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How Big Tech and Silicon Valley are Transforming the Military-Industrial Complex

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Over the past decade, the center of America's military-industrial complex has been slowly shifting from the Capital Beltway to Silicon Valley. Although much of the Pentagon's $886 billion budget is spent on conventional weapon systems, and goes to well-established defense giants such as Lockheed Martin, RTX, Northrop Grumman, General Dynamics, Boeing, and BAE Systems, a new political economy is emerging, driven by the imperatives of big tech companies, venture capital, and private equity firms.[2] As Defense Department officials have sought to adopt AI-enabled systems and secure cloud computing services, they have awarded large multi-billion dollar contracts to Microsoft, Amazon, Google, and Oracle. At the same time, the Pentagon has increased funding for smaller defense tech startups seeking to "disrupt" existing markets and "move fast and break things."[3] This report examines how the priorities of the tech industry, the peculiarities of venture capital (VC) funding structures, and Silicon Valley's startup model are likely to lead to costly, high-tech products that are ineffective, unpredictable, and unsafe when deployed in real world conditions.

Booming demand for AI-enabled military technologies and cloud computing services is being driven by several developments. Perhaps most importantly, the easy availability of massive amounts of digital data collected from satellites, drones, surveillance cameras, smartphones, social media posts, email messages, and other sources has motivated Pentagon planners to find new ways of analyzing the information. This, coupled with years of "AI hype" generated by tech leaders, venture capitalists, and business reporters among others, has played a crucial role in sparking the interest of military leaders who have come to view Silicon Valley's newest innovations as indispensable warfighting tools. The United States military's shift towards AI and "data driven" warfare is

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[2] The $886 billion budget was authorized by the U.S. Congress for Fiscal Year 2024.

[3] The latter phrase is often attributed to Facebook CEO Mark Zuckerberg, and for years, it was an informal slogan at the company. See also Guyer, J. (2022, December 14). *Inside the Chaos at Washington's Most Connected Military Tech Startup*. Vox. https://www.vox.com/recode/23507236/inside-disruption-rebellion-defense-washington-connected-military-tech-startup

connected with broader changes affecting a wide range of government agencies and industries.[4]

Over the past two years, global events have further fueled the Pentagon's demand for Silicon Valley technologies, including the deployment of drones and AI-enabled weapon systems in Ukraine and Gaza, and fears of a global AI arms race against China. The prospect of Russian cyberwarfare and disinformation campaigns have also motivated Defense Department officials to invest heavily in new digital technologies. Consequently, DoD officials have outlined plans to develop expansive fleets of autonomous aerial, maritime, and terrestrial drones for transportation, surveillance, and combat; acquire commercial cloud computing capabilities for data sharing, data storage, and "seamless connectivity"; bolster America's cyberdefense systems; and employ AI for training and combat simulation exercises.[5]

New Pentagon spending streams are destined for a different breed of defense contractors: a combination of gargantuan tech firms (for example, Microsoft, Amazon, Google, Oracle, Hewlett Packard, Dell, Motorola, and IBM) and hundreds of smaller startup companies supported by VC firms.[6] Almost all of the startups are in the pre-IPO phase of funding.[7] Examples include Anduril Industries, Shield AI, HawkEye 360, Skydio, Rebellion Defense, and Epirus, among many others.[8] Between 2019 and 2022, U.S. military and intelligence agencies awarded major tech firms contracts with ceilings worth at least $53 billion combined.

This report dispels the common myth that Silicon Valley has been reluctant to do business with the Pentagon due to a so-called "cultural divide."[9] As we shall see, the DoD has awarded large, multiyear contracts—some worth tens of billions of dollars—to the tech industry over the past decade. A conservative estimate indicates that U.S. military and

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[4] In America, algorithmic processes and AI have transformed banking, real estate, higher education, health care, entertainment, public transportation, the insurance industry, and much more. See Besteman, C., & Gusterson, H. (eds.). (2019). *Life by Algorithms: How Roboprocesses Are Remaking Our World*. Chicago: University of Chicago Press.

[5] Youssef, N.A. (2023, September 6). *Pentagon Plans Vast AI Fleet to Counter China Threat.* Wall Street Journal. https://www.wsj.com/politics/national-security/pentagon-plans-vast-ai-fleet-to-counter-china-threat-4186a186; Demarest, C. (2023, May 4). *First "Secret" Task Orders Received for Pentagon's $9B Cloud Contract*. Defense News. https://www.defensenews.com/smr/cloud/2023/05/04/first-secret-task-orders-received-for-pentagons-9b-cloud-contract/; DARPA. (2023, February 13). *ACE Program's AI Agents Transition from Simulation to Live Flight*. https://www.darpa.mil/news-events/2023-02-13

[6] Unlike other large tech companies, Apple has not pursued DoD work. But in June 2023, it acquired Mira, a startup company that was previously awarded U.S. military contracts. Mira produces augmented reality headsets. See Schiffer, Z., & Heath, A. (2023, June 6). *Apple Has Bought an AR Headset Startup Called Mira*. The Verge. https://www.theverge.com/2023/6/6/23751350/apple-mira-ar-headset-startup

[7] IPO refers to initial public offering, the moment when shares of a company are publicly available for purchase by institutional or individual investors.

[8] So far, Palantir Technologies is the only defense tech startup to have become a publicly traded corporation.

[9] See for example Zegart, A., & K. Childs. (2018, December 13). *The Divide between Silicon Valley and Washington Is a National Security Threat*. The Atlantic. https://www.theatlantic.com/ideas/archive/2018/12/growing-gulf-between-silicon-valley-and-washington/577963/; Mehta, A. (2019, January 28). *Cultural Divide: Can the Pentagon Crack Silicon Valley?* Defense News. https://www.defensenews.com/pentagon/2019/01/28/cultural-divide-can-the-pentagon-crack-silicon-valley/

intelligence agencies awarded $28 billion to Microsoft, Amazon, and Alphabet (Google's parent company) between 2018 and 2022.[10] The actual value of Pentagon and IC (U.S. intelligence community) contracts is likely to be significantly higher, since "many of the largest known [Defense Department and IC] contracts with U.S. tech companies are classified and withheld from public procurement databases."[11] In the meantime, major VC firms such as Sequoia Capital and Andreessen Horowitz—and dozens of smaller ones—have ramped up investments in defense tech startups. More than $100 billion in venture capital funding went to defense tech startups between 2021 and 2023.

This paper also refutes the popular misperception that China is poised to surpass the U.S. in a global "AI arms race" that will determine the future of geopolitics and global economic dominance. It does this by showing how the arms race narrative has been propagated by Pentagon officials and tech leaders who stand to benefit from increased sales of high-tech weapon, surveillance, and logistics systems enabled by AI. These myths and misperceptions risk diverting taxpayer funds towards research and development (R&D) projects that meet military needs, rather than civilian needs.

Within a relatively short period of time, Defense Department officials have created a vast infrastructure designed to provide funding support to defense tech companies. For example, in 2015, the Pentagon established a U.S. taxpayer-funded venture capital firm, DIUx (Defense Innovation Unit-Experimental, now called DIU) for financing small startups developing products for military applications. That same year, it also created MD5 (renamed the National Security Innovation Network)—billed as a "national security technology accelerator"—to speed up the development of technologies useful to the Pentagon. More recently, the Defense Department has launched the Office of Strategic Capital, an entity for linking AI, biotechnology, and other startups with sources of private capital.[12] All major armed branches of the U.S. military now have a range of organizations designed to streamline DoD's "innovation ecosystem." As these Pentagon initiatives have grown in number and size, VC and private equity firms have dramatically expanded their investments in defense tech startups, signaling a shift in how military technologies are developed and deployed—and demonstrating how VC is anticipating future trends in Defense Department expenditures. This report explores how both large and small defense contractors from the tech industry, as well as private venture capital, are transforming the political economy of war.

Historical Context

For the better part of a century, a triad of research universities, tech companies, and the U.S. military have shaped the regional economy and culture of Silicon Valley. After a team of engineers invented the semiconductor in Mountain View, California in 1956,

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[10] Poulson, J. (2022, September 5). *Militaries, Intelligence Agencies, and Law Enforcement Agencies Dominate U.S. and UK Government Purchasing from U.S. Tech Giants*. Tech Inquiry. https://techinquiry.org/docs/InternationalCloud.pdf, p. 6.

[11] Ibid, p. 2.

[12] Gill, J. (2023, September 6). *Pentagon Office of Strategic Capital's Investment Strategy Expected Later This Year*. Breaking Defense. https://breakingdefense.com/2023/09/pentagon-office-of-strategic-capitals-investment-strategy-expected-later-this-year/

Pentagon funding fueled a local economic boom. The Defense Department played a crucial role in launching the tech industry by awarding military contracts in such fields as microwave electronics, missile and satellite production, and semiconductor research. Within a few short decades, the region was transformed from a patchwork of small towns, fruit orchards, and farms to a sprawling metropolitan area. From the 1950s to the late 1990s, its largest private-sector employer was Lockheed.[13]

Throughout the Cold War period, regional firms produced dual-use technologies that could be employed for military purposes or adapted for commercial products: "Silicon Valley built elegant miniaturized machines that could power missiles and rockets, but that also held possibilities for peaceful use—in watches, calculators, appliances, and computers, large and small."[14] Historian Thomas Heinrich notes that popular portrayals of "ingenious inventor-businessmen and venture capitalists [who] forged a dynamic, high-tech economy unencumbered by government's heavy hand" overlook the crucial role of "Pentagon funding for research and development [that] helped lay the technological groundwork for a new generation of startups" at the dawn of the twenty-first century.[15] Even the internet has military roots: it famously evolved from the ARPANET, a project coordinated by the Pentagon's Advanced Research Projects Agency in collaboration with researchers from several West Coast universities.

Things could have turned out differently. A thriving high-tech region could have emerged in the greater San Francisco Bay Area with government investments from civilian agencies, rather than military and intelligence agencies. For example, thousands of technology jobs might have been created if the U.S. Department of Energy—not the Defense Department—had provided abundant support for basic research into semiconductors and renewable energy a half-century ago. More of the region's biotech industry could have been underwritten by the National Institutes of Health, rather than private venture capital and military funding. Given the importance of the internet for businesses and schools, it would have been logical for the Web to have been financed by the U.S. Department of Commerce and Department of Education, rather than the Pentagon. Silicon Valley's long-standing connections to the Defense Department are a contingent historical fact, shaped largely by the imperatives of a deeply militarized society.

For a good illustration of how Pentagon R&D funding facilitated the rise of today's tech industry, consider the origins of Google, founded by Larry Page and Sergey Brin more than a quarter century ago. When they were Stanford graduate students in the mid-1990s, Page and Brin received financial support from the Defense Advanced Research Projects Agency (DARPA) and the National Science Foundation (NSF) as part of the Digital Libraries

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[13] Heinrich, T. (2002). *Cold War Armory: Military Contracting in Silicon Valley*. Enterprise & Society (3), 247-284. https://faculty.fiu.edu/~revellk/pad2011/heinrich.pdf

[14] O'Mara, M. (2018, October 26). *Silicon Valley Can't Escape the Business of War*. The New York Times. https://www.nytimes.com/2018/10/26/opinion/amazon-bezos-pentagon-hq2.html. See also O'Mara, M (2019). *The Code: Silicon Valley and the Remaking of America*. New York: Penguin.

[15] Heinrich, T. (2002). *Cold War Armory: Military Contracting in Silicon Valley*. Enterprise & Society (3), 247-284. https://faculty.fiu.edu/~revellk/pad2011/heinrich.pdf

Initiative, an effort to collect, store, and assemble data from the internet.[16] According to former NSF official Jeff Nesbit, federal funding for companies that specialized in digital data collection "has made a comprehensive public-private mass surveillance state possible today."[17] This is just one of many examples of Silicon Valley's long-standing entanglements with the Pentagon. Although some analysts have suggested that there is are deep divisions between Silicon Valley firms and the Pentagon—with some even declaring the tech industry's alleged reluctance to pursue defense work a "national security threat"—this is not borne out by the historical record. Nearly all of today's tech giants carry some DNA from the defense industry, and have a long history of cooperating with the Pentagon.[18]

More recently, the Defense Department has made a concerted effort to renew its ties to the tech industry. Under the leadership of Ash Carter, who served as Defense Secretary from 2015 to 2017, Pentagon officials launched a number of organizations designed to renew and solidify DoD's connections to Silicon Valley. These included the Pentagon's DIUx venture capital fund (see above) and the Defense Innovation Board (DIB), an elite civilian brain trust consisting of executives from Google, Facebook, and other technology firms. In 2018, the U.S. Congress created the National Security Commission on Artificial Intelligence (NSCAI), and former Google CEO Eric Schmidt was appointed to chair both the DIB and NSCAI.

The Pentagon also quietly launched Project Maven in 2017, an effort to use machine learning (a form of AI) for analyzing massive datasets consisting of surveillance images taken by drones in the Middle East and other locations. The Defense Department awarded Project Maven contracts to a range of large and small tech firms, including Google, Amazon, Microsoft, Rebellion Defense, Clarifai, Cubic Corporation, and two established defense contractors, ECS Federal and Booz Allen Hamilton.[19] When internal emails about Google's involvement in Project Maven were leaked to the press, thousands of the company's employees protested, and several resigned. Google executives did not renew the Project Maven contract, but the firm has continued seeking DoD work.[20] (In response to employee protests, Google developed ethical guidelines or "AI Principles" stating that the company will not work on "weapons or other technologies whose principal purpose or

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[16] Page and Brin also received funding from the U.S. Intelligence Community. See González, R.J. (2022). *War Virtually: The Quest to Automate Conflict, Militarize Data, and Predict the Future*. University of California Press.
[17] Nesbit, J. (2017, December 8). *Google's True Origin Partly Lies in CIA and NSA Research Grants for Mass Surveillance*. Quartz. https://qz.com/1145669/googles-true-origin-partly-lies-in-cia-and-nsa-research-grants-for-mass-surveillance
[18] Zegart, A., & Childs, K. (2018, December). *The Divide between Silicon Valley and Washington Is a National Security Threat*. The Atlantic. https://www.theatlantic.com/ideas/archive/2018/12/growing-gulf-between-silicon-valley-and-washington/577963/; O' Mara, M. (2018, October 26). *Silicon Valley Can't Escape the Business of War*. The New York Times. https://www.nytimes.com/2018/10/26/opinion/amazon-bezos-pentagon-hq2.html
[19] Tech Inquiry. (2021, September 10). *Easy as PAI*. https://techinquiry.org/EasyAsPAI/
[20] Simonite, T. (2021, November 18). *Three Years after the Project Maven Uproar, Google Cozies to the Pentagon*. Wired. https://www.wired.com/story/3-years-maven-uproar-google-warms-pentagon/. The non-profit Tech Inquiry noted: "We conclude that the U.S. weapons and intelligence community dramatically overreacted to a particular tech company [i.e. Google] democratically deciding to not contribute to weapons systems." See Tech Inquiry. (2020, July 7). *Reports of a Silicon Valley/Military Divide Have Been Greatly Exaggerated*. https://techinquiry.org/SiliconValley-Military/#direct-contracting-fpds-contract-values

implementation is to cause or directly facilitate injury to people."[21]) And despite a lingering perception among some analysts that tech firms and startups are hesitant to work for the Pentagon, many have eagerly done so over the past three to four years.[22]

DoD Is Awarding More (and Larger) Contracts to Big Tech Companies

A growing portion of the Defense Department's spending is going to large, well known tech firms, including some of the most valuable corporations in the world. These include Microsoft, Amazon, Alphabet (Google's parent company), Oracle, Hewlett Packard, IBM, Intel, Motorola, Motorola, and Dell, among others.[23] Contracts for hardware, software, and support services may have ceilings of hundreds of millions—or even billions—of dollars. According to the nonprofit research organization Tech Inquiry, three of the world's biggest tech corporations were awarded approximately $28 billion from 2018 to 2022, including Microsoft ($13.5 billion), Amazon ($10.2 billion), and Alphabet, Google's parent company ($4.3 billion).[24] It is important to note that this is a conservative estimate, since large defense and intelligence contracts are often classified. The top five contracts to major tech firms during this period have contract ceilings totaling at least $53 billion (see Table 1). In addition to the Pentagon, other non-DoD agencies (the CIA in particular) have also dramatically expanded their technology contracts while forging closer bonds with Silicon Valley firms.

It is exceedingly difficult to untangle the web of Pentagon procurement contracts awarded to tech companies for several reasons. Like many defense contractors, tech firms frequently acquire or merge with other companies. Sometimes segments of a corporation are reorganized as independent entities (or "spinoffs"). For example, over the past decade the firm commonly known as "Hewlett Packard" has undergone a number of transformations that resulted in the creation of many entities, including a personal computer company (HP Inc.), a cloud services company (Hewlett Packard Enterprise or HPE), an IT provider that was spun off from HPE following a merger (DTX Technology), and a public sector IT provider that was spun off from DTX technology (Perspecta). Perspecta was later acquired by another entity (Peraton), which is owned by a private equity firm (Veritas Capital).[25]

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[21] See https://ai.google/responsibility/principles/
[22] Scharre, P. (2023). *Four Battlegrounds: Power in the Age of Artificial Intelligence*. W.W. Norton. p. 224.
[23] Tech Inquiry. (2020, July 7). *Reports of a Silicon Valley/Military Divide Have Been Greatly Exaggerated*. https://techinquiry.org/SiliconValley-Military/#direct-contracting-fpds-contract-values. Tracy, R. (2021, September 7). *As Google, Microsoft, and Amazon Seek Bigger Defense Role, Some Are Leery*. The Wall Street Journal. https://www.wsj.com/articles/tech-industry-seeks-bigger-role-in-defense-not-everyone-is-on-board-11631019600
[24] Poulson, J. (2022, September 5). *Militaries, Intelligence Agencies, and Law Enforcement Agencies Dominate U.S. and UK Government Purchasing from U.S. Tech Giants*. Tech Inquiry. https://techinquiry.org/docs/InternationalCloud.pdf, p. 6.
[25] This example is taken from a Tech Inquiry report. See Tech Inquiry. (2020, July 7). *Reports of a Silicon Valley/Military Divide Have Been Greatly Exaggerated*. https://techinquiry.org/SiliconValley-Military/#direct-contracting-fpds-contract-values

Table 1. Five Largest Publicly Disclosed Tech Contracts Awarded by U.S. Military and Intelligence Agencies, 2019-2022.[26]

Five Largest Publicly Disclosed Tech Contracts Awarded by U.S. Military and Intelligence Agencies, 2019–2022

VENDOR(S)	BUYER	DESCRIPTION	CONTRACT CEILING	AWARD	LENGTH
Microsoft	U.S. Army	Integrated Visual Augmentation System (IVAS)	$22 Billion	Mar 2021	10 Yrs
Amazon	NSA	"Wild and Stormy"	$10 Billion	Jul 2021	5 Yrs
Amazon Microsoft Google Oracle IBM	CIA	Commercial Cloud Enterprise (C2E)	"Tens of Billions"	Nov 2020	15 Yrs
Amazon Microsoft Google Oracle	DoD	Joint Warfighting Cloud Capability (JWCC)	$9 Billion	Dec 2022	5 Yrs
Microsoft	DoD	Enterprise Services	$1.76 Billion	Jan 2019	5 Yrs

Another complication that makes it challenging to analyze DoD procurement contracts is the fact that major tech firms are often awarded large subcontracts from relatively obscure intermediary or "passthrough" companies that are granted primary contracts from the Pentagon.[27]

Such arrangements make it difficult—but not impossible—to determine the extent to which the tech industry is involved in military work. Tech Inquiry is a non-profit research organization that uses FOIA (the U.S. Freedom of Information Act), among other methods, to collect, collate, and analyze public government records, particularly procurement

[26] Sources: Poulson, J. (2022, September 5). *Militaries, Intelligence Agencies, and Law Enforcement Agencies Dominate US and UK Government Purchasing from US Tech Giants*. Tech Inquiry. https://techinquiry.org/docs/InternationalCloud.pdf; Matney, L. (2021, March 31). *Microsoft Gets Contract Worth up to $22 Billion to Outfit US Army with 120,000 AR Headsets*. TechCrunch. https://techcrunch.com/2021/03/31/microsoft-wins-contract-worth-up-to-22-billion-to-outfit-u-s-army-with-120000-ar-headsets/; Jones, J.H. (2022, April 27). *NSA Re-awards $10B Wild and Stormy Cloud Computing Contract to AWS*. FedScoop. https://fedscoop.com/nsa-re-awards-10b-wildandstormy-cloud-computing-contract-to-aws/; Mitchell, B. (2020, November 20). *CIA Quietly Awards C2E Cloud Contract Possibly Worth Billions*. FedScoop. https://fedscoop.com/cia-quietly-awards-billion-dollar-c2e-cloud-contract/; Alexander, D. (2019, January 11). *Microsoft Wins $1.76 Billion Defense Contract*. Reuters. https://www.reuters.com/article/idUSKCN1P52I4/.

[27] For example, Microsoft has had several major intermediaries that have included CDW Corporation, Insight Enterprises, Minburn Technology Group, and Dell. Amazon's intermediaries have included Four Points Technology, ECS Federal, and JHC Technology. Google's intermediaries have included DLT Solutions, Eyak Technology, Dnutch Associates, and Daston Corporation. See Ibid.

contracts with companies that provide weapon systems, surveillance technologies, and cloud computing services to U.S. government agencies.[28] In a 2020 report, Tech Inquiry concluded that Pentagon officials' "alarmist claims" about Silicon Valley's purported reluctance to conduct defense work were unwarranted, since major tech firms were awarded hundreds, and sometimes thousands, of Pentagon contracts and subcontracts.[29] Some of these deals were worth hundreds of millions, or even billions, of dollars.

After an endless series of summits, forums, and private meetings bringing together DoD officials, academics, Silicon Valley executives, and influential investors—as well as years of persistent messaging from Pentagon leaders and hawkish public policy think tanks about an "AI arms race" with China and the looming threats to U.S. national security posed by Russia and Iran—the Defense Department and the CIA now routinely award multiyear contracts to major tech firms.[30]

From a corporate perspective, there are advantages to expanding such activities. First, during a time of heightened concerns about global conflicts (in Ukraine and the Middle East) and "great power competition," some tech executives can position themselves—and their companies—as guardians of America's national security.[31] But more importantly, when Big Tech firms expand their contracts with the Pentagon, it enables them to tap into an extraordinarily lucrative, and endlessly expanding, source of revenue. Carving out a greater share of the Defense Department's $886 billion annual budget is undoubtedly an appealing prospect for the tech industry, even by the gargantuan standards of firms like Amazon, Microsoft, and Alphabet.

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[28] See www.techinquiry.org. The organization was founded by mathematician Jack Poulson, a former Google scientist.

[29] Tech Inquiry. (2020, July 7). *Reports of a Silicon Valley/Military Divide Have Been Greatly Exaggerated*. https://techinquiry.org/SiliconValley-Military/#direct-contracting-fpds-contract-values

[30] Defense tech summits are events in which representatives from industry, government, and academia meet, and typically include keynote speeches, roundtable discussions, "fireside chats," and networking events. Examples include Defense TechConnect; Defense Tech Week; and DefenseOne's Tech Summit. Some of these summits are organized by industry trade journals with sponsorship from other organizations, including U.S. defense and intelligence agencies. In early 2024, I was invited to attend and participate in the Global National Security Institute's (GNSI) annual AI Summit, coordinated by the University of South Florida (USF), U.S. Central Command (CENTCOM), and the Pentagon's Chief Digital and Artificial Intelligence Office, with corporate sponsorship from HII (Huntington Ingalls Industries), a defense contract firm. Attendees included venture capitalists, representatives from startup firms, military officials and procurement specialists, intelligence analysts, USF administrators, and faculty and students affiliated with GNSI. The three-day event was held on the USF campus in Tampa, Florida and included a semi-formal dinner, complimentary lunches, and coffee breaks for networking. Speakers included Deputy Defense Secretary Kathleen Hicks, U.S. Army General Bryan Fenton, U.S. Navy Vice Admiral Brad Cooper, and retired U.S. Air Force Lieutenant General Jack Shanahan. Former Google CEO Eric Schmidt was scheduled to speak on the last day of the event, but cancelled his visit a few days before the summit began. I learned that the U.S. Defense Department paid for speakers' travel expenses (including my own).

[31] Waters, R. (2019, December 8). *Jeff Bezos Warns U.S. Military It Risks Losing Tech Supremacy*. Financial Times. https://www.ft.com/content/b38c5cf6-198a-11ea-97df-cc63de1d73f4. See also Schmidt, E. (2022). *AI, Great Power Competition & National Security*. Daedalus 151(2), 288-298. Emphasizing Big Tech's dedication to U.S. national security would be beneficial to tech firms that have faced a series of public relations crises in recent years. Among other things, the tech industry has been accused of inadequately monitoring hate speech and violent content on the internet; of creating products that have fueled a mental health crisis among teenagers; and of failing to provide adequate privacy protections to its users.

In late 2022, many observers took note when the Pentagon announced that a $9 billion contract for its Joint Warfighting Cloud Capability (JWCC) initiative had been jointly awarded to Microsoft, Google, Oracle, and Amazon.[32] The stated goal of the program is to provide cloud computing services "at the speed of mission, at all classification levels, from headquarters to the tactical edge."[33] Among other things, the deal clearly demonstrated the tech industry's commitment to working with the Pentagon, putting to rest any doubts about the so-called "cultural divide" between Silicon Valley and Washington. Despite ongoing employee protests against military contracts such as Project Nimbus (a Google and Amazon cloud computing contract with the Israeli government that reportedly includes face recognition capability, video analysis, and sentiment analysis), company executives have pushed ahead.[34]

The JWCC award has rightly received a great deal of attention since its announcement, but there are many other major contracts that the Defense Department has awarded to big technology firms in recent years. For example, in early 2019, the Pentagon awarded Microsoft a five-year $1.76 billion contract for software development and services (see Table 1).[35] Later that year, the company's vendors (General Dynamics, Dell, and Minburn Technology Group) secured a ten-year $7.6 billion deal for the Defense Enterprise Office Solutions contract, which provides Office 365 tools such as spreadsheets, email, and word processing software to the Pentagon.[36] And two years later, in 2021, the DoD granted Microsoft a $22 billion contract to produce tactical augmented reality headsets for the U.S. Army. Although soldiers complained about early prototypes of the device—it reportedly left users with "mission-affecting physical impairments" including nausea, headaches, and eyestrain—the deal has since moved forward, since Microsoft has reportedly made substantial improvements.[37] Significantly, Microsoft has expanded a "strategic relationship"

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[32] Several years earlier, the Pentagon awarded Microsoft a similar contract known as the Joint Enterprise Defense Initiative (JEDI), but then cancelled it after multiple legal complaints involving Amazon and Oracle. See Nix, N., & Capaccio, A. (2021, July 6). *Pentagon Moves to Split Cloud Deal between Microsoft, Amazon*. Bloomberg News. https://www.bloomberg.com/news/articles/2021-07-06/pentagon-scraps-10-billion-cloud-contract-award-to-microsoft

[33] U.S. Department of Defense. (2022, December 7). *Department of Defense Announces Joint Warfighting Cloud Capability Procurement*. https://www.defense.gov/News/Releases/Release/Article/3239378/department-of-defense-announces-joint-warfighting-cloud-capability-procurement/

[34] Harrington, C. (2022, September 9). *Google and Amazon Want More Defense Contracts, Despite Worker Protests*. Wired. https://www.wired.com/story/google-and-amazon-want-more-defense-contracts-despite-worker-protests/

[35] U.S. Department of Defense. (2019, January 11). *Contracts for Jan. 11, 2019*. https://www.defense.gov/News/Contracts/Contract/Article/1730557/

[36] Owusu, T. (2019, August 29). *General Dynamics, Dell, Microsoft Are Winners of DoD's $7.6 Billion Contract*. The Street. https://www.thestreet.com/investing/stocks/general-dynamics-dell-microsoft-are-winners-of-dod-contract-15072434

[37] Roque, A. (2021, October 13). *U.S. Army "Pauses" IVAS Programme, Fielding on Hold*. Jane's Defence Weekly. https://www.janes.com/defence-news/c4isr-command-tech/latest/ausa-2021-us-army-pauses-ivas-programme-fielding-on-hold; Capaccio, A. (2022, October 13). *Microsoft's Army Goggles Left U.S. Soldiers with Nausea, Headaches in Test*. Bloomberg News. https://www.bloomberg.com/news/articles/2022-10-13/microsoft-s-us-army-version-of-hololens-goggles-gave-soldiers-nausea-headaches; Tucker, P. (2023, October 9). *Army Headset's Latest Version Clears Hurdle, but Service Wishlist Remains Long*. Defense One. https://www.defenseone.com/technology/2023/10/army-headsets-latest-version-clears-hurdle-service-wishlist-remains-long/391043/. In December 2023, China's state media network featured an air force

with Lockheed Martin to conduct collaborative research on AI and machine learning, modeling and simulation programs, classified cloud computing, and secure 5G networking for use "at the tactical edge."[38] Microsoft has also partnered with Leidos, an AI company producing missile launchers, hypersonic weapons, and autonomous maritime and aerial vehicles.[39]

Amazon is another JWCC awardee that has received major DoD contracts. Many of these are for cloud computing services, which is used for data storage and communication within and across military and intelligence agencies. More than a decade ago, the company snagged a $600 million CIA deal for such services.[40] In 2021, the NSA granted the company a ten-year, $10 billion contract called "Wild and Stormy." A central aim of the project is to move the Agency's global intelligence and surveillance data from internal servers to Amazon's cloud.[41] A year later, the U.S. Navy awarded the company a contract worth $724 million for similar services.[42] These are but of few of many contracts secured by the firm in recent years. For years, the company's CEO, Jeff Bezos, has enthusiastically supported closer ties between the tech industry and national security agencies and has dismissed criticism from Amazon employees.[43]

The Defense Department and U.S. intelligence agencies are also relying on contracts granted to multiple awardees, who then compete with each other for specific task orders. For example, in 2020, the CIA jointly awarded a multi-year cloud services contract to Microsoft, Amazon, Google, Oracle, and IBM. This contract, which is called the Commercial Cloud Enterprise (C2E), is reportedly worth "tens of billions" of dollars, although the CIA has not commented on the actual value of the contract.[44] Another large long-term project

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engineer wearing Microsoft's HoloLens2 headset (which is available commercially in China) to simulate repairs on an aircraft. Such cases illustrate the complexities of "great power competition" in an era of global capitalism. See Brar, A. (2023, December 14). *China's State Media Shows Military Using Microsoft's HoloLens 2 Headsets*. Newsweek. https://www.newsweek.com/china-peoples-liberation-army-microsoft-hololens2-mixed-reality-headsets-1852381

[38] Microsoft News Center. (2022, November 16). *Lockheed Martin, Microsoft Announce Landmark Agreement on Classified Cloud, Advanced Technologies for Department of Defense*. https://news.microsoft.com/2022/11/16/lockheed-martin-microsoft-announce-landmark-agreement-on-classified-cloud-advanced-technologies-for-department-of-defense/.

[39] Krishan, N. (2023, July 31). *Leidos Teams Up with Microsoft to Push on Generative AI in the Public Sector*. FedScoop. https://fedscoop.com/leidos-teams-up-with-microsoft-on-public-sector-generative-ai/

[40] Konkel, F. (2014, July 17). *The Details about the CIA's Deal with Amazon*. The Atlantic. https://www.theatlantic.com/technology/archive/2014/07/the-details-about-the-cias-deal-with-amazon/374632/

[41] Jones, J.H. (2022, April 27). *NSA Re-awards $10B Wild and Stormy Cloud Computing Contract to AWS*. FedScoop. https://fedscoop.com/nsa-re-awards-10b-wildandstormy-cloud-computing-contract-to-aws/

[42] Pomerleau, M. (2022, December 23). *AWS Wins $724 M Contract Providing Navy Access to Commercial Cloud Environment*. FedScoop. https://fedscoop.com/aws-wins-724m-contract-providing-navy-access-to-commercial-cloud-environment/

[43] Hamilton, I.A. (2019, December 9). *Jeff Bezos Says Employee Activists Are Wrong and Silicon Valley Firms Should Feel Comfortable Doing Business with the U.S. Military*. Business Insider. https://www.businessinsider.com/jeff-bezos-amazon-employee-activists-military-wrong-2019-12?r=MX&IR=T

[44] Mitchell, B. (2020, November 20). *CIA Quietly Awards C2E Cloud Contract Possibly Worth Billions*. FedScoop. https://fedscoop.com/cia-quietly-awards-billion-dollar-c2e-cloud-contract/. The CIA has not publicized details of this large contract, which isn't surprising since the agency is not subject to Congressional review.

funded by the DoD is the Joint All Domain Command and Control (JADC2) initiative, a multi-billion-dollar effort to link sensors and communications devices from all branches of the U.S. military. It includes the Army's Project Convergence, the Navy and Marine Corps Project Overmatch, and the Air Force's Advanced Battle Management System, and has made awards to hundreds of companies since the program in 2020.[45] These multi-year contracts, in which Big Tech firms are primarily providing "software as a service" rather than hardware or equipment, may have the effect of making the Pentagon and CIA more dependent than ever on the expertise of technical experts from the private sector. It is also likely to lead to a situation where Defense Department officials rely heavily upon the goodwill and cooperation of tech leaders on a continuous basis for some of its most basic functions.[46]

Startup Companies Are Receiving More Defense Funding Than Ever

The immense size of big tech firms has made it relatively easy for them to bid for defense and intelligence agency contracts, and some have been doing so for decades. The same cannot be said for small startup companies that are often starved for cash and need revenue streams to stay alive. According to some analysts, pilot projects launched by defense tech startups may succeed in creating prototypes, but frequently fail to cross the so-called "valley of death" lying between early prototype production and multi-year Pentagon contracts. Historically, the overhead costs associated with U.S. government procurement processes have made it difficult for smaller firms to compete.[47]

This began to change in 2015, when then Defense Secretary Ash Carter established DIUx. It was headquartered in Silicon Valley and designed as a venture capital fund: the goal was to quickly identify and invest in startups developing cutting-edge technologies that might have military applications.[48] With DIUx, the Pentagon built its own startup accelerator to fund firms specializing in AI, robotics, data analytics, cybersecurity, and biotechnology. DIUx was intentionally located in the heart of Silicon Valley, near Amazon's Lab126, Microsoft's Silicon Valley campus, and Apple's corporate offices. Carter, who had spent several years at Stanford University prior to his appointment as Defense Secretary, had reportedly been impressed with the Bay Area's innovative entrepreneurial spirit.[49] In 2018, DIUx was renamed Defense Innovation Unit (DIU), indicating that it was no longer

[45] Harper, J. (2023, March 13). *Pentagon Requesting More Than $3B for AI, JADC2*. DefenseScoop. https://defensescoop.com/2023/03/13/pentagon-requesting-more-than-3b-for-ai-jadc2/

[46] To put this in slightly different terms, "as government comes to rely more on business leaders than business leaders on government. . .senior officials are often obliged to kiss the rings of billionaires with questionable goals, and rely on the kindness of multinational corporations." See Farrell, H., & Newman. A. (2023, September 20). *What Happens When the Tech Bros Run National Security*. Time. https://time.com/6315670/big-tech-national-security/

[47] Scharre. P. (2023). *Four Battlegrounds: Power in the Age of Artificial Intelligence*. W.W. Norton. pp. 224-225.

[48] Kaplan, F. (2016, December 19). *The Pentagon's Innovation Experiment.* MIT Technology Review. https://www.technologyreview.com/2016/12/19/155246/the-pentagons-innovation-experiment/

[49] Hempel, J. (2015, November 18). *DoD Head Ashton Carter Enlists Silicon Valley to Transform the Military*. Wired. https://www.wired.com/2015/11/secretary-of-defense-ashton-carter/

experimental. Between June 2016 and September 2022, DIU awarded contracts worth a total of $1.2 billion to more than 320 companies.[50]

Carter modeled DIU after In-Q-Tel, a firm established by the CIA in the late 1990s to capitalize on innovations being developed in the private sector, particularly in Silicon Valley.[51] By channeling CIA funds to nascent companies building surveillance, intelligence gathering, data analysis, and cyberwar technologies, the agency hoped to outdo global rivals by funding firms with creative engineers, hackers, scientists, and programmers. In-Q-Tel has made more than 500 investments across an extraordinary range of startups.[52] In-Q-Tel's portfolio includes firms with futuristic projects such as Cyphy, which manufactures tethered drones that can fly reconnaissance missions for extended periods using a continuous power source; Atlas Wearables, which produces fitness trackers that closely monitor body movements and vital signs; Fuel3d, which sells a handheld device that produces detailed three-dimensional scans of structures or objects; Sonitus, which has developed a wireless communications system, part of which fits inside the user's mouth; and Saildrone, which produces autonomous maritime surveillance drones enabled by AI.[53] In-Q-Tel has also invested in data-mining firms like Geofeedia, TransVoyant, and PATHAR.[54]

Once again, it's worth reflecting on how funding for these new companies could have come from taxpayer-funded civilian agencies, rather than from the CIA or Pentagon. For example, financing for Cyphy's tethered drones could have come from FEMA (Federal Emergency Management Agency), the USDA (the Department of Agriculture), or the Department of the Interior, since these agencies could presumably use new drone technologies to help survey disaster zones, farms, or federal lands. Since the tools being developed by Atlas Wearables clearly have medical applications, research and development for the company's devices could have been supported by the NIH (National Institutes of Health). And Saildrone's nautical vessels potentially have a ride range of oceanographic applications, and under different circumstances, could have been funded exclusively by NOAA (National Oceanographic and Atmospheric Administration) or the EPA (Environmental Protection Agency). Instead, all of these startups were partly supported by military agencies that presumably had a vital role in influencing the development of the new technologies. As noted by Hugh Gusterson: "When research that could be funded by neutral civilian agencies is instead funded by the military, knowledge is subtly militarized and bent in the way a tree is bent by a prevailing wind."[55] The public comes to accept that

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[50] Defense Innovation Unit. (2023). *Annual Report FY 2022*. https://downloads.ctfassets.net/3nanhbfkr0pc/5guJIhcMGwIgoop4z9r5QM/a724a6935a7e5a8d516cc58328e47796/DIU_Annual_Report_FY22_FINAL.pdf

[51] Reinert, J.T. (2013). *In-Q-Tel: The Central Intelligence Agency as Venture Capitalist*. Northwestern Journal of International Law & Business, 33(3), 677-709. https://scholarlycommons.law.northwestern.edu/cgi/viewcontent.cgi?article=1739&context=njilb

[52] In-Q-Tel. (2023). *How We Work*. https://www.iqt.org/how-we-work/

[53] Szoldra, P. (2016, September 21). *14 Cutting Edge Firms Funded by the CIA*. Business Insider. https://www.businessinsider.com/companies-funded-by-cia-2016-9.

[54] Fang, L. (2016, April 14). *The CIA Is Investing in Firms that Mine Your Tweets and Instagram Photos*. The Intercept. https://theintercept.com/2016/04/14/in-undisclosed-cia-investments-social-media-mining-looms-large/.

[55] Gusterson, H. (2008, June 10). *The U.S. Military's Quest to Weaponize Culture*. Bulletin of the Atomic Scientists. https://thebulletin.org/2008/06/the-u-s-militarys-quest-to-weaponize-culture/.

military institutions should rightfully dominate the direction of research and development work, and loses sight of long term consequences—namely, the ways in which this process binds the American economy ever more tightly to endless wars abroad and greater surveillance at home.

DIU and In-Q-Tel are parts of an investment infrastructure that has expanded quickly over time. As noted above, the Defense Department created MD5—now called the National Security Innovation Network—shortly after DIUx was founded, and last year, it established the Office of Strategic Capital as a means of connecting defense tech startups to sources of venture capital and private equity. In addition, the DoD has rapidly developed a range of "accelerators," "incubators," and "hubs" to cultivate "innovation ecosystems" that bring small entrepreneurs and startup firms into contact with potential customers from U.S. defense and intelligence agencies.[56]

Startups typically follow one of three paths. By far, the most common is failure. According to conservative estimates, 75 percent of startups do not succeed in bringing a commercially viable product to market, or its early investors fail to make a profit.[57] Other estimates place the failure rate at approximately 90 percent. The few startups that do manage to survive either "go public"—that is, they emerge as publicly traded corporations—or they are purchased and merged with (or acquired by) a larger company. As they develop and incur expenses, successful startups generally organize several fundraising stages or "funding rounds" (Seed, Series A, Series B, Series C, Series D, etc.) to keep afloat.

To illustrate how U.S. military and intelligence agencies have supported tech startups, consider the case of Keyhole, a small San Francisco-based company that developed software for creating three-dimensional models of the earth's surface. By patching together satellite images and aerial photos, the program could essentially produce a high-resolution map of the entire planet. In-Q-Tel provided seed funding in 2003, and within two weeks, military and intelligence agencies were reportedly using Keyhole's software to support the U.S. war in Iraq.[58] The following year, Google acquired Keyhole for an undisclosed sum.[59] It was renamed Google Earth and today, it is worth approximately $4 billion.[60] In this case, In-Q-Tel's investment paid off in monetary terms, but the bigger

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[56] Many of the DoD's innovation centers have rapidly adopted tech industry buzzwords. See for example https://defensewerx.org/innovation-hubs/; https://afaccelerators.com/.

[57] Pollman, E. (2023, August 6). *Startup Failure.* Duke Law Journal, 73, 327-287. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4535089

[58] In-Q-Tel. (2003, June 25). *In-Q-Tel Announces Strategic Investment in Keyhole*. https://www.iqt.org/news/in-q-tel-announces-strategic-investment-in-keyhole/. In-Q-Tel does not report the amount of its investments, but Keyhole reportedly received a total of $527,000 in seed funding from various investors.

[59] Page, H. (2018, June 8). *What Big Tech Has Acquired from In-Q-Tel, the CIA's VC Arm*. CrunchBase News. https://news.crunchbase.com/liquidity/what-big-tech-has-acquired-from-in-q-tel-the-cias-vc-arm/. David Rosenthal, a partner at VC firm Wave Capital, has suggested that Google paid $35 million for Keyhole. See *Acquired* podcast (2019, August 26). https://www.acquired.fm/episodes/google-maps

[60] Kumparak, G. (2019, March 29). *How a Google Side Project Evolved into a $4B Company*. TechCrunch. https://techcrunch.com/2019/03/29/how-a-google-side-project-evolved-into-a-4b-company/

jackpot was the Keyhole program itself, which the CIA and Pentagon immediately deployed in support of military operations.

Like many DIU and In-Q-Tel investments, Keyhole-Google Earth is a dual-use technology that can be adapted for both military and civilian applications. The vast majority of In-Q-Tel funded startups acquired by large tech companies have created dual-use products, such as AppThwack and Elemental Technologies (acquired by Amazon); Acompli and Perceptive Pixel (acquired by Microsoft); Tacit Software (acquired by Oracle); Cleversafe (acquired by IBM); MindMeld (acquired by Cisco); QD Vision (acquired by Samsung); and Pixim (acquired by Sony).[61]

But In-Q-Tel does not just provide promising startups with cash—it typically invests in companies at an early stage of development, when companies tend to be amenable to shaping their technologies to meet the CIA's needs. Presumably DIU is taking the same approach. Tech startups are often open to suggestions and recommendations from military and intelligence agencies, since federal agencies are potentially a large customer base.[62] Consequently, In-Q-Tel and DIU are able to play an influential role in steering the development of new technology for their own purposes. As mentioned above, these processes have the effect of "bending" innovation toward the needs of the CIA and Pentagon, respectively. One can only imagine the scientific opportunities that have been lost or delayed because they are not aligned with military priorities: for example, increased research to better understand and develop mitigation plans for accelerating climate change and its effects; better tools for forecasting epidemic diseases; and improved methods for sustainable agriculture and resource management.

For small companies, In-Q-Tel and DIU funding can lead to two long-term benefits. First, In-Q-Tel and DIU offer an important advantage to defense tech startups: they typically have a "halo effect" that results in an ability to leverage much greater amounts of private investment—particularly VC funding—than would otherwise be the case.[63] According to In-Q-Tel, on average every dollar it invests in a company is leveraged into $28 of private VC funding.[64] Another important benefit is that early funding from In-Q-Tel and DIU, which is typically granted for prototype development using an expedited "OT [other transaction] agreement," often leads to high-value multiyear production contracts.[65]

Not all of the startups funded by DIU and In-Q-Tel are acquired by larger companies. Many of them fail—and a few become publicly traded corporations. Perhaps the best-known example of the latter is Palantir, which was founded in 2003 by Peter Thiel, Alex Karp, and others. The company's mission was to develop software that would help counter the threat of terrorism. Palantir reportedly struggled to raise early-stage funding, until In-

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[61] Page, H. (2018, June 8). *What Big Tech Has Acquired from In-Q-Tel, the CIA's VC Arm*. CrunchBase News. https://news.crunchbase.com/liquidity/what-big-tech-has-acquired-from-in-q-tel-the-cias-vc-arm/

[62] Crane K.W. et al. (2019). *Assessment of the Utility of a Government Strategic Investment Fund for Space*. Institute for Defense Analyses. https://www.jstor.org/stable/pdf/resrep22819.11.pdf

[63] Ibid.

[64] In-Q-Tel. (2023). *How We Work*. https://www.iqt.org/how-we-work/

[65] Cassidy, S.B., & J. Plitsch (2018, February 22). *DIUx and DoD Other Transaction Prototype Agreements: The Fast Track to DoD Funding*. Inside Government Contracts. https://www.insidegovernmentcontracts.com/2018/02/7476/. Expedited OT agreements are attractive for small companies lacking sufficient staff to adequately meet DoD's procurement processes.

Q-Tel invested approximately $2 million.[66] By 2013, the firm's clients included the CIA, the NSA, the FBI, the Marine Corps, the Air Force, and the Special Operations Command.[67] In subsequent years, Palantir expanded its list of customers to include U.S. police departments and regional law enforcement agencies, U.S. Immigration and Customs Enforcement, and the UK's National Health Service, among others. It also reportedly took over DoD's Project Maven after Google executives chose to not renew its contract.[68] For years, Palantir has had multiple contracts with the Israeli Defense Forces, and it extended its support for Israel after its war against Hamas began in October 2023.[69] The company has also played a role in supporting Ukrainian forces against the Russian military.

In September 2020, Palantir went public on the New York Stock Exchange. Just months before its initial public offering, it was awarded a major multi-year $800 million U.S. Army contract, beating out defense giant Raytheon.[70] Such developments might lead some to ask: Is Palantir poised to become the new Raytheon or Lockheed Martin? Will tech companies eventually displace established defense contractors as the primary recipients of U.S. military spending? Given Big Tech's overwhelming financial power, a more likely scenario is that corporations like Microsoft and Amazon will begin acquiring pieces of the "traditional" military-industrial complex—and that "traditional" firms like Northrop Grumman and RTX will begin buying up promising defense tech startups. Jack Poulson, a mathematician who worked at Google before founding Tech Inquiry, put it this way: "I believe we are witnessing the transition of major U.S. tech companies into defense contractors and would go so far as to predict them purchasing defense contractors in the coming years—something like Amazon buying Raytheon."[71]

Today, Palantir has nearly 4,000 employees, and is valued at approximately $36 billion. Since going public, more than half of Palantir's revenue has come from the U.S. federal government.[72] Recent deals include a $250 million AI services contract with the U.S. Army, a $463 million deal with the Special Operations Command, a $115 million Army

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[66] Greenberg, A. (2013, August 14). *How a "Deviant" Philosopher Built Palantir, a CIA-Funded Data-Mining Juggernaut*. Forbes. https://www.forbes.com/sites/andygreenberg/2013/08/14/agent-of-intelligence-how-a-deviant-philosopher-built-palantir-a-cia-funded-data-mining-juggernaut/

[67] Burns, M. (2015, January 11). *Leaked Palantir Doc Reveals Uses, Specific Functions and Key Clients*. TechCrunch. https://techcrunch.com/2015/01/11/leaked-palantir-doc-reveals-uses-specific-functions-and-key-clients/

[68] Peterson, B. (2019, December 10). *Palantir Grabbed Project Maven Defense Contract after Google Left the Program*. Business Insider. https://www.businessinsider.com/palantir-took-over-from-google-on-project-maven-2019-12?r=MX&IR=T

[69] Newman, M. (2024, January 10). *Palantir Supplying Israel with New Tools Since Hamas War Started*. Bloomberg News. https://www.bloomberg.com/news/articles/2024-01-10/palantir-supplying-israel-with-new-tools-since-hamas-war-started

[70] Chapman, L. (2019, December 13). *Palantir Wins New Pentagon Deal with $111 Million from the Army*. Bloomberg News. https://www.bloomberg.com/news/articles/2019-12-14/palantir-wins-new-pentagon-deal-with-111-million-from-the-army; Harris, S. (2019, March 26). *Palantir Wins Competition to Build Army Intelligence System*. Washington Post. https://www.washingtonpost.com/world/national-security/palantir-wins-competition-to-build-army-intelligence-system/2019/03/26/c6d62bf0-3927-11e9-aaae-69364b2ed137_story.html

[71] Poulson, J. (2019, June 19). Personal communication with the author.

[72] Wilkers, R. (2021, February 16). *Palantir Details New Phase of Federal Strategy*. Washington Technology. https://washingtontechnology.com/2021/02/palantir-details-new-phase-of-federal-strategy/355117/

contract extension for data management services, and three Air Force contracts worth more than $100 million.[73] Perhaps not surprisingly, Palantir stock rose more than 170 percent in 2023.[74] Pentagon contracts involving publicly traded corporations raise questions about the possibility of insider trading.[75]

If Palantir is the largest of the DoD- and CIA-funded startup companies, then Anduril Industries, currently valued at $8.5 billion, is undoubtedly the second. Since its 2017 founding, the firm has received funding from both In-Q-Tel, DIU, and dozens of private VC firms. In investment circles, there is much debate about when (or if) Anduril will go public. In recent years, the company has acquired other startups, including Dive Technologies, (which manufactures autonomous underwater vehicles), and Blue Force Technologies and Area-I (which produce autonomous aerial drones).[76] Anduril has secured several major contracts with U.S. military and intelligence agencies, including a $99 million deal with the DoD and a ten-year $967 million contract with the Special Operations Command.[77]

Other major defense tech startups include aerial drone manufacturers Shield AI and Skydio, geospatial analytics company HawkEye 360, AI firm Rebellion Defense, and Epirus, which produces directed energy counter-drone technologies. In VC parlance, these companies are all either "unicorns," which means that they are valued at more than $1 billion, or are just below that mark.

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[73] Krause, R. (2023, September 27). *Palantir Wins $250M U.S. Army Services Contract for AI*. Investor's Business Daily. https://www.investors.com/news/technology/pltr-stock-palantir-wins-250-million-army-ai-services-contract/; Savitz, E.J. (2023, December 15). *Palantir Gets "Unexpected" $115 Million Add-on to Army Vantage Contract*. Barron's. https://www.barrons.com/articles/palantir-stock-army-contract-extension-864d316f; Kilgore, T. (2023, June 5). *Palantir's Stock Surges toward 17-Month on News of Special-Ops Contract Valued at Up to $463 Million*. MarketWatch. https://www.marketwatch.com/story/palantirs-stock-surges-toward-17-month-high-after-being-awarded-u-s-special-ops-contract-valued-at-up-to-463-million-165d2099; Harper, J. (2023, June 16). *Palantir Racks Up More Than $100M in New Air Force Contract Awards to Provide Data-as-a-Service*. DefenseScoop. https://defensescoop.com/2023/06/16/palantir-racks-up-more-than-100m-in-new-air-force-contract-awards-to-provide-data-as-a-service/

[74] Zambonin, B. (2023, October 11). *Why Do Retailers Love Palantir Stock?* The Street. https://www.thestreet.com/memestocks/reddit-trends/why-do-retail-investors-love-palantir-stock

[75] Concerns about insider trading among members of Congress and their staff have been a persistent theme over the years. See for example Cleveland-Stout, N. (2022, September 16). *Who Held Defense Stocks While Making National Security Policy?* Responsible Statecraft. https://responsiblestatecraft.org/2022/09/16/lawmakers-making-national-security-policy-trade-in-defense-stocks/; Leonard, K. (2022, May 19). *20 Members of Congress Personally Invest in Top Weapons Contractors That Profit from the Just-Passed $40 Billion Ukraine Aid Package*. Business Insider. https://www.businessinsider.com/congress-war-profiteers-stock-lockheed-martin-raytheon-investment-2022/.

[76] Metinko, C. (2023, October 4). *Anduril Looking to Raise as Much as $500M*. CrunchBase News. https://news.crunchbase.com/ai-robotics/anduril-funding-valuation-palmer-luckey-defense-tech/

[77] Mehta, A. (2021, July 27). *Anduril Nabs DIU "Service" Contract for Counter-Drone AI*. Breaking Defense. https://breakingdefense.com/2021/07/anduril-nabs-diu-service-contract-for-counter-drone-ai/

Venture Capital and the Military-Industrial Complex

A distinctive aspect of the shifting military-industrial complex is the crucial role played by venture capital (VC).[78] Some observers have noted that the rapid rise in VC funding for defense tech firms has been spurred by recent global conflicts, particularly the war in Ukraine, and more recently, escalating conflicts in Gaza and other parts of the Middle East. According to this line of reasoning, the widely publicized use of drones, satellite imagery, Starlink, and other technologies are generating interest among investors, and Russia's invasion of Ukraine has led to a shifting "ethical red line" that is prompting VC to back defense tech startups.[79] The perceived threats of "great power competition," a global AI arms race, or a hypothetical Chinese invasion of Taiwan, have also reportedly led some investors to back defense tech firms as part of an effort to maintain America's military and technological superiority.[80]

While shifting ethical norms in an era of geopolitical uncertainty may account for part of VC's newfound interest in defense tech firms, economic realities are undoubtedly more important. As noted earlier, the DoD and the CIA have their own VC arms (DIU and In-Q-Tel), but defense tech startups receive much more funding from private sources. Unlike older, more established U.S. investment firms, VC companies tend to focus on funding startups that are in the early stages of development. These are notoriously risky ventures, but investing in a successful startup can lead to huge profits. In geographic terms, VC investment is heavily concentrated in Silicon Valley: more than a third of all VC funding in America comes from investors in the greater San Francisco Bay Area.[81]

Historically, the largest VC firms were generally reluctant to invest in defense tech startups, but this has changed dramatically over the past few years (see Figure 1).[82] For example, influential VC firm Andreessen Horowitz is now Anduril Industries' largest financial backer, and has made investments across a wide range of defense tech firms. Over the past several years, one of the firm's partners, Katherine Boyle, has helped to reorient Andreessen Horowitz's portfolio towards startups that are developing military and intelligence products, such as Epirus, Hadrian, Hermeus, Saildrone, Shield AI, and Vannevar Labs.[83]

Another indication that defense tech startups are now mainstream investments is VC giant Sequoia Capital's backing for Mach Industries, a company that is developing

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[78] Marshall, S. (2023, December). *The Military-Industrial-Venture Capital Complex*. Security in Context Policy Paper 23-03. https://www.securityincontext.com/posts/the-military-industrial-venture-capital-complex

[79] Levingston, I., Foy, H., & Kinder, T. (2003, September 24). *Nato's €1bn Venture Fund Offers Defence Start-ups an Alternative to China*. Financial Times. https://www.ft.com/content/2a41355b-e0bb-425b-b49c-3864cb48bf26; Dou, E., & Temkin, M. (2022, October 26). *VCs Go Outside Their Comfort Zone with Bets on Defense Tech*. Pitchbook. https://pitchbook.com/news/articles/defense-space-vc-ukraine-recession

[80] The Economist. (2022, August 8). *Can Tech Reshape the Pentagon?* https://www.economist.com/business/2022/08/08/can-tech-reshape-the-pentagon

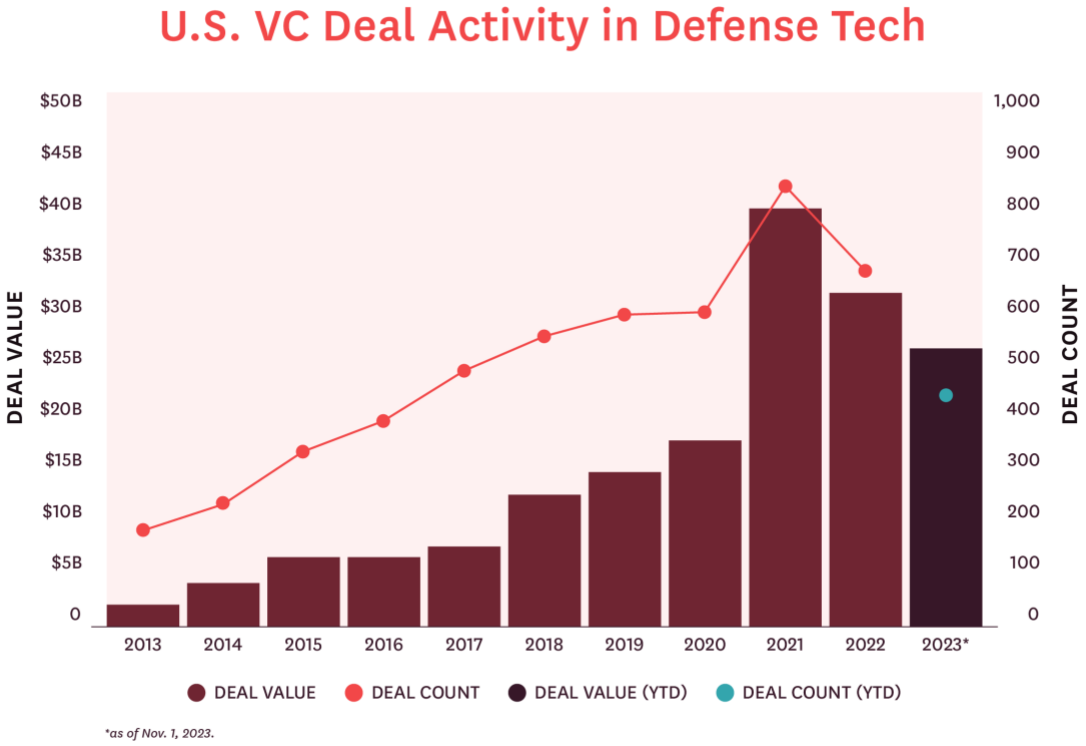
[81] Florida, R. (2022, March 9). *The Post-Pandemic Geography of the U.S. Tech Economy*. Bloomberg News. https://www.bloomberg.com/news/articles/2022-03-09/where-venture-capital-and-tech-jobs-are-growing

[82] Heim, A. (2023, September 30). *Venture Capital Is Opening the Gates for Defense Tech*. TechCrunch. https://techcrunch.com/2023/09/30/vc-defense-tech/

[83] Horowitz, A. (2023). *The American Dynamism 50*. https://a16z.com/american-dynamism-50/

hydrogen-powered aerial drones.[84] Shortly afterwards, Sequoia invested in Senra Systems, a manufacturer of military parts. Sequoia and Andreessen Horowitz are unquestionably the largest and most well-known VC firms in America. Other major VC firms, such as Lux Capital, General Catalyst, Shield Capital, and Founders Fund are also significant sources of funding for defense tech startups. Significantly, two "traditional" defense contractors have also created their own VC funds: Lockheed Martin Ventures and RTX Ventures.

Figure 1. U.S. VC Deal Activity in Defense Tech.[85]



As a greater percentage of the DoD's steadily increasing budget is allocated for AI applications, cloud computing, autonomous and semi-autonomous weapon and surveillance systems, drones, and other technologies, VC firms are responding with enthusiasm. For example, last year the Pentagon requested $145 billion from Congress to fund its innovation and modernization programs—an increase of approximately 10 percent over the previous year.[86] This spending growth has been accompanied by the Defense

[84] Hu, K. (2023, June 15). *Sequoia Makes First Defense Tech Investment in Mach Industries*. Reuters. https://www.reuters.com/technology/sequoia-makes-first-defense-tech-investment-mach-industries-2023-06-15/. VC investment in defense tech firms decreased in 2022 and 2023, reflecting a broader slump, due largely to higher interest rates. Even so, VC funding for defense tech outpaced investment in other sectors.
[85] Pitchbook data. https://pitchbook.com/news/articles/defense-tech-boom-ukraine-china-israel
[86] Albon, C.; Demarest, C. (2023, March 13). *Pentagon's Historic R&D Request Has Billions for Advanced Networks, AI*. C4ISRNET. https://www.c4isrnet.com/battlefield-tech/2023/03/13/pentagons-historic-rd-request-has-billions-for-advanced-networks-ai/

Department's growing commitment to venture capital funds like DIU and the CIA's In-Q-Tel. Last year, an influential group of Silicon Valley VC and tech executives publicly demanded an overhaul of Pentagon procurement processes, but DoD's bureaucratic requirements didn't deter big investors.[87] From 2021 through 2023, VC firms reportedly pumped nearly $100 billion into defense tech companies—an amount 40 percent higher than the previous seven years combined.[88]

Political and economic transformations are reshaping the military-industrial complex, and an ideological superstructure is reinforcing those processes of change. It is made up of several elements—an AI hype machine that makes grandiose claims about the effectiveness of artificial intelligence; the overestimation of China's military and technological capabilities; the idea that America alone has the ability (and the duty) to protect the world's democratic societies; and a steadfast belief that the best way to preserve U.S. dominance is through a largely unregulated free market that prioritizes corporate needs.[89] These perspectives, which play a role in boosting demand for military AI, are promulgated by an interconnected network of tech executives, venture capitalists, think tank analysts, academic researchers, journalists, and Pentagon leaders. Over the course of a few years, this group has saturated the media landscape with a frightening scenario: they claim that America is on the verge of losing an epic struggle for global geopolitical and economic supremacy—unless it can outpace China in the "AI arms race." This compelling idea is reminiscent of Cold War narratives and serves to justify and accelerate U.S. military spending in the technology sector.[90]

Perhaps the most influential figure promoting such ideas is Eric Schmidt, the former CEO of Google. Schmidt, who chaired both the Defense Innovation Board (DIB) and the National Security Commission on Artificial Intelligence (NSCAI), has warned that the U.S. has arrived at a new "Sputnik moment" that requires a massive mobilization of resources to advance AI technologies before China does. "This is the moment where the government collectively with private industry needs to say these technologies are important," he said.[91] Schmidt's frequent op-ed pieces and commentaries have consistently stoked fears of America losing "technology wars" to China.[92]

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[87] Kinder, T. (2023, June 26). *Silicon Valley Chiefs Urge Pentagon Procurement Overhaul*. Financial Times. https://www.ft.com/content/45da39f2-4e05-46f1-96f4-813fbba79b16

[88] Temkin, M. (2023, November 3). *Sizing Up the Boom in Defense Tech*. Pitchbook. https://pitchbook.com/news/articles/defense-tech-boom-ukraine-china-Israel

[89] Heaven, W.D. (2023, August 30). *AI Hype Is Built on High Test Scores. Those Tests Are Flawed*. MIT Technology Review. https://www.technologyreview.com/2023/08/30/1078670/large-language-models-arent-people-lets-stop-testing-them-like-they-were/

[90] At times, the idea of preserving the U.S.'s status as the world's sole superpower appears to be driven by nostalgia for an imagined, idyllic post-WWII (and pre-Sputnik) America. But the idea of a unipolar global society isn't shared by many of America's allies, much less the rest of the world's countries. See Ashford, E.; Cooper, E. (2023, October 2). *Assumption Testing: Multipolarity Is More Dangerous Than Bipolarity for the United States*. Stimson Center. https://www.stimson.org/2023/assumption-testing-multipolarity-is-more-dangerous-than-bipolarity-for-the-united-states/

[91] Quoted in Scharre, P. (2023). *Four Battlegrounds: Power in the Age of Artificial Intelligence*. W.W. Norton. p. 71-72.

[92] Schmidt, E. (2020, February 27). *I Used to Run Google. Silicon Valley Could Lose to China*. The New York Times. https://www.nytimes.com/2020/02/27/opinion/eric-schmidt-ai-china.html; Schmidt, E. (2023,

Many reports have suggested that Schmidt benefits materially from a closer relationship between the Pentagon and the tech industry, and questions have emerged about the ethical implications of the immense influence he wields over U.S. defense and technology policy.[93] Schmidt is among the largest Alphabet shareholders, owning more than $5 billion worth of stock in Google's parent company.[94] And in recent years, he has invested millions of dollars from his own VC firm in defense tech startups, including Rebellion Defense.[95]

In 2022, Schmidt, along with Peter Thiel (tech executive, venture capitalist, and co-founder of Palantir) and others established America's Frontier Fund (AFF), a non-profit VC organization "that invests for the national interest" by supporting tech firms, particularly semiconductor companies.[96] Although the group's co-founders have a net worth totaling tens of billions of dollars, AFF investors met with Congressional lawmakers shortly after it was established, seeking $1 billion in funding. After Congress didn't allocate any money to AFF, the group successfully convinced the New Mexico State Investment Council to commit $100 million to its fund.[97] AFF may have also played a critical role in shaping Congress's

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February 28). I*nnovation Power—Why Technology Will Define the Future of Geopolitics*. Foreign Policy. https://www.foreignaffairs.com/united-states/eric-schmidt-innovation-power-technology-geopolitics; Allison, G., & Schmidt, E. (2021, December 7). *China Will Soon Lead the U.S. in Tech*. Wall Street Journal. https://www.wsj.com/articles/china-will-soon-lead-the-us-in-tech-global-leader-semiconductors-5g-wireless-green-energy-11638915759

[93] Schmidt, B., & Edgerton, A. (2023, September 8). *Google's Former CEO Is Leveraging His $27 Billion Fortune to Shape AI Policy*. Bloomberg News. https://www.bloomberg.com/news/articles/2023-09-08/google-ex-ceo-eric-schmidt-influences-ai-policy-with-27-billion-fortune; Thompson, A. (2022, March 28). *A Google Billionaire's Fingerprints Are All over Biden's Science Office*. Politico. https://www.politico.com/news/2022/03/28/google-billionaire-joe-biden-science-office-00020712; Kim, W. (2022, June 9). *Ex-Google CEO Eric Schmidt's New Investment Fund Deepens His Ties to National Security Interests*. Vox. https://www.vox.com/recode/2022/6/9/23160588/eric-schmidt-americas-frontier-fund-google-alphabet-tech-government-revolving-door; Winters, B. (2022, April 1). *Playing Both Sides: Impact of Tech Industry on Early Federal AI Policy*. Electronic Privacy Information Center. https://epic.org/playing-both-sides-ai-policy/; Tech Transparency Project (2022, December 20). *Eric Schmidt's Expanding Influence Apparatus*. https://www.techtransparencyproject.org/articles/eric-schmidts-expanding-influence-apparatus; Kaye, K. (2022, October 31). *Inside Eric Schmidt's Push to Profit from an AI Cold War with China*. Protocol. https://www.protocol.com/enterprise/eric-schmidt-ai-china; Tech Transparency Project. (2022, May 25). *Eric Schmidt's Hidden Influence over U.S. Defense Spending*. https://www.techtransparencyproject.org/articles/eric-schmidts-unseen-influence-over-us-defense-spending

[94] Knight, W. (2023, February 13). *Eric Schmidt Is Building the Perfect AI War-fighting Machine*. Wired. https://www.wired.com/story/eric-schmidt-is-building-the-perfect-ai-war-fighting-machine/

[95] Guyer, J. (2021, January 19). *Silicon Valley Takes the Battlespace*. The American Prospect. https://prospect.org/power/silicon-valley-takes-battlespace-eric-schmidt-rebellion/; Conger, K., & Metz, C. (2020, May 2). *"I Could Solve Most of Your Problems": Eric Schmidt's Pentagon Offensive*. The New York Times. https://www.nytimes.com/2020/05/02/technology/eric-schmidt-pentagon-google.html

[96] Livni, E. (2022, June 9). *The Billionaires Behind a Push to Reinvigorate U.S. Chip-Making*. The New York Times. https://www.nytimes.com/2022/06/09/business/americas-frontier-fund-chip-making.html

[97] James, R. (2022, November 22). *New Mexico Pledges $100 Million to Back First Vehicle of America's Frontier Fund*. The Wall Street Journal. https://www.wsj.com/articles/new-mexico-pledges-100-million-to-back-first-vehicle-of-americas-frontier-fund-11669160566

massive $280 billion CHIPS and Science Act, a 2022 bipartisan law which, among other things, provides subsidies and tax credits to semiconductor manufacturers.[98]

Apart from Eric Schmidt, other tech executives have sounded alarm bells about China's ambitions for AI dominance, arguing that the U.S. must maintain its global superiority at all costs. For example, Peter Thiel portrayed AI as the essential "military technology" of the future, chiding Google and Microsoft for recruiting Chinese researchers.[99] Palantir's CEO Alex Karp notes that America's "Oppenheimer moment" has arrived, and that any effort to slow down the development of AI-enabled weapons will eventually lead to the downfall of the U.S. and other democratic societies.[100] The CEO of Anduril Industries, Palmer Luckey, has complained that too many tech firms are unwilling to cooperate with the Pentagon to counter China's high-tech weaponry.[101] All of these statements raise questions about how these corporate executives' financial interests are influencing their foreign policy perspectives.

Current and former senior Defense Department officials have repeated similar narratives, including Deputy Defense Secretary Katherine Hicks and her recent predecessors, particularly Robert O. Work, David L. Norquist, Patrick Shanahan, and the late Ash Carter (who established DIUx).[102] Although it is tempting to think that as civil servants, Pentagon leaders would not seek to benefit from their connections to government, the storied "revolving door" between the Defense Department and private industry is still very much a reality. After leaving his Pentagon post, Robert Work became an advisor to defense tech startup Hawkeye 360, then joined Raytheon's board of directors in 2017.[103] David Norquist now serves as president and CEO of the National Defense Industrial Association, which lobbies on behalf of defense contractors.[104] Patrick Shanahan is on the board of directors for Leidos, an AI company specializing in autonomous maritime and aerial vehicles for military use.[105]

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[98] See Poulson, J. (2023, February 2). *How an Eric Schmidt-backed Venture Capital Firm Claims Its Investments Will Increase '10x Overnight' if China Invades Taiwan*. Tech Inquiry. https://techinquiry.org/?article=10x-overnight

[99] Thiel, P. (2019, August 1). *Good for Google, Bad for America*. The New York Times. https://www.nytimes.com/2019/08/01/opinion/peter-thiel-google.html#click=https://t.co/XdDvxUSG7a

[100] Karp, A. (2023, July 25). *Our Oppenheimer Moment: The Creation of AI Weapons*. The New York Times. https://www.nytimes.com/2023/07/25/opinion/karp-palantir-artificial-intelligence.html

[101] Sullivan, M. (2022, July 14). *Palmer Luckey: The U.S. Is Falling Behind in Defense because Big Tech Is Scared of China*. Fast Company. https://www.fastcompany.com/90769130/palmer-luckey-big-tech-defense-china

[102] Youssef, N.A., & Gordon, M. R. (2023, September 6). *Pentagon Plans Vast AI Fleet to Counter China Threat*. The Wall Street Journal. https://www.wsj.com/politics/national-security/pentagon-plans-vast-ai-fleet-to-counter-china-threat-4186a186; Freedberg, S.J. (2022, September 2). *"We May Be Losing the Race" for AI with China: Bob Work*. Breaking Defense. https://breakingdefense.com/2020/09/we-may-be-losing-the-race-for-ai-with-china-bob-work/; Barnett, J. (2019, July 25). *DoD Deputy Secretary Nominee Norquist Loves AI, Just Like Secretary Esper*. FedScoop. https://fedscoop.com/norquist-ai-nomination-hearing/

[103] Wilkers, R. (2018, April 17). *Hawkeye 360 Adds Robert Work, John Mulholland to Advisory Board*. Washington Technology. https://washingtontechnology.com/2018/04/hawkeye-360-adds-robert-work-john-mulholland-to-advisory-board/349261/

[104] Magnuson, S. (2022, March 31). *NDIA Names Former DepSecDef Norquist as New President, CEO*. National Defense. https://www.nationaldefensemagazine.org/articles/2022/3/31/ndia-names-norquist-as-new-ceo

[105] Bertuca, T. (2022, February 16). *Shanahan Joins Leidos Board*. Inside Defense. https://insidedefense.com/insider/shanahan-joins-leidos-board

But perhaps more importantly, dozens of senior Pentagon and national security officials are now gravitating towards defense-related VC or private equity firms as executives or advisors after they retire from public service. While in the past, the "revolving door" usually meant that a former DoD official might accept an executive position with weapons manufacturers like Lockheed Martin or McDonnell Douglas, there are new, more lucrative options. At least fifty former Defense Department officials are now working in VC and private equity, leveraging their connections with current DoD officials or members of Congress to push for legislation that might benefit the defense tech firms that are part of their firms' investment portfolios.[106] The implications of this are significant: the new "revolving door" is likely to accelerate some of the trends outlined in this report, most notably increased military and intelligence agency funding for early-stage defense tech startups.

Hawkish bipartisan establishment think tanks—particularly the Center for a New American Security (CNAS) and the Center for Strategic and International Studies (CSIS)—are also propagating the idea of an AI arms race against China. For example, CNAS staff have written numerous reports on the topic, and have testified in Congressional hearings related to China's AI capabilities.[107] CSIS has hosted similar events, and its fellows often produce reports advocating tougher U.S. policies against China, such as tighter export controls on advanced microchips and semiconductors.[108] Like many American think tanks, CNAS and CSIS rely heavily on corporate funding. The two organizations' biggest donors include defense firms Lockheed Martin, Northrop Grumman, and RTX—and significantly, tech giants like Alphabet-Google, Microsoft, Amazon, Meta-Facebook, and Apple.[109] This raises serious questions about how such financial linkages are shaping the perspectives and policy proposals offered by CNAS and CSIS analysts.

The Defense Department's current leadership is largely dismissing alternative viewpoints that cast doubt on the narratives mentioned above. For example, the idea that the U.S. is on the verge of losing an AI arms race—which often leads tech executives to argue that regulating AI may threaten national security—is contested by researchers who argue that the significance of China's technological progress has been overstated.[110] Others

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[106] Lipton, E. (2023, December 30). *The Pentagon Road to Venture Capital*. The New York Times. https://www.nytimes.com/2023/12/30/us/politics/the-pentagon-road-to-venture-capital.html

[107] Stokes, J, Sullivan, A., & Greene, N. (2023, July 25). *U.S.-China Competition and Military AI*. CNAS. https://www.cnas.org/publications/reports/u-s-china-competition-and-military-ai; Kania, E. (2019, June 7). *Chinese Military Innovation in Artificial Intelligence.* CNAS. https://www.cnas.org/publications/congressional-testimony/chinese-military-innovation-in-artificial-intelligence

[108] Lin, B., & Allen, G.C. (2023, May 24). *China's Approach to Artificial Intelligence: A Conversation.* CSIS. https://www.csis.org/podcasts/chinapower/chinas-approach-artificial-intelligence-conversation-gregory-c-allen; Allen, G.C. (2022, October 11). *Choking Off China's Access to the Future of AI.* CSIS. https://www.csis.org/analysis/choking-chinas-access-future-ai. The latter is a CSIS report funded by Schmidt Futures, a philanthropic organization founded by Eric Schmidt.

[109] See https://www.cnas.org/support-cnas/cnas-supporters; https://www.csis.org/about/financial-information/donors/corporations

[110] Toner, H., Xiao, J., & Ding, J. (2023, June 2). *The Illusion of China's AI Prowess.* Foreign Affairs. https://www.foreignaffairs.com/china/illusion-chinas-ai-prowess-regulation-helen-toner; Hartung, W. (2023, December 6). *Hyped China Fears Are Driving a High-Tech Arms Race.* Responsible Statecraft. https://responsiblestatecraft.org/china-arms-race/; Grazier, D. (2022, December 7). *China Threat Inflation*

have noted that in recent years, China and the U.S. have been trapped in an "escalatory cycle of exclusion and retaliation," and that policymakers' fears about an alliance between Russia and China do not take into account the deep differences between the two countries. Many countries would prefer alternatives to a stark "either-or" choice between the U.S. and China.[111]

At least one former Pentagon leader has expressed doubts about the rhetoric of an AI arms race. Retired U.S. Air Force Lieutenant General Jack Shanahan, who served as director of the DoD's Joint Artificial Intelligence Commission, recently noted: "It feels at times like we are dangerously close to making the same kind of erroneous 'bomber/missile gap' assessment with AI that we did with the Soviet Union in the early 1960s. (And to be fair, I'm not exactly blameless here.)"[112] Shanahan's parenthetical remark is a reference to the fact that in his capacity as director of the DoD's Joint Artificial Intelligence Center and as director of Project Maven, he promoted the rapid adoption of AI in military applications.

The Cold War provides a useful analogy to the current situation, but there are also other historical moments worth considering. For example, the creation of the American national security state in 1947 and implementation of new U.S. security initiatives immediately following the attacks of September 11, 2001 led to the "designation of new insecurities, new institutions to fight them, [and] a public mobilization campaign grounded in fear."[113] This led to massive military investments that allocated vast resources to ward off imagined catastrophic futures, while simultaneously creating the conditions for those catastrophic futures to occur—by generating new arms races, exacerbating international tensions, and failing to respond to human suffering at home and abroad.[114] This troubling history is directly relevant for understanding the potential consequences of America's current mobilization for war.

The Costs of Preparing for Algorithmic War

The rush to build an AI-enabled military—and preparing for war by algorithms—promises to be costly to American society in several ways. In economic terms, VC and private equity firms are investing much more than ever before in defense tech startups for a reason: they are betting that an expansion of DoD spending on high-tech products will lead

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and America's Nonsensical Plans. Project on Government Oversight. https://www.pogo.org/reports/china-threat-inflation-and-americas-nonsensical-plans

[111] Werner, J. (2023, September 14). *Competition Versus Exclusion in U.S.-China Relations: A Choice between Stability and Conflict*. Quincy Institute. https://quincyinst.org/research/competition-versus-exclusion-in-u-s-china-relations-a-choice-between-stability-and-conflict/; Chow, T., & Werner, J. (2022, April 4). *Don't Assume Russia and China Are on the Same Page. The U.S. Can Work with China*. The Guardian. https://www.theguardian.com/commentisfree/2022/apr/04/us-china-relationship-xi

[112] See https://www.linkedin.com/posts/jackntshanahan_the-illusion-of-chinas-ai-prowess-activity-7071588483651264513-rY7N/?originalSubdomain=bo.

[113] Masco, J. (2014). *The Theater of Operations: National Security from the Cold War to the War on Terror*. Durham, NC: Duke University Press, p. 5. See also Lutz, C. (2001). *Homefront: A Military City and the American 20th Century*. Boston: Beacon Press.

[114] Ibid., p. 13.

to lucrative returns.[115] In other words, private investors are willing to fund high-risk defense tech companies because the payoff from taxpayer-funded Pentagon production contracts can be enormous. VC and private equity companies know that when DIU and In-Q-Tel provide early-stage funding for a startup, there is a decent chance that it will eventually be awarded a longer-term deal from military and intelligence agencies.[116] Through this process, billions of dollars in public funds can be easily transferred to private hands in the name of national security.

Apart from the economic burdens associated with a tech-heavy defense agenda, preparation for AI wars will incur a high political cost. The immense influence of major firms like Microsoft, Amazon, Alphabet-Google, HP, IBM, Oracle, and others will become even greater as U.S. military and intelligence agencies award tech companies more contracts in the months and years ahead. The industry's lobbying expenditures are comparable to those of other major industries, and frequently exceed them: in 2022, Microsoft spent nearly $10.5 million; Oracle spent more than $11.6 million; Alphabet (Google's parent company) spent more than $13 million; and Amazon spent a whopping $21.4 million.[117] Eisenhower's exhortation that American citizens should "guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex" is just as relevant today as it was in 1961.[118] Assuming that the tech industry continues to dominate sizeable portions of the America economy—including an annual military and intelligence budget likely to soon reach $1 trillion—its executives and lobbyists will continue wielding influence to secure more defense spending, while simultaneously seeking to avoid meaningful regulation over data privacy or AI initiatives. So far, the U.S. tech industry has essentially been allowed to regulate itself. The European Union, Canada, and several other countries have adopted strict rules on data privacy and AI, but the U.S. lags behind—due in large part to Congressional lawmakers who have been unwilling to take meaningful action.[119]

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[115] Sraders, A. (2023, May 25). *VCs Are Betting on Defense Tech in 2023*. Fortune. https://fortune.com/2023/05/25/why-vcs-are-betting-on-defense-tech-2023/

[116] DIU boasts a "transition rate" of nearly 50 percent, meaning that nearly half of its investments lead to products that wind up being used in the field. Albon, C. (2022, September 8). *Pentagon Must Rethink Incentives, Outgoing DIU Chief Says*. Defense News. https://www.defensenews.com/pentagon/2022/09/08/pentagon-must-rethink-incentives-outgoing-diu-chief-says/

[117] See https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000115; https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000422; https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=d000067823; https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000023883. By comparison, in 2022 Northrop Grumman spent $10.9 million; Lockheed Martin spent $13.8 million; and RTX spent $6.4 million. See OpenSecrets.com.

[118] Eisenhower, D.D. (1961, January 17). *Farewell Address*. U.S. National Archives. https://www.archives.gov/milestone-documents/president-dwight-d-eisenhowers-farewell-address; Ledbetter, J. (2011). *Unwarranted Influence: Dwight D. Eisenhower and the Military-Industrial Complex*. New Haven, CT: Yale University Press.

[119] In the absence of federal data privacy laws and AI regulation, several U.S. states have adopted their own rules, including California, Colorado, Connecticut, Utah, and Virginia. See Bellamy, F.D., & Fernandez, A. N. (2023, November 15). *A New Era of Privacy Laws Takes Shape in the United States*. Reuters.

Finally, we must ask what the costs might be for those who will be most directly affected by risky AI-enabled weapon and surveillance systems currently under development: members of the armed services and civilians who are in danger of being harmed by inadequately tested—or algorithmically flawed—technologies. By their very nature, VC firms seek rapid returns on investment by quickly bringing a product to market, and then "cashing out" by either selling the startup or going public. This means that VC-funded defense tech companies are under pressure to produce prototypes quickly and then move to production before adequate testing has occurred. VC firms are interested in "selling new modes of warfare to Pentagon officials not because this approach fits some strategic framework but because it aligns with *their* business model."[120] To put this in slightly different terms: the more influence VC and major tech firms can wield on Pentagon officials—and convince them of the dangers of a new kind of big-tech, AI enabled war—the quicker they can get their products into the marketplace.[121] In the meantime, the Defense Department may find itself unprepared for future wars that are likely to be protracted conflicts in which Western powers struggle vainly against "insurgents [who] will fight back, rigging the rules of the game in their own favor, with low-tech but effective tactics": for example, digging tunnels to escape observation, using vehicular decoys to deceive surveillance cameras, and switching cellphone SIM cards to evade GPS tracking.[122]

With each passing year, Big Tech exerts its vast financial and political might while dramatically expanding sales of its products to U.S. military and intelligence agencies. As mentioned earlier, we can conservatively estimate that Microsoft, Amazon, and Alphabet-Google received $28 billion in DoD and IC contracts between 2018 and 2022. These companies, and others such as Oracle, HP, and Dell, have increasingly shaped new military technologies. In addition to big tech firms, startup companies are also receiving more defense dollars than ever, and these trends are steering the path of new research and development toward military needs, rather than civilian needs. Since Defense Department contracts are often classified, and are characterized by an overall lack of transparency, it is impossible to determine exactly how much is going into the hands of the tech industry. Even so, it is clear that some individuals and companies are profiting enormously from spending patterns that favor high-tech, AI-enabled military systems.

The political economy of military spending is being transformed by VC funding structures that encourage high-risk startups to prioritize rapid growth, find profitable business models, deploy aggressive marketing campaigns, and launch accelerated "hype cycles" in which corporate leaders make extraordinary, but often unverifiable, claims about

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https://www.reuters.com/legal/legalindustry/new-era-privacy-laws-takes-shape-united-states-2023-11-15/

[120] Marshall, S. (2023, December). *The Military-Industrial-Venture Capital Complex*. Security in Context Policy Paper 23-03. https://www.securityincontext.com/posts/the-military-industrial-venture-capital-complex. See also Hoijtink, M. (2022). *'Prototype Warfare': Innovation, Optimisation, and the Experimental Way of Warfare*. European Journal of International Security 7(3), 322-336. doi:10.1017/eis.2022.12; Gould, L., Hoijtink, M., Jaarsma, M., & Davies, J. (2023). *Innovating Algorithmic Warfare: Experimentation with Information Manoeuvre beyond the Boundaries of the Law*. Global Society 38(1), 49-66. https://doi.org/10.1080/13600826.2023.2261466

[121] Schwarz, E. (2021). *Silicon Valley Goes to War*. Philosophy Today 65(3), 549-569. https://doi.org/10.5840/philtoday2021519407

[122] Gusterson, H. (2023, November 28). *A Subaltern View of Military Strength*. Unpublished manuscript.

their products. While such activities may be acceptable for promoting consumer goods, much more is at stake when the Silicon Valley startup model is applied to military products, particularly weapon and surveillance systems. Retired Air Force Lieutenant General Jack Shanahan played a crucial role in accelerating the U.S. military's AI capabilities, but in recent months, he has been one of the few voices from the defense establishment to raise concerns. Speaking in an interview, he said, "I'm less worried right now about autonomous weapons making their own decisions than just fielding shitty capabilities that don't work as advertised or result in innocent people dying."[123] If the pace of developing and adopting AI-enabled weapon and surveillance systems continues to accelerate, the end result is likely to be a high-tech arsenal consisting of flawed, unreliable, and dangerous technologies that don't work as advertised.

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[123] Quoted in Scharre, P. (2023). *Four Battlegrounds: Power in the Age of Artificial Intelligence*. W.W. Norton. p. 256. Scharre's book also describes an incident in which Marines were able to outsmart an AI-enabled robot by hiding under cardboard boxes, somersaulting, and giggling hysterically. See Scharre, P. p. 231.