

The Effect of Defense-Sponsored Innovation Programs on the Military's Industrial Base

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Research Question

- + The DOD **invests billions of dollars** annually into innovation programs, rapid acquisition programs, small business outreach programs and accelerators (“DOD innovation initiatives” or “initiatives”) with the stated or implicit objective of helping the military **to attract innovative commercial technology companies into the defense department**.
- + Limited scholarship exists to determine **whether these initiatives have proven effective at attracting newcomers** with no prior DOD experience into the defense market, versus the extent to which they are leveraged by existing DOD vendors.
- + Our research aimed to **fill this gap** by evaluating the number and composition of new vendors that have entered the defense market annually, along with the number and composition of **new versus existing vendors that have participated in different DOD innovation initiatives**, over the last decade.

Research Process: Sizing the Defense Industrial Base

Calculating the total number of unique DOD vendors annually:

We acquired publicly-available government expenditures data from 2010 through 2019, isolated contracts awarded by DOD, filtered the data by fiscal year, and isolated the total number of contract actions each year.

We then grouped each contract action by its associated vendor DUNS number and calculated the tally of unique DUNS numbers contained in the data each year (resolving back to a parent DUNS number as needed).

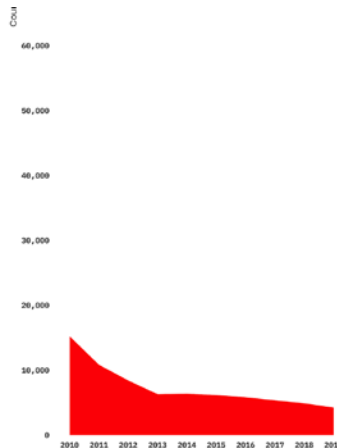
Calculating new vendors that entered the defense market annually:

For each DUNS number we isolated the year of its first recorded DOD contract action, dating back to the 1950s.

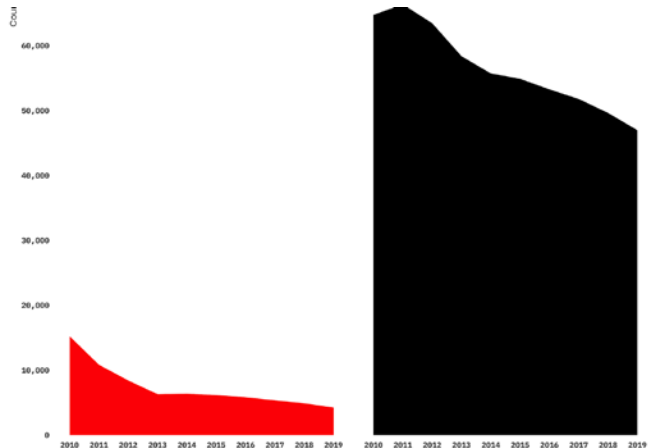
If the first recorded contract action for a given DUNS number was 2010, the entity associated with that DUNS was classified as a “first time vendor” in 2010.

Conversely, if a DUNS number contained in the 2010 vendor data was associated with a DOD contract action in an earlier year, it was classified as an existing vendor; and so forth.

Annual New Vendors



Annual Existing Vendors



SOURCE: PW COMMUNICATIONS

Conclusion

The total number of DOD vendors and the number of vendors entering the defense market for the first time have **declined substantially** year to year over the last decade.

Budget Year	Unique Vendors	Existing Vendors	New Vendors
2010	79,993	64,761	15,232
2011	77,155	66,356	10,839
2012	71,864	63,466	8,418
2013	64,685	58,382	6,303
2014	62,080	55,726	6,354
2015	61,055	54,898	6,197
2016	59,101	53,270	5,831
2017	57,165	51,792	5,373
2018	54,535	49,634	4,901
2019	51,239	46,981	4,258

Source: PW Communications

The Product Services Codes (PSC) associated with new vendors' initial contract actions indicate that more than 50% of new vendors were not contracted for innovative goods/services.

40 first time vendors' initial contract awards were > \$100 million.

Upon further analysis, we determined that an existing government supplier can form a Joint Venture (JV) or Special Purpose Vehicle (SPV) and register it as a completely independent entity.

Figure 2 displays four sunburst charts illustrating the distribution of equipment types across different categories. Each chart includes a legend with 'COUNT' and 'PERCENT' for three categories: SERVICE, EQUIPMENT, and SOCIAL SERVICES.

- TRANSPORT, MEDICAL EQUIPMENT:**
 - SERVICE: 32,085 (53.5%)
 - EQUIPMENT: 2,927 (4.9%)
 - SOCIAL SERVICES: 2,927 (4.9%)
- SOCIAL SERVICES:**
 - SERVICE: 32,085 (53.5%)
 - EQUIPMENT: 1,731 (2.9%)
 - SOCIAL SERVICES: 1,731 (2.9%)
- HOME HEALTH MEDICAL EQUIPMENT:**
 - SERVICE: 32,085 (53.5%)
 - EQUIPMENT: 2,943 (4.9%)
 - SOCIAL SERVICES: 2,943 (4.9%)
- TRANSPORT, MEDICAL EQUIPMENT:**
 - SERVICE: 32,085 (53.5%)
 - EQUIPMENT: 1,189 (1.9%)
 - SOCIAL SERVICES: 1,189 (1.9%)

2020

2009

2008

2007

2006

2005

2004

2003

2002

2001

2000

FLUOR MARINE PROPULSION LLC

RANGE AMMUNITION WEST LLC

INTERNATIONAL AUTO LOGISTICS LLC

MUSKIE PHILES KIEWIT JOINT VENTURE

THE BAUMANN PETROLEUM COMPANY BSC (CLOSED)

CLARK HICKORY HEALTHCARE PARTNERS II

BP PRODUCTS NORTH AMERICA INC.

ALFA LOMI TRONTO & JOINT VENTURE

KIMCO/CHILPES

BENTLEY DEFENSE SYSTEMS

WORLD AEROSPACE INC.

BOE SYSTEMS DYNAMICS SYSTEMS INC.

GAC/CHERRY HARRIS PROPERTIES LLC

WEST FAR ENTERPRISES LIMITED

BALFOUR BEATTY/PCS BULL & DOVE VENTURE

ALUMINUM INTEGRATED SUPPORT SERVICES IV

NICKELHORN EXPORT GROUP

BALFOUR BEATTY/CONCRETE & JOINT VENTURE

AC FIRST LLC

PFLA SUPPORT SERVICES LLC

GEMINUM DEFENSE LLC

VINNELL BROWN & SONS LLC

KNOX NATIONAL OIL COMPANY FOR DISTRIBUTION

LOCKHEED MARTIN INTEGRATED SYSTEMS LLC

ENVIROMAX CORPORATION

\$0.000 \$0.000 \$0.000 \$0.000,000 \$0.000,000 \$0.000,000

log10 Total Contract Obligation

SOURCE: ENVIROMAX CORPORATION

SBIR / STTR Analysis

To calculate the number of first-time vendors that entered DOD through Phase I SBIR/STTR, we isolated instances in which a company's initial contract action indicated a Phase I SBIR/STTR award ("Gateway SBIR/STTR Vendors").

To compare the number of Gateway SBIR/STTR Vendors to the total number of Phase I SBIR/STTR companies each year, we aggregated complete historical SBIR award data from USASpending and filtered it to isolate Phase I SBIR/STTR awards funded and awarded by DOD from FY2010-FY2019. We then filtered the award data to isolate unique DUNS numbers.

We linked the award values into our data set to explore how SBIR/STTR funding was distributed between gateway and existing vendors.

Analyzing the contract actions of existing SBIR/STTR vendors, **we recognized that some vendors won hundreds of Phase I SBIR/STTR awards** worth tens of millions of dollars over the last decade.

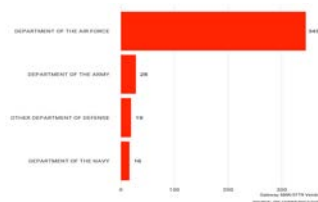
Analysis Results

- 1 The vast majority of **new vendors did not leverage SBIR/STTR** to enter the defense market.
- 2 The **vast majority** of Phase I SBIR/STTR participants every year had **existing defense business**.
- 3 Participants with **existing** defense business received the **vast majority** of DOD Phase I SBIR/STTR funding.
- 4 The count of Gateway SBIR/STTR vendors and the share of funding allocated to them increased in 2019. Isolating the 2019 data, we determined that ~85% of Gateway vendors were sponsored by the Air Force. The spike in new vendors suggested that **AFWERX's efforts may help the Air Force attract nontraditional commercial technology companies**.

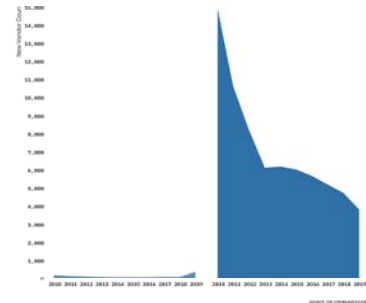
Vendor	Total Count of Phase I Awards	Total Value of Phase I Awards
PHYSICAL OPTICS CORPORATION	472	\$62,310,358
INTELLIGENT AUTOMATION, INC	288	\$40,134,060
PHYSICAL SCIENCES INC	238	\$34,729,760
CHARLES RIVER ANALYTICS INC	228	\$32,065,168

Source: PW Communications

4 2019 Gateway SBIR/STTR Vendors

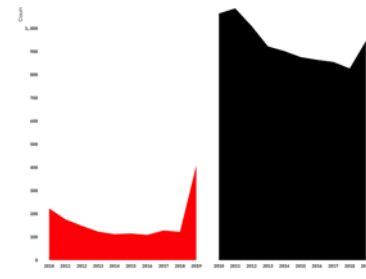


1 New Vendors that Leveraged SBIR/STTR vs. Other Channels

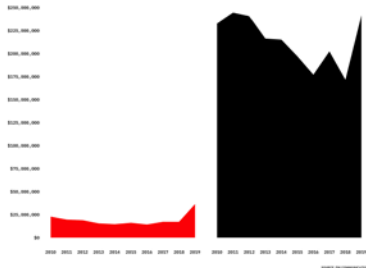


■ New Vendors ■ Existing Vendors

2 Phase I SBIR/STTR Participants



3 Phase I SBIR Funding Allocation:



Other Transaction Agreement (OTA) Analysis

To explore Gateway versus Existing OTA vendors, we isolated contract actions that corresponded to an OTA in each year, filtered for OTAs funded and/or awarded by DOD, and filtered by unique DUNS number (resolving to a parent DUNS as needed).

We then searched OTA vendors' DUNS number in our USASpending/FPDS database to identify its first DOD contract action. Entities with no DOD contract actions prior to their first DOD OTA between 2010-2019 were classified as "Gateway OTA Vendors" and entities with prior DOD contract actions were classified as "Existing OTA Vendors."

Analysis Results

- 1 The vast **majority of OTAs were awarded to existing vendors every year**. Even as the use of OTAs expanded, most contracts were awarded to companies with existing defense business, and nearly all DOD OTA funding was awarded to existing vendors.
- 2 By exploring the OTA vendor features, we determined that **the majority of OTAs over the last decade were awarded to consortium management firms (CMFs)**. A consortium is an organized group of companies, academic organizations or

nonprofits that specialize in a technology area. They pay membership fees to join the consortium, which is typically managed by a not-for-profit CMF that serves as the intermediary between the members and the government. Although our data treats each CMF as a unique vendor, the CMF does not actually conduct the research or prototyping; it administers subcontracts to its members. CMFs are not required to report how they award subcontracts, thus we had no ability to audit the recipients of the majority of OTAs. **While they claim to serve as a single entry point to hundreds of innovators that traditionally do not do business with the government, due to the lack of transparency in the data, we could not verify this claim.**

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Budget Year	Total OTA Vendors	Gateway OTA Vendors	% Gateway Vendors	Distinct OTA Contracts	# Contracts Awarded to Gateway Vendors	% Contracts to Gateway Vendors	Total OTA Obligations	Obligations to Gateway OTA Vendors	Share of Funding to Gateway OTA Vendors
2010	22	5	22.73%	23	5	21.74%	\$201,440,780	\$5,040,114	4.49%
2011	33	4	12.12%	36	4	11.11%	\$371,869,569	\$8,456,361	2.54%
2012	42	7	16.67%	46	8	17.39%	\$467,200,390	\$14,122,484	3.02%
2013	36	5	13.89%	39	5	12.82%	\$340,159,779	\$33,129,910	9.73%
2014	41	4	9.76%	47	4	8.51%	\$122,839,408	\$1,756,636	0.34%
2015	39	7	17.95%	47	7	14.89%	\$694,883,118	\$12,760,330	1.83%
2016	54	11	20.37%	68	11	16.18%	\$1,432,545,330	\$21,144,098	1.51%
2017	123	32	26.02%	148	36	24.32%	\$2,096,054,328	\$194,114,048	9.26%
2018	221	33	14.93%	236	33	13.13%	\$4,031,138,879	\$46,430,349	1.15%
2019	420	84	20.00%	485	93	19.18%	\$7,381,238,011	\$227,164,313	3.08%

Source: PW Communications

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Type	Total OTA Funding	Unique Contracts
Consortium Management Firm	\$11,738,265,037	165
Non-Consortium Management Firm	\$5,805,318,954	712

Source: PW Communications

3

Topic Area	Supply Chain Consortium Initiative (SCCI)	Consortium for Command, Control, and Communications in Cyberspace (C3C)	Naval Surface Technology and Innovation Consortium (NSTIC)	Undersea Technology Innovation Consortium (UTIC)	Sensors, Communications and Electronics Consortium (SCEC)	Space Enterprise Consortium (SEEC)	Engineer, Research, and Development Center (ERDC) Consortium	Information Warfare Research Project (IWRP)
Artificial Intelligence/ Machine Learning	X	X	X	X				
Sensors		X		X	X	X	X	
Analytics	X	X	X				X	X

Source: MITRE

3 Reviewing the list of consortia and their priority technology areas on the MITRE website, we determined that **many CMFs share the same priority technology areas.**

OTA Analysis (cont.)

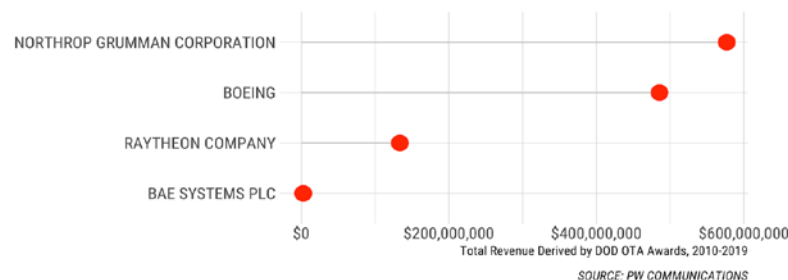
Analysis Results (cont.)

4 Exploring vendor names and OTA award features, we determined that **large primes have been leveraging OTAs**. They can do so if at least one nontraditional defense contractor participates in the project to a “significant extent,” or if there is a cost sharing arrangement in which at least one-third of the cost of the OTA comes from non-Federal sources. However, the current definition of “nontraditional defense contractor” is a company not subject to full government cost accounting in the prior year, irrespective of the share of revenue it derives from the government.

5 Exploring the features of OTAs from 2017-2019, we determined that **DIU (formerly DIUx) may have contributed to the increase in Gateway OTA vendors** during that time frame.

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Large Primes Leveraging OTAs



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Contracting Office ID	Contracting Office Name	Total Non-CMF OTA Vendors	Non-CMFs Existing OTA Vendors	Non-CMF Gateway OTA Vendors
W15QKN	W9QK ACC-PICA	196	142	54
HR0011	DEF ADVANCED RESEARCH PROJECTS AGENCY WASHINGTON	142	127	15
HQ0034	HEADQUARTERS SERVICE	47	36	11
W911QY	W9QK ACC-APG NATICK	43	40	3
FA8649	USAF SBIR STTR CONTRACTING OFFICE OF NAVAL RESEARCH	35	24	11
N00014	W4MM USA JOINT MUNITIONS CMD	21	17	4
W52P1J	COMMANDER	20	16	4
M67854	W9QK ACC - ORLANDO	15	13	2
W900KK	WSAF AFMC AFRL P2L RAK RXX	15	14	1
FA8650	ACC-ABERDEEN PROVIDING GROUND CONT C	9	4	5
W909MY	DCMA BOSTON	8	6	2
S2206A		7	7	0

Source: PW Communications

5

Contracting Office	Contract Description
W6QK ACC-PICA	PROJECT AWARD IN SUPPORT OF THE DRUX CSO PROGRAM IS ENTITLED AUTONOMOUS TACTICAL AIRBORNE DRONE.
W6QK ACC-PICA	BASE OTA AWARD FOR SAILDRONE, INC IN SUPPORT OF DRUX AND NAVAL SPECIAL WARFARE. SUPPORTING R&D EFFORTS FOR UNMANNED MARITIME SURFACE VESSEL RELEVANT TO ENHANCING THE MISSION EFFECTIVENESS OF MILITARY PERSONNEL.
W6QK ACC-PICA	PROJECT AWARD IN SUPPORT OF DRUX PROGRAM ENTITLED US NAVY EXPLOSIVE ORDNANCE DISPOSAL.
W6QK ACC-PICA	OPEN ARCHITECTURE DATA MANAGEMENT AND ADVANCED ANALYTICS IN SUPPORT OF DRUX.
W6QK ACC-PICA	AWARD UNDER DRUX AOI HARDWARE TO SOFTWARE TRANSFORMATION AGREEMENT OTA, W15QKN-18-9-2002, BETWEEN THE UNITED STATES ARMY CONTRACTING COMMAND - NEW JERSEY PREVALENT, INC. IN SUPPORT OF THE DEFENSE INNOVATION UNIT DRU.
W6QK ACC-PICA	THE PURPOSE OF THIS ACTION IS TO AWARD ANOTHER TRANSACTION AGREEMENT OTA, W15QKN-18-9-2002, BETWEEN THE UNITED STATES ARMY CONTRACTING COMMAND AND STRATEGY ROBOT, INC. IN SUPPORT OF THE DEFENSE INNOVATION UNIT DRU.
W6QK ACC-PICA	THE PURPOSE OF THIS MODIFICATION IS TO PROVIDE CLARIFICATION TO THE DRU STRATEGY ROBOT SOW. THE VALUE AND PERIOD OF PERFORMANCE REMAIN UNCHANGED.
W6QK ACC-PICA	AWARD OF DRU PROTOTYPE PROJECT TO AIRMAP UNDER GROUP 1 UNMANNED ARCHITECTURE.
W6QK ACC-PICA	THE PRINCIPLE PURPOSE OF THIS OTA IS TO PROVIDE DRAGONEYE STABILIZED MICRO EO/IR CAMERA SYSTEMS FOR ALL UNMANNED AERIAL SYSTEMS SUAS IN SUPPORT OF THE DEFENSE INNOVATION UNIT DRU.
W6QK ACC-PICA	AWARD OF SHORT RANGE NELCON PROTOTYPE PROJECT IN SUPPORT OF DRU AND PED AVIATION.
W6QK ACC-PICA	PROTOTYPE PROJECT UNDER THE DEFENSE INNOVATION UNIT DRU SMALL RESPONSIVE LAUNCH SRL.
W6QK ACC-PICA	EXTEND POP TO OTA WITH SRI INTERNATIONAL IN SUPPORT OF DRU AOI HARDWARE TO SOFTWARE TRANSFORMATION.
W6QK ACC-PICA	MODIFICATION TO OTA TO VOLANSI IN SUPPORT OF DRU AOI CRITICAL SUPPLY DELIVERY - PHASE 4 AND OPTION PHASE 5.

Source: PW Communications

xTechSearch Prize Analysis

Prize Competitions are not subject to consistent reporting requirements, so we could not analyze Prize data at scale.

Instead, we conducted a microanalysis of 24 participants of the Army's 2019 Expeditionary Technology Search Prize (xTechSearch).

The small sample size allowed us to explore features of the xTechSearch companies that we were unable to consider in our broader quantitative analyses: the extent to which a company had any previous federal business (DOD or non-DOD); and the extent to which a company had prior non-contract federal funding (assistance).

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Companies had prior government business

- + 2 had been doing business with the government for 10+ years
- + 5 had > \$10 million in government revenue
- + 4 had between \$1 million and \$9.9 million in government revenue

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Companies had no prior government business

- + 3 companies had initial contract actions in 2019, and the features of these contracts appeared to align with the terms of the xTechSearch prize

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Companies had no records in FPDS or USASpending

- + This finding contradicts the list of finalists on the xTechSearch website and is likely the result of inconsistent/nonexistent reporting requirements. We were unable to determine if these companies had prior government business.

Conclusion

The xTechSearch prize, like SBIR/STTR and OTAs, primarily benefited existing vendors.

Conclusions

- 1 Efforts to streamline the regulatory requirements and accelerate award timelines **fail to mitigate the underlying factors that have thwarted the growth** of the defense industrial base.
- 2 **Most participants in DOD innovation initiatives have existing defense business**; and even as the number of new vendors that participate in a DOD initiative grows, **existing vendors continue to consume the majority of funding** (i.e., existing vendors benefit most).
- 3 While available data is too limited to draw conclusive determinations regarding the composition of AFWERX and DIU participants, initial findings suggest the **DOD may benefit from studying and implementing the approaches taken by AFWERX and DIU to attract new vendors**.
- 4 Inconsistent or **nonexistent reporting requirements make it challenging to audit** the effectiveness of innovation initiatives, particularly with respect to OTAs (the majority of which are awarded through CMFs) and Prize Challenges.
- 5 The use of **CMFs may impede the effectiveness of OTAs** as a means of attracting new vendors.
 - + The fact that multiple CMFs share many of the same priority technology areas begs questions: **if an innovative commercial company sees that its capabilities align with multiple consortia, how does it decide which to join?** Is it expected to join multiple, which requires both money and time?
 - + Commercial companies outside of the traditional defense ecosystem are **largely unfamiliar** with how the government conducts market research in general; why does the DOD assume that the **nuances of the consortium process** are somehow better understood?
 - + Joining a consortium does not guarantee a company will be awarded government funding; the company is still required to bid on opportunities made available through the CMF. Even to the extent innovative commercial companies are aware of the consortium process, **can the DOD assume that the opportunity is appealing, particularly for companies with robust private sector revenue streams?**

Recommendations

- 1 **Require transparency.** The government must implement consistent reporting standards for all innovation initiatives
- 2 **Revise the consortium model for OTAs.** Consortium management firms must be required to report how they distribute funds among consortia members. Until the composition of CMF members can be evaluated, we recommend that the DOD require the majority of OTAs annually be awarded to non-CMF entities.
- 3 **Modify the definition of “nontraditional participation” for OTAs** to mean companies that have derived **no revenue from the defense market in the previous 5 years.** Doing so would put the onus on large legacy contractors to enhance outreach efforts in commercial communities of interest, beyond the scope of the traditional defense industrial base.
- 4 For all DOD innovation initiatives, begin to **consider the number of awards made to companies with no previous DOD experience as one explicit measure of success.** Doing so will reduce the extent to which these initiatives become channels for existing DOD suppliers to expand their DOD market share. Additionally, the DOD should **require that a minimum number of innovation program participants annually have no prior defense business.** Further research is required to determine the appropriate number, as we recognize that the commercial market is more robust in certain fields of interest to the DOD than others—for example, cyber security versus hypersonic missiles—and it would be appropriate to vary the allocation of awards to new vendors, depending on the field.
 - + **Add “First Time Vendor” field to SAM profiles,** powered by publicly-available data, to indicate if a company has previous government/DOD business.
- 5 **Establish a New Vendor Gateway,** a single gateway for innovative commercial technology companies with no prior defense business, to:
 - + **Allow disparate DOD stakeholders with similar requirements to pool their marketing resources/efforts,** and direct potential vendors to a single initial resource.
 - + Allow DOD stakeholders to help **direct a company to the most appropriate opportunity** using a variety of criteria, and allow companies to ask clarifying questions using a chat-bot.
 - + **Provide additional support tools/resources** for companies in **certain technology areas** deemed **critical to the DOD**, to help them navigate the submission process.