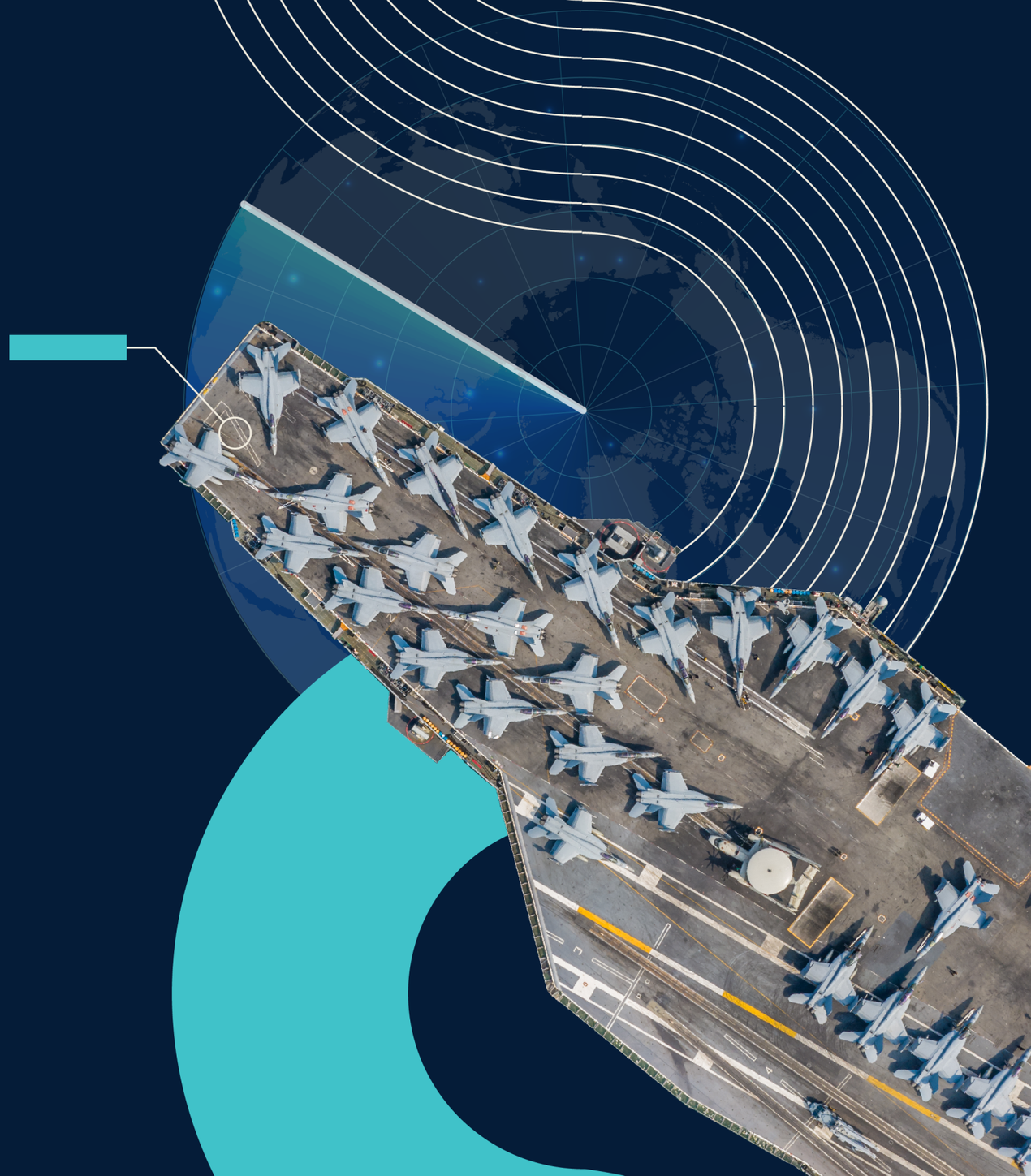
PitchBook

EMERGING TECH RESEARCH

Vertical Snapshot: Defense Tech

VC trends, industry overview, and market landscape



2023

REPORT PREVIEW

The full report is available through the PitchBook Platform.

Published May 22, 2023

Contents

Institutional Research Group

Analysis

Ali Javaheri Associate Analyst, Emerging Technology
ali.javaheri@pitchbook.com
pbinstitutionalresearch@pitchbook.com

Data

Matthew Nacionales, Data Analyst

Publishing

Report designed by **Jenna O'Malley** and **Mara Potter**

Published on May 22, 2023

Executive summary

Defense tech investment and acquisitions were robust from 2016 to 2022—$135.3 billion was invested and 71.0% of VC exits were acquisitions. In the period from 2016 to 2022, the defense tech sector experienced remarkable growth, with a total of $135.3 billion invested across 4,744 deals. During the same time frame, acquisitions accounted for 71% of defense tech VC exits, reflecting the sector's consolidation and the strategic value of these companies to larger industry players.

The top segments in defense tech are not necessarily about defense. Over the past twelve months, the top defense tech segments were renewable energy & generation ($3.9 billion), sensing, connectivity & security ($3.4 billion), and biotechnology ($3.2 billion). The inclusion of biotechnology and renewable energy segments at the top indicate that military priorities go beyond just aerospace and weaponry to include a full suite of technologies that form a broad definition of "national security."

Rapid growth will be driven by venture capital and government demand. Opportunities abound in the booming defense tech market, which is expected to surge to $184.7 billion by 2027, driven by the government's growing demand for innovative dual-use technologies to meet its national security goals. With a projected CAGR of 15.9%, this market presents a lucrative and dynamic landscape for investors and entrepreneurs alike.

Organizations are emerging to build a 21st century military-industrial complex. The defense tech industry is undergoing significant transformation as governments prioritize national security objectives and promote the adoption of commercial technologies for military use. The establishment of innovation hubs like the Defense Innovation Unit (DIU) and capital providers like the Office of Strategic Capital are meant to bridge the gap between the military, entrepreneurs, and investors. This shift encourages the development of critical technologies and attracts funding, fostering innovation and growth in the sector.

Geopolitical tensions are driving demand for advanced defense technologies. Escalating geopolitical tensions have led to increased demand for advanced defense technologies with global military expenditure rising 3.7% to $2.24 trillion in 2022. This surge in demand is benefiting traditional defense contractors and creating opportunities for technology companies and startups to innovate and compete in the growing defense tech market.

An influx of talent and emerging challenges are shaping the defense tech landscape. The increasing need for skilled talent in the defense tech sector is attracting professionals from various disciplines and driving industry growth and innovation. Emerging challenges, such as climate change, resource scarcity, and the rise of unconventional warfare tactics, are propelling the industry to seek innovative solutions that enhance resilience and sustainability.

Introduction

Geopolitical tensions are ballooning—literally—and with them, so too is the nature of warfare. As changing technologies such as artificial intelligence, autonomous weapons, and cyber warfare come to the fore, traditional military power based on mass and firepower is becoming less relevant. Instead, the future of warfare will be defined by technology, speed, agility, and innovation, and the country that can best leverage these will have a significant advantage.

However, the US and its allies are facing challenges in adapting quickly enough to these changing circumstances. According to Christian Brose's book, "The Kill Chain," the US military is falling behind potential adversaries such as China and Russia in key areas such as artificial intelligence and cyber warfare. Brose argues that the military's bureaucratic structure and slow decision-making processes are hindering its ability to innovate, and it needs to adopt a new approach to defense that is more focused on innovation, agility, and collaboration with the private sector.

This is where the defense tech industry comes in. VCs are increasingly investing in companies that are developing innovative technologies to help the US military keep pace with emerging threats. In this vertical snapshot, we will explore the current state of VC investment in the defense tech industry, identify trends and patterns in investment activity, and examine the implications of these trends. By analyzing the latest data and insights, we aim to provide a comprehensive overview of this rapidly evolving market and help investors, entrepreneurs, and policymakers make informed decisions about the future of defense.

Defense tech timeline

Government policies, initiatives, and business programs

Private sector and the military-industrial complex

Geopolitical events

October 1957

The Soviet Union launches Sputnik 1, spurring the United States to invest heavily in space and missile defense technology.

February 1958

Formed in response to the Soviet Union's launch of Sputnik 1, DARPA is founded as an agency of the US DoD that is responsible for the development of emerging technologies for use by the military.

August 1961

US Secretary of Defense Robert McNamara introduces the PPBE process to the DoD. The PPBE system is designed to improve decision-making, resource allocation, and management efficiency within the defense establishment. This innovative approach to defense acquisition and resource management seeks to align military strategy, program planning, and budgeting, while emphasizing the integration of analysis and evaluation in defense decision-making.

July 1958

The SBIC program is established by the US Congress as part of the Small Business Investment Act to promote the growth of small businesses by providing access to financial support and private equity capital. SBICs are privately owned and managed investment funds, licensed and regulated by the US Small Business Administration (SBA), which invests in small businesses with the potential for growth and job creation.

March 1983

US President Ronald Reagan announces the Strategic Defense Initiative (SDI), a missile defense system intended to protect the United States from a potential nuclear attack.

November 1969

Creation of the US Advanced Research Projects Agency Network (ARPANET), a project funded by the US DoD, which laid the foundation for the modern internet.

August 1990 - February 1991

The US enters the Gulf War, showcasing the effectiveness of advanced defense technologies such as stealth aircraft, precision-guided munitions, and satellite-based communications.

September 2001

Terrorists attack the World Trade Center in New York City, which results in a renewed focus on counterterrorism and defense technology investments among the Five Eyes countries: the US, the UK, Canada, New Zealand, and Australia.

DEFENSE TECH TIMELINE

Government policies, initiatives, and business programs

Private sector and the military-industrial complex

Geopolitical events

June 2003

Palantir Technologies is founded, a software company specializing in data analysis and integration for defense, intelligence, and security applications, with initial backing from In-Q-Tel, the venture capital arm of the US Central Intelligence Agency (CIA).

March 2004

The first DARPA Grand Challenge is announced—a driverless vehicle competition organized by DARPA aimed at fostering the development of autonomous ground vehicles for military applications and advancing the state of robotics and artificial intelligence research.

December 2009

The creation of the UK's Defence Cyber Security Programme, which is aimed at enhancing the country's cyber defense capabilities.

May 2010

The establishment of the United States Cyber Command (USCYBERCOM), a unified combatant command responsible for centralizing cyberspace operations, strengthening the military's cybersecurity, and ensuring the protection of US critical infrastructure from cyber threats.

January 2014

China successfully tests a hypersonic glide vehicle, the WU-14, raising concerns about the country's development of advanced defense capabilities.[9]

August 2014

The US Navy announces the successful test of its first laser weapon system (LaWS), demonstrating the potential of directed energy technology in defense applications.

February 2014 to March 2014

Russia annexes Crimea, a major geopolitical event involving the seizure and subsequent incorporation of the Crimean Peninsula by the Russian Federation, leading to increased tensions between Russia and Western countries and influencing global defense strategies and investments.

February 2015

The Royal Australian Air Force establishes Plan Jericho, an initiative to modernize and integrate its defense capabilities with advanced technologies.[10]

August 2015

The US DIU is launched with the aim of accelerating the adoption of commercial technology for national defense purposes.

June 2016

Palantir Technologies files a lawsuit against the US Army, alleging that the Army's procurement process for its Distributed Common Ground System (DCGS-A) was biased and unfairly favored traditional defense contractors over commercial technology companies.[11] The lawsuit underscores the challenges faced by innovative technology companies in entering the defense market and the need to modernize the military procurement processes.

9: "China Confirms Hypersonic Missile Carrier Test," Reuters, January 15, 2014.
10: "Plan Jericho: RAAF 10-Year Transformation Plan Launched by Air Marshal Geoff Brown," news.com.au, February 23, 2015.
11: "Palantir Takes Fight With Army To Federal Court," Defense News, Jen Judson, July 1, 2016.

DEFENSE TECH TIMELINE

Government policies, initiatives, and business programs

Private sector and the military-industrial complex

Geopolitical events

July 2016

The Permanent Court of Arbitration in The Hague rules against China's territorial claims in the South China Sea in a case brought by the Philippines. Despite the ruling, China continues to assert its claims and expands its presence in the disputed waters, building artificial islands and militarizing them with naval, air, and missile defense facilities. This ongoing situation highlights China's growing military capabilities and its willingness to assert its interests in the region, contributing to increasing tensions and potential conflicts with neighboring countries and their allies, including the US.

August 2016

DARPA launches the Cyber Grand Challenge, a competition to develop autonomous cybersecurity systems, emphasizing the importance of advanced computing and software in the defense sector.

April 2017

The US DoD launches Project Maven, an initiative focused on leveraging artificial intelligence and machine learning technologies to analyze drone and satellite imagery, improving situational awareness and decision-making on the battlefield.

2017

June 2017

The founding of Anduril Industries, a US technology company focused on developing advanced defense technologies, such as autonomous systems, artificial intelligence, and sensor networks, to provide innovative solutions for national security and military applications.

September 2017

Google becomes involved in Project Maven, providing its artificial intelligence and machine learning expertise to assist the US DoD in analyzing drone and satellite imagery.

July 2017

The Chinese government releases its "New Generation Artificial Intelligence Development Plan," a comprehensive strategy outlining the country's ambition to become a global leader in artificial intelligence by 2030. The plan emphasizes the importance of AI in various sectors, including defense, and underscores China's commitment to investing in cutting-edge technologies to enhance its military capabilities and global influence.

September 2017

Russian President Vladimir Putin asserts that AI will play a crucial role in global power dynamics, stating, "Whoever becomes the leader in [AI] will become the ruler of the world."[12] This statement highlights the increasing importance of AI in shaping national defense strategies and geopolitical competition.

12: "Putin Says the Nation That Leads in AI 'Will Be the Ruler of the World,'" The Verge, James Vincent, September 4, 2017.

DEFENSE TECH TIMELINE

Government policies, initiatives, and business programs

Private sector and the military-industrial complex

Geopolitical events

June 2018

Google announces its decision not to renew the contract for Project Maven with the US DoD, following internal and external controversy, employee protests, and resignations over the use of Google's artificial intelligence technology in military applications.

March 2019

Palantir Technologies is awarded a contract by the US Army for its Distributed Common Ground System (DCGS-A), following the resolution of the lawsuit filed by the company in 2016.[14] The contract marks a significant milestone in Palantir's efforts to provide its data integration and analysis software to the US military and demonstrates the potential for commercial technology companies to play a key role in the defense sector.

December 2019

Russia announces the deployment of its Avangard hypersonic glide vehicle, underscoring the growing importance of hypersonic technology in global defense.[16]

December 2019

The US Space Force is officially established, highlighting the increasing significance of space technology in defense strategy.

2018

2019

2020

October 2017

China introduces the "military-civil fusion" strategy, an initiative championed by President Xi Jinping, which aims to integrate civilian and military technologies to rapidly advance the nation's defense capabilities.[13] The strategy underscores the value of capitalizing on commercial innovations and breakthroughs in areas such as artificial intelligence, autonomous systems, and cyber capabilities, in order to bolster China's defense capacity and maintain strategic competitiveness on the global stage.

December 2018

US President Donald Trump signs the National Quantum Initiative Act, a law aimed at accelerating the development of quantum information science (QIS) and technology in the US. The act allocates over $1.2 billion over five years for quantum research, development, and education, emphasizing the importance of quantum computing in maintaining the nation's competitive edge in technology and defense.

October 2019

Google announces a significant milestone in quantum computing, claiming "quantum supremacy" with its 53-quantum-bit quantum computer called Sycamore.[15] The computer successfully performs a complex computational task in just 200 seconds. The same task would take a classical supercomputer approximately 10,000 years to complete. This breakthrough highlights the potential of quantum computing to revolutionize various industries, including defense, by solving complex problems and enhancing encryption and cybersecurity capabilities.

13: "China's Shift from Civil-Military Integration to Military-Civil Fusion," Asia Policy, Richard A. Blitzinger, January 2021.
14: "Palantir — Who Successfully Sued the Army — Has Won a Major Army Contract," Defense News, Jen Judson, March 29, 2019.
15: "Quantum Supremacy Using a Programmable Superconducting Processor," Nature, Frank Arute, et al., October 23, 2019.
16: "Russia Deploys Avangard Hypersonic Missile System," the BBC, December 27, 2019.

DEFENSE TECH TIMELINE

Government policies, initiatives, and business programs

Private sector and the military-industrial complex

Geopolitical events

December 2020

Researchers at the University of Science and Technology of China announce a major breakthrough in quantum computing, claiming "quantum supremacy" with their photonic quantum computer called Jiuzhang.[17] The computer performs a specific calculation in just over three minutes, a task that would take a classical supercomputer an estimated 2.5 billion years to complete. This achievement underscores China's progress in the field of quantum computing and its potential implications for defense, encryption, and cybersecurity.

September 2021

The US, the UK, and Australia announce the formation of the AUKUS alliance, focusing on cooperation in areas like artificial intelligence, quantum technologies, and undersea capabilities.

February 2022

Russia invades Ukraine, but contrary to intelligence estimates, Ukrainian forces manage to prevent significant Russian advancements, leading to an effective stalemate in the eastern provinces. Ukraine leverages cutting-edge technology from defense startups such as Anduril and Starlink, showcasing the impact of innovative defense solutions in modern warfare and their potential to alter the course of conflicts.

December 2022

The Secretary of Defense announces the establishment of the Office of Strategic Capital, which aims to foster and execute collaborative capital initiatives that can attract and expand private investment into critical technologies.[18]

2021 2022 2023 2024

October 2021

Palantir Technologies and Raytheon Intelligence & Space announce a strategic partnership to develop TITAN, an advanced ground system that fuses data from multiple sources, including satellite imagery and signals intelligence, to provide near-real-time insights for US military commanders. This collaboration highlights the growing synergy between traditional defense contractors and innovative technology companies, as well as the increasing importance of data analytics and its integration in modern warfare.

August 2022

President Joe Biden signs the CHIPS and Science Act into law, allocating $280 billion to strengthen domestic semiconductor research and manufacturing in the US during a global shortage. The act invests $10 billion in regional innovation and technology hubs, promoting collaboration between governments, industry, and academia. Additionally, it establishes a technology-focused directorate at the National Science Foundation (NSF), concentrating on fields such as semiconductors, advanced computing, advanced communications technology, advanced energy technologies, quantum information technologies, and biotechnology.

April 2023

The Secretary of Defense appoints Apple Vice President Doug Beck as the new director of the DIU. Beck's appointment also coincides with a departmental reshuffling, resulting in the Director of the DIU reporting directly to the Secretary of Defense.[19]

17: "The New Light-Based Quantum Computer Jiuzhang Has Achieved Quantum Supremacy," Science News, Emily Conover, December 3, 2020.
18: "Secretary of Defense Establishes Office of Strategic Capital," United States Department of Defense, December 1, 2022.
19: "Secretary of Defense Lloyd J. Austin III Announces New Director of the Defense Innovation Unit," United States Department of Defense, April 4, 2023.

Defense tech market map

Click to view the interactive market map on the PitchBook Platform.

Market map is a representative overview of venture-backed or growth-stage providers in each segment. Companies listed have received venture capital or other notable private investments.

Autonomous systems

- Unmanned aerial vehicles
- Defense systems integration & optimization
- Unmanned surface vehicles
- Unmanned ground vehicles
- Autonomous manufacturing

Advanced materials & manufacturing

- Advanced armor & structural materials
- Additive manufacturing & maintenance

Quantum sciences

- Quantum computing
- Post-quantum cryptography
- Quantum sensing & networking

Sensing, connectivity & security

- Information security
- Advanced senors
- Next-generation wireless networks
- Electronic warfare

Human-machine interfaces

- Augmented & virtual reality
- Wearable technology
- Brain-computer interfaces

Defense tech market map

Click to view the interactive market map on the PitchBook Platform.

Market map is a representative overview of venture-backed or growth-stage providers in each segment. Companies listed have received venture capital or other notable private investments.

Semiconductors & microelectronics

- Semiconductors
- Nanotechnology

Biotechnology

- Syntheic biology
- Biodefense

Advanced computing & software

- Data management & analysis
- Novel computing architectures
- DevSecOps
- Supply chain management

Space technology

- Space launch, reentry & navigation
- In-space services
- Satellite systems

Renewable energy generation & storage

- Advanced energy storage
  - Factorial
  - Sila
  - Wright
  - Decision Sciences
  - FUELX
- Alternative energy generation
  - TerraPower
  - achatesPOWER
  - RADIANT
- Power systems
  - Heila
  - ResilientGrid
  - DYNAMIC GRID

Defense-specific

- Directed energy
  - BLUEHALO
  - Lumi
- Hypersonics
  - HERMEUS
  - SPINLAUNCH
  - VENUS AEROSPACE

CONFIDENTIAL. NOT FOR REDISTRIBUTION.

About PitchBook Emerging Tech Research

Independent, objective, and timely market intel

As the private markets continue to grow in complexity and competition, it's essential for investors to understand the industries, sectors and companies driving the asset class.

Our Emerging Tech Research provides detailed analysis of nascent tech sectors so you can better navigate the changing markets you operate in—and pursue new opportunities with confidence.

©2023 by PitchBook Data, Inc. All rights reserved. No part of this publication may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, and information storage and retrieval systems—without the express written permission of PitchBook Data, Inc. Contents are based on information from sources believed to be reliable, but accuracy and completeness cannot be guaranteed. Nothing herein should be construed as any past, current or future recommendation to buy or sell any security or an offer to sell, or a solicitation of an offer to buy any security. This material does not purport to contain all of the information that a prospective investor may wish to consider and is not to be relied upon as such or used in substitution for the exercise of independent judgment.

PitchBook Data, Inc.

John Gabbert Founder, CEO

Nizar Tarhuni Vice President, Institutional Research and Editorial

Paul Condra Head of Emerging Technology Research

Additional research

Eric Bellomo
eric.bellomo@pitchbook.com
Gaming
E-Commerce

Brendan Burke
brendan.burke@pitchbook.com
Internet of Things
Information Security
Artificial Intelligence & Machine Learning

Aaron DeGagne
aaron.degagne@pitchbook.com
Medtech
Digital Health

Alex Frederick
alex.frederick@pitchbook.com
Agtech
Foodtech

Jonathan Geurkink
jonathan.geurkink@pitchbook.com
Supply Chain Tech
Mobility Tech

Derek Hernandez
derek.hernandez@pitchbook.com
Enterprise SaaS

Ali Javaheri
ali.javaheri@pitchbook.com
Emerging Spaces

Robert Le
robert.le@pitchbook.com
Web3/DeFi
Insurtech
Crypto

John MacDonagh
john.macdonagh@pitchbook.com
Carbon & Emissions Tech
Clean Energy Tech

Rebecca Springer
rebecca.springer@pitchbook.com
Healthcare Services
Healthcare IT

Rudy Yang
rudy.yang@pitchbook.com
Fintech

Coming soon
Biotech
Pharma Services