



# Assessing the Effectiveness of Defense-Sponsored Innovation Programs as a Means of Accelerating the Adoption of Innovation Forcewide

Amanda Bresler, *Chief Strategy Officer* | PW Communications | [abresler@pwcommunications.com](mailto:abresler@pwcommunications.com)

Alex Bresler, *Chief Data Officer* | PW Communications | [alexbresler@pwcommunications.com](mailto:alexbresler@pwcommunications.com)

## Research Question

The Department of Defense (DoD) invests billions of dollars into innovation programs every year. One primary objective of these programs is to accelerate the adoption of critical new technologies force wide.

**To what extent have investments in the DoD-funded SBIR/STTR program resulted in new capabilities reaching the warfighter?**

# Research Issue & Methodology

## Data Set of DoD-funded SBIR/STTR Companies (“SBIR Companies”) for Analysis: 4703 Companies

### Defining Transition

- Coded Phase III Awards
- Subsequent DoD-funded Procurement Contracts
- Subsequent DoD-funded Subcontract Awards

FY	Count of DoD-Funded PI/PII SBIR/STTR Awards	Total DoD-Funded PI/PII SBIR/STTR Funding	Count of Unique Entities in Receipt of DoD-Funded PI/PII SBIR/STTR Awards
2012	4973	\$1,090,143,968	1584
2013	4901	\$988,818,482	1627
2014	4796	\$1,082,209,915	1609
2015	4832	\$1,040,778,158	1648
2016	4971	\$1,105,200,418	1625
2017	5190	\$1,260,999,328	1695
2018	5251	\$1,240,980,064	1660
2019	5796	\$1,691,062,982	1999
2020	6046	\$1,905,575,032	2276
2021	5990	\$1,711,005,801	2190
<b>Total</b>	<b>52746</b>	<b>\$13,116,774,149</b>	

Total SBIR Companies	Total DoD PIII Funding to SBIR Companies	SBIR Companies w/ PIII Award(s)	% SBIR Companies w/ PIII Award(s)	Total DoD PIII + Non-SBIR DoD Procurement to SBIR Companies	SBIR Companies w/ PIII Award(s) and/or non-SBIR DoD Procurement	% SBIR Companies w/ PIII Award(s) and/or non-SBIR DoD Procurement	Total DoD PIII + Non-SBIR DoD Procurement + DoD Subcontracts to SBIR Companies	SBIR Companies w/ PIII Award(s) and/or non-SBIR DoD Procurement and/or DoD Subcontracts	% SBIR Companies w/ PIII Award(s) and/or non-SBIR DoD Procurement and/or DoD Subcontracts
4703	\$10,276,728,376	748	16%	\$60,004,772,641	2731	58%	\$118,726,886,820	2949	63%

# Ratio of Phase I/Phase II Awards to Transition Funding

A substantial portion of DoD SBIR companies failed to transition, by any metric.

Nearly all that transitioned consumed more in Phase I/Phase II funding than what they generated in subsequent non-SBIR defense revenue.

### Phase III Transition Ratio

% of Companies with Phase III Contracts that Generated More in Phase III \$ than Phase I/Phase II Funding	% of All SBIR Companies that Generated More in Phase III \$ than Phase I/Phase II Funding
39%	6%

### Phase III + Procurement Transition Ratio

% of Companies with (PIII + Procurement Contracts) that Generated More in Transition Funding than Phase I/Phase II Funding	% of All SBIR Companies that Generated More in Transition Funding than Phase I/Phase II Funding
51%	29%

### Phase III + Procurement + Subcontracts Transition Ratio

% of Companies with (PIII + Procurement Contracts + Subcontracts) that Generated More in Transition Funding than Phase I/Phase II Funding	% of All SBIR Companies that Generated More in Transition Funding than Phase I/Phase II Funding
58%	36%

# Top 25 SBIR Companies

	Company	Total DoD PI/PII Funding, FY2012-FY2021	% of Total DoD PI/PII Funding, FY2012-FY2021	Lifetime Total DoD PI/PII Award Funding
1	PHYSICAL OPTICS CORPORATION	\$198,222,973	1.51%	\$359,325,897
2	INTELLIGENT AUTOMATION INC	\$172,174,305	1.31%	\$321,023,208
3	PHYSICAL SCIENCES INC	\$168,520,875	1.28%	\$274,156,442
4	CREARE INCORPORATED	\$158,034,669	1.20%	\$269,444,012
5	CHARLES RIVER ANALYTICS INC	\$153,639,314	1.17%	\$260,141,162
6	TRITON SYSTEMS INC	\$121,816,610	0.93%	\$243,888,188
7	LUNA INNOVATIONS INCORPORATED	\$115,727,487	0.88%	\$213,364,011
8	CFD RESEARCH CORPORATION	\$103,029,444	0.79%	\$199,301,561
9	LYNNTech INC	\$95,715,220	0.73%	\$158,497,089
10	TOYON RESEARCH CORPORATION	\$92,398,212	0.70%	\$153,759,374
11	ARETE ASSOCIATES	\$86,856,904	0.66%	\$152,596,850
12	PROGENY SYSTEMS CORPORATION	\$76,422,839	0.58%	\$139,482,615
13	SA PHOTONICS INC	\$75,002,150	0.57%	\$133,489,054
14	MAINSTREAM ENGINEERING CORPORATION	\$70,653,705	0.54%	\$106,391,125

	Company	Total DoD PI/PII Funding, FY2012-FY2021	% of Total DoD PI/PII Funding, FY2012-FY2021	Lifetime Total DoD PI/PII Award Funding
15	APTIMA INC	\$70,561,859	0.54%	\$105,438,088
16	CORVID TECHNOLOGIES LLC	\$64,965,146	0.50%	\$102,005,756
17	SOAR TECHNOLOGY INC	\$67,302,292	0.51%	\$101,166,814
18	CORNERSTONE RESEARCH GROUP	\$59,984,693	0.46%	\$98,359,670
19	ENGINEERING AND SOFTWARE SYSTEM SOLUTIONS INC	\$57,145,087	0.44%	\$84,704,547
20	TDA RESEARCH INC	\$56,439,024	0.43%	\$84,536,933
21	INTELLISENSE SYSTEMS INC	\$55,685,545	0.42%	\$80,279,823
22	MAXENTRIC TECHNOLOGIES LLC	\$55,054,742	0.42%	\$76,722,560
23	OCEANIT LABORATORIES INC	\$54,091,626	0.41%	\$75,206,735
24	FIRST RF CORPORATION	\$53,791,669	0.41%	\$71,623,153
25	SYSTEMS TECHNOLOGY RESEARCH LLC	\$52,631,563	0.40%	\$53,419,184
	<b>TOTAL</b>	<b>\$2,335,867,952</b>	<b>18%</b>	<b>\$3,558,997,955</b>

# Top 25 SBIR Companies

## Key Takeaways

### Small By What Standards?

- Individually, **MAWs receive tens of millions or more in non-dilutive R&D grants**. Cumulatively, they have received **18% of all DoD Phase I/Phase II SBIR funding**.
- MAWs have participated in DoD SBIR for decades and win Phase I/Phase IIs from non-DoD agencies, too.
- MAWs win Phase I/Phase II for projects that span a wide range of unrelated topics.

# Transition Metrics: Top 25 SBIR Companies

Company	Total DoD PI/PII \$	Total PIII \$	Ratio PIII \$ vs. PI/PII \$	Total PIII + non-SBIR \$	Ratio PIII + non-SBIR \$ vs. PI/PII \$	Total PIII + non-SBIR + DoD Subcontract \$	Ratio PIII + non-SBIR + DoD Subcontract \$ vs. PI/PII \$
PHYSICAL OPTICS CORPORATION	\$198,222,973	\$296,550,639	150%	\$506,752,621	256%	\$543,835,766	274%
INTELLIGENT AUTOMATION INC	\$172,174,305	\$14,607,362	8%	\$68,236,490	40%	\$86,709,123	50%
PHYSICAL SCIENCES INC	\$168,520,875	\$10,303,411	6%	\$74,941,384	44%	\$101,913,061	60%
CREARE INCORPORATED	\$158,034,669	\$53,366,123	34%	\$85,743,425	54%	\$88,505,471	56%
CHARLES RIVER ANALYTICS INC	\$153,639,314	\$15,930,109	10%	\$206,213,710	134%	\$241,430,984	157%
TRITON SYSTEMS INC	\$121,816,610	\$6,430,752	5%	\$35,544,912	29%	\$36,091,069	30%
LUNA INNOVATIONS INCORPORATED	\$115,727,487	\$3,616,872	3%	\$32,884,666	28%	\$36,422,619	31%
CFD RESEARCH CORPORATION	\$103,029,444	\$450,378	0%	\$21,122,072	21%	\$53,267,339	52%
LYNNTECH INC	\$95,715,220	\$3,849,136	4%	\$20,586,029	22%	\$20,742,065	22%
TOYON RESEARCH CORPORATION	\$92,398,212	\$19,174,422	21%	\$129,289,686	140%	\$228,169,816	247%
ARETE ASSOCIATES	\$86,856,904	\$125,140,457	144%	\$179,414,186	207%	\$231,727,064	267%
PROGENY SYSTEMS CORPORATION	\$76,422,839	\$875,436,015	1146%	\$1,326,867,356	1736%	\$2,068,581,929	2707%
SA PHOTONICS INC	\$75,002,150	\$11,267,031	15%	\$82,407,497	110%	\$205,665,144	274%
MAINSTREAM ENGINEERING CORPORATION	\$70,653,705	\$143,565	0%	\$26,159,461	37%	\$51,320,790	73%
APTIMA INC	\$70,561,859	\$82,468,290	117%	\$193,482,868	274%	\$276,564,268	392%
CORVID TECHNOLOGIES LLC	\$64,965,146	\$26,602,284	41%	\$112,915,222	174%	\$201,785,024	311%
SOAR TECHNOLOGY INC	\$67,302,292	\$5,760,555	9%	\$104,177,240	155%	\$213,942,061	318%
CORNERSTONE RESEARCH GROUP	\$59,984,693	\$4,820,260	8%	\$20,992,906	35%	\$27,303,828	46%
ENGINEERING AND SOFTWARE SYSTEM SOLUTIONS INC	\$57,145,087	\$66,924,136	117%	\$177,492,020	311%	\$178,879,990	313%
TDA RESEARCH INC	\$56,439,024	\$610,100	1%	\$17,383,352	31%	\$18,439,670	33%
INTELLISENSE SYSTEMS INC	\$55,685,545	\$15,624,644	28%	\$31,418,599	56%	\$58,408,779	105%
MAXENTRIC TECHNOLOGIES LLC	\$55,054,742	\$6,290,024	11%	\$22,033,549	40%	\$27,717,398	50%
OCEANIT LABORATORIES INC	\$54,091,626	\$22,630,526	42%	\$52,124,554	96%	\$53,565,949	99%
FIRST RF CORPORATION	\$53,791,669	\$33,006,900	61%	\$70,982,752	132%	\$468,983,023	872%
SYSTEMS TECHNOLOGY RESEARCH LLC	\$52,631,563	\$49,937,790	95%	\$594,811,635	1130%	\$677,348,738	1287%

# Transition Metrics: Top 25 SBIR Companies

## Key Takeaways

- **Only 4** of the Top 25 **generated more in Phase IIIs than they consumed in Phase I/Phase II funding.**
- Adding non-SBIR DoD procurement to the transition calculation, most of the Top 25 still received more in Phase I/Phase II funding than they generated in transition revenue.
- By the most liberal transition metric, just over half of the Top 25 generated more in transition revenue than Phase I/Phase II funding.



# Ranking of Top 25 SBIR Companies

Company Ranking based on Total DoD Phase III Contracts

Rank	Company
6	PHYSICAL OPTICS CORPORATION
112	INTELLIGENT AUTOMATION INC
147	PHYSICAL SCIENCES INC
40	CREARE INCORPORATED
104	CHARLES RIVER ANALYTICS INC
207	TRITON SYSTEMS INC
273	LUNA INNOVATIONS INCORPORATED
585	CFD RESEARCH CORPORATION
266	LYNNTECH INC
91	TOYON RESEARCH CORPORATION
18	ARETE ASSOCIATES
1	PROGENY SYSTEMS CORPORATION
136	SA PHOTONICS INC
653	MAINSTREAM ENGINEERING CORPORATION
27	APTIMA INC
68	CORVID TECHNOLOGIES LLC
223	SOAR TECHNOLOGY INC
247	CORNERSTONE RESEARCH GROUP
30	ENGINEERING AND SOFTWARE SYSTEM SOLUTIONS INC
555	TDA RESEARCH INC
106	INTELLISENSE SYSTEMS INC
210	MAXENTRIC TECHNOLOGIES LLC
80	OCEANIT LABORATORIES INC
56	FIRST RF CORPORATION
42	SYSTEMS TECHNOLOGY RESEARCH LLC

## Key Takeaways

We ranked the 748 SBIR companies with Phase III contracts, where “1” denoted the company with the most and “748” denoted the company with the least.

- **Only 9** of the top 25 companies **fell in the top 10%** of DoD SBIR companies with the most in Phase III contract dollars.
- **There is no consistent relationship between a company’s Phase I/Phase II funding and the extent to which it transitions.** Some MAWs had below average rates of transition.

# Transition Challenges for Smaller Companies

**Expectation:** Performing well during Phase I/Phase II will lead to follow-on defense business.

**Reality:** The DoD SBIR program rarely positions participants for success in the broader defense market.

- Participants' capabilities are not effectively marketed to USG stakeholders
- No education on how or where to identify DoD opportunities
- DoD solicitations are anticompetitive
- Must "pay to play" to connect with potential DoD customers
- No clear information on the systems/approvals required to perform on DoD contracts
- Cannot justify the cost of compliance

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Analyzing 1M+ DoD solicitations, **70% required responses within 21 days of posting, and 30% required responses in 10 days or less.**

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Analyzing the readability of 1M+ DoD solicitations, **fewer than 3% of descriptions were written in "plain English."**

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Government stakeholders do not coordinate their requirements, despite often seeking the same capabilities. For instance, **on a single day in October 2020, there were 132 open requirements related to UAVs.**

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# Conclusions

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**A substantial portion of DoD SBIR companies failed to transition their capabilities to the warfighter by any metric.**

- Nearly all companies that transitioned consumed more in Phase I/Phase II funding than what they generated in subsequent non-SBIR defense revenue.
- More Phase I/Phase II funding does not necessarily improve a company's likelihood of transition.
- **DoD SBIR awards a disproportionate share of Phase I/Phase II funding to a set of companies unlikely to deliver capabilities to defense end-users, effectively guaranteeing the existence of a “valley of death.”**
- A significant share of Phase I/Phase II funds are not simply awarded to companies unlikely to transition their capabilities; they are awarded to companies that, by any reasonable definition, cannot be considered “small businesses.”
- Companies with expertise submitting SBIR proposals, rather than companies with the best ideas, are the likely recipients of Phase I/Phase II funding.

# Recommendations

- Require more **comprehensive reporting on Phase III contracts**.
- Create a **code** in USASpending **to denote Phase III subcontracts**.
- **Overhaul SBA size standards** so that the SBIR program benefits truly small businesses.
- **Establish Phase III transition requirements** for SBIR program offices.
- When evaluating Phase I/Phase II proposals, **consider the ratio of a company's prior Phase I/Phase II funding relative to its transition revenue**. **Firms** with \$10M+ in Phase I/Phase II DoD SBIRs **must meet minimum Phase III transition thresholds** to remain eligible for additional Phase I/Phase II funding.
- **Incentivize DoD stakeholders to integrate SBIR capabilities**. Require that a certain percentage of contracts annually be awarded as Phase IIIs, and offer additional "credit" for Phase IIIs initially funded by a different agency.
- **Incentivize prime contractors to integrate SBIR companies**.
- **Address the underlying issues** that keep small businesses from succeeding in the defense market.



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