continues to be the top supplier of the minerals our economy needs, including for those needed by our energy, manufacturing, technology, transportation, infrastructure and defense sectors.”

Still, countries have begun to look beyond globalization and economic benefits and prioritize domestic security and resilience. Complete deglobalization isn't beneficial to any country as it will inflict social and economic pain, but we see countries looking to balance the benefits of globalization with the need to build more independent and resilient local

industries such as energy, healthcare, defense, manufacturing and financial services.

The strong globalization trends of access to cheap labor, the cost of capital, and persistent falling inflation previously pushed countries to prioritize the financialization of their economies to boost growth, while de-prioritizing self-resiliency in many critical sectors, becoming dependent on globalization to keep their domestic industries operating. But things are changing fast. If capital was the point of leverage in the past, science and access to deep tech talent will be the point of leverage in the future.

AI IS THE FUTURE, BUT WHERE IS THE ENERGY COMING FROM?

An [analysis](#) done by Alex de Vries, a data scientist at the Central Bank of the Netherlands and a Ph.D. candidate at Vrije University Amsterdam, found that powering AI could use as much electricity as a small country. This energy demand arises from the extensive training and inference tasks required to develop and deploy AI algorithms effectively, a consequence of their complex computational processes.

The increasing scale and complexity of AI models, such as large language models like GPT-3, contribute significantly to this energy consumption. As AI continues to play a crucial role in various industries, addressing the energy consumption of AI models has become a priority to ensure sustainable and environmentally friendly deployment of these technologies.

It's the same challenge with semiconductors. The semiconductor industry is experiencing a surge in energy consumption due to several factors. As semiconductor manufacturers strive to meet the growing demand for electronic devices, they are constantly pushing the limits of technology, leading to more energy-intensive fabrication processes. Additionally, the increasing complexity of semiconductor designs, driven by advancements such as smaller transistor sizes and 3D stacking, requires more energy-intensive manufacturing techniques.

This trend is further exacerbated by the industry's shift toward more specialized and power-hungry processes, such as those used in AI and high-performance computing applications. As a result, semiconductor manufacturers are facing mounting pressure to develop more energy-efficient manufacturing processes and explore alternative materials and technologies to mitigate the environmental impact of their operations. **These are the challenges deep tech can solve.**

WHAT IS DEEP TECH?

In a nutshell, deep tech refers to breakthrough technologies that have the potential to push boundaries beyond what is considered possible now. It builds on advanced science and engineering innovations to bring disruptive new products to market to solve the largest and most complex problems in the world today.

The main difference to "traditional tech" is that most times traditional tech companies use existing technologies to improve a product or a process, to achieve a better experience, efficiency, or lower expenses. Deep tech companies are looking to create an entirely new technology to solve much more complex and high-stakes global challenges.

THE CURRENT STATE OF DEEP TECH

A [recent study](#) by Boston Consulting Group (BCG) found deep tech technologies have grown to represent about 20% of venture capital funding, doubling from 10% a decade ago.

The two most important, and perhaps surprising, takeaways from the study are:

1. Deep technologies have become a mainstream destination for corporate, venture capital, sovereign wealth and private equity funds.
2. Deep tech returns are similar to those of other venture investments, as seen in the chart below. BCG's analysis of approximately 1,100 venture funds shows that over the past five years, the weighted average internal rate of return was 21% for traditional venture capital investors and 26% for deep tech-focused funds.

Traditional and Deep Tech-Focused Funds Deliver Similar Internal Rates of Return



Sources: Preqin; BCG analysis.
Note: VC = venture capital. n = 911 for traditional funds, and n = 164 for deep tech-focused funds. Only 150 randomized data points are shown on the scatter plot.

Deep tech is rapidly gaining traction as investors shift focus toward pioneering advancements in artificial intelligence, quantum computing, biotechnology and renewable energy. This trend is poised to intensify in 2024, propelled by strides in scientific exploration, enhanced collaboration between academia and industry and mounting calls for solutions to intricate global issues. Venture capitalists are poised to inject billions into deep tech startups with the capacity to revolutionize industries and redefine tomorrow. The prospects for disruptive innovation spanning from personalized medicine to sustainable agriculture are boundless, compelling investors to seize the forthcoming paradigm shift. We are already seeing major US funds, such as Khosla, Eclipse, DCVC, and LUX, forming billion-dollar funds dedicated to deep tech. Just recently, Y Combinator put a strong emphasis on deep tech in its most recent [request for startups](#).

According to the [Bessemer's XB100](#), a leading list of the top deep tech companies, 50% of the companies listed were founded by PhDs. Almost a third of all companies listed received government funding, including nearly half of the companies in space, agriculture, climate, and quantum computing.

Bessemer expects climate companies, in particular, to receive a large amount of non-dilutive government funding in the coming years, thanks to federal agencies such as the Loan Programs Office (LPO), which was given \$100 billion in loan authority to fund climate technology deployments under the landmark 2022 Inflation Reduction Act (IRA).

NOT FOR THE FAINT OF HEART

Deep tech investing comes with its share of risks, primarily stemming from the complexity and uncertainty inherent in cutting-edge technologies. One significant risk is the long development cycles often associated with deep tech projects, which can lead to prolonged periods without revenue generation. The high level of technical expertise required to evaluate and manage deep tech investments can also pose a challenge for investors who may not have the necessary background. Another risk is the rapid pace of technological advancement, which can quickly render current technologies obsolete. Moreover, deep tech investments often face regulatory and ethical challenges, especially in areas like AI and biotechnology, which can impact their viability and adoption. While deep tech investments offer the potential for significant returns, investors must carefully assess and manage these risks to maximize their chances of success.

NOT ALL DEEP TECH FUNDS ARE CREATED EQUAL

We believe the deep tech space will provide investors exceptional investment opportunities, but investors should be careful before picking managers. We see many funds that are more generalist starting to target deep tech companies.

This is a fast lane to failure. Deep tech's playbook is very different from B2B or SaaS. There is much less flexibility, and middle-of-the-road pivoting isn't an option. From our conversations with leading deep tech managers, we learned it takes between 10 to 12 months just to prove a market fit for a product. Identifying the right market from the start is crucial for the success of the product, and there must be a strong need to adopt the technology now.

A good deep tech fund manager understands the gap between the founder's aspiration for their idea and market reality and needs. Many founders of deep tech companies are PhDs and academics who spent years researching acute problems. They might be great researchers and innovators, but fitting a product to market requires a very different set of skills and understanding.

Successfully navigating the complex and rapidly evolving landscape of deep tech investing requires a strategic approach and a unique set of capabilities. Here are some of the key requirements:

- **Technical Expertise:** Deep tech ventures often involve highly complex technologies. Having a team with strong technical expertise is crucial for evaluating the feasibility and potential of such technologies. This expertise can help identify promising startups and guide them through the challenges of product development and commercialization.
- **Industry Knowledge:** Deep tech spans a wide range of industries, from healthcare to energy to aerospace. A successful deep tech venture fund should have significant understanding of the target industries, including market dynamics, regulatory environments and key players. This knowledge is essential for identifying market opportunities and providing strategic guidance to portfolio companies.
- **Network and Partnerships:** Building a strong network of industry experts, researchers, and entrepreneurs is critical for accessing deal flow and gaining insights into emerging technologies.

Strategic partnerships with research institutions, corporations and other venture funds can also provide critical resources and expertise.

- Patient Capital: Deep tech ventures require lengthier development cycles and may take longer to generate returns compared to other types of startups. A successful deep tech venture fund should have a patient investment strategy and the ability to provide ongoing support and resources to portfolio companies.

THE CRITICAL ROLE OF LATER STAGE AND SECONDARY FUNDS

The secondary market has evolved significantly since its inception back in the early 1980s. Secondary transactions were primarily driven by distressed sellers looking to exit their investments prematurely. Over the last several decades, the secondary market has matured into a robust and dynamic ecosystem fueled by growing investor demand for liquidity, portfolio optimization and strategic capital deployment.

The relationship between early-stage VC funds and secondary funds is a critical, yet often overlooked, aspect of the startup ecosystem. While VCs provide early-stage funding and support to innovative startups, secondary funds play a vital role in providing liquidity to investors, early employees and GPs. Secondary funds reduce the pressure on VCs to seek early exits, allowing them to take a longer-term view and support startups through multiple funding rounds. This, in turn, enables startups to focus on innovation and growth rather than short-term financial objectives. This is of additional importance in the deep tech space, where the time to market for technologies is longer. By understanding the importance of this partnership, both funds can unlock new opportunities for growth and innovation.

The current environment is a good example of the importance of secondary funds. With more capital being

called than distributed in today's market environment of slow M&A and IPO activity, LPs are increasingly tapping the secondary market to generate liquidity, fund their commitments and rebalance their portfolios. GPs, on the other hand, are increasingly transferring assets from older funds to new entities, often to secure additional time and capital to support their portfolio companies' growth or to manage a structured exit.

LEADERSHIP AND NEW INITIATIVES

I believe as part of its fiscal policy, the US needs to invest trillions of dollars in new technologies, compensating for years of under-investment. When the Soviet Union launched the world's first satellite in 1957, the US response was to create NASA in 1958. Today, we should act the same and invest heavily in deep tech sectors, including climate, quantum computing, artificial intelligence, biotech, nanotech, agriculture, green energy and robotics.

The government can fund new initiatives, like the successful Yozma public-private partnership program Israel created in the early 1990s, to generate billions of extra tax revenues and profits for investors. This is the only realistic solution to fix our deficit problems in the long run: **We need to invest in producing technologies that will improve Americans' lives and maintain the US as a leading technology superpower.**

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