Strategic Trends in DoD SBIR Funding (2015–2025):

An Empirical Analysis of Emerging Defense Technologies

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Abstract

This paper analyzes Department of Defense Small Business Innovation Research funding from 2015 to 2025 to understand how investment patterns reflect shifting national security priorities. The study applies descriptive statistics, t-tests, ANOVA, time series analysis, and regression forecasting to evaluate funding across seven technology domains, including artificial intelligence, cybersecurity, aerospace, and infrastructure. Results show that the DoD follows a tiered investment strategy, dispersing many low-dollar awards to support broad experimentation while reserving larger awards for high-impact areas such as cyber defense and space systems. Statistically significant differences across categories confirm strategic allocation, and regression trends suggest significant continued growth in AI and aerospace through 2030 compared to other tech categories. These findings offer insight into DoD innovation strategy and help guide businesses, investors, and policymakers seeking to align with future defense priorities.

Keywords: SBIR, Department of Defense, emerging technologies, funding analysis, forecasting

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The Small Business Innovation Research (SBIR) program is a cornerstone of the U.S. federal research and development ecosystem. It is designed to fund early-stage innovation by small businesses. The Department of Defense (DoD) is among the participating federal agencies and is the largest user of the SBIR program. They channel billions of dollars into technologies that support national security objectives. The DoD uses SBIR to foster innovation and to shape the future of defense capabilities through targeted investments in areas such as artificial intelligence, robotics, cybersecurity, and aerospace.

The decade from 2015 to 2025 is a period of evolution in defense strategy and global geopolitics. Events such as the release of the 2018 National Defense Strategy, the COVID-19 pandemic, the emergence of AI, and renewed global-power competition with Russia and China have directly influenced U.S. military priorities. These shifts are reflected in the DoD's SBIR funding patterns, which increasingly favor autonomous systems, cyber resilience, and space-based technologies over legacy platforms. The funding landscape adapts to sustain emerging priorities as the nature of warfare evolves.

This study analyzes SBIR awards funded by the Department of Defense between 2015 and 2025 to identify patterns in funding distribution, category prioritization, and temporal trends. Each award was classified into one of eight technology categories: AI & Data Systems, Robotics & Autonomous Systems, Weapons & Defense Systems, Medical & Biotech, Operations & Infrastructure, Space & Aerospace, Cyber & Security Technologies, and Other. The "Other" category includes projects that did not clearly align with any single defined category, often due to insufficient detail or highly interdisciplinary content. The analysis reveals how funding priorities have shifted over time and which technologies are most likely to attract future investment by using descriptive statistics, inferential tests, time series visualizations, and regression modeling.

The findings provide insight into how the DoD balances exploratory investment with strategic focus. Smaller awards dominate the dataset, consistent with early-stage feasibility studies typical of SBIR Phase I contracts. However, categories such as Cybersecurity and Aerospace stand out for their disproportionately high average award amounts which indicate deeper investment in areas considered vital to future readiness. Statistically significant differences in average award sizes across categories highlights the DoD's use of SBIR as a precision funding tool rather than a uniform grant mechanism.

Regression forecasting highlights where future growth is likely to occur. This is intended to help businesses and policymakers align with defense innovation trends. Understanding SBIR funding trajectories is important for anticipating where the DoD will focus its resources in the decade ahead as global threats grow more complex and technology continues to advance.

Data

The dataset used in this analysis was obtained from SBIR.gov and includes all DoD SBIR awards issued between 2015 and 2025. The dataset includes approximately 30,000 SBIR award records funded by the DoD between 2015 and 2025. Each entry represents an individual project and was pre-filtered to reflect DoD-specific investments across a range of small businesses and tech categories. The data were further organized using dummy-coded binary indicators for the technology categories which enabled structured analysis of funding distribution and strategic prioritization across domains.

Each record in the dataset includes award details such as funding amount, award year, company name, and project title. It also included research keywords and abstracts. Award amounts varied widely and reflect the different phases of SBIR participation. These range from smaller Phase I feasibility studies to larger Phase II prototype development efforts. Exceptionally large awards may signal projects that progressed toward Phase III commercialization — though such funding originates outside the SBIR program itself.

Methodology

Data Cleaning and Categorization

A structured cleaning and categorization process was applied to prepare the data for analysis. Duplicate entries were removed, formatting inconsistencies in numeric and date fields were corrected, and records with missing or incomplete funding information were excluded. Award abstracts and keyword fields were then used to classify each award into one of eight technology categories including projects that could not be clearly categorized that were assigned to the "Other" group. This classification process used keyword matching and iterative validation checks to ensure that categorization accurately reflected project focus.

Statistical Tools and Analysis Procedures

Excel was used to perform descriptive analyses, including total funding, number of awards, and average award amounts by category. For inferential analysis, JASP was used to perform independent-samples t-tests and one-way ANOVA, both at a significance level of $\alpha = 0.05$. These tests were used to determine whether observed differences in average award sizes between categories were statistically meaningful or likely due to chance.

A time series analysis was conducted to assess changes in category-specific funding across the study period. Annual totals and average award sizes were plotted to identify key inflection points associated with global events and strategic shifts. A linear regression model was developed to evaluate whether award year and category could predict funding levels.

Analysis

Descriptive Statistics

The distribution of award amounts within the DoD SBIR dataset shows a highly skewed funding structure that reflects the program's tiered approach to innovation investment. As shown in Figure 1, the majority of SBIR contracts were awarded at the lower end of the funding spectrum, with over 60% of all awards falling below $250,000. These awards typically correspond to Phase I feasibility studies, which are designed to encourage broad, low-risk experimentation across a wide range of technologies. Awards exceeding $5 million were rare — fewer than 50 across the entire dataset — and were concentrated in domains requiring intensive capital investment, such as cybersecurity and aerospace systems.

This funding distribution suggests a deliberate innovation funnel: the Department initiates a broad pool of exploratory research through small awards and subsequently channels increased resources into select, high-potential projects. This model allows the DoD to balance the exploration of emerging technologies with the strategic scaling of capabilities deemed operationally critical.

In addition to this broad distributional pattern, categorical analysis of SBIR investments highlights specific areas of technological prioritization. As illustrated in Table 1, Operations & Infrastructure received the highest cumulative investment, totaling approximately $7.78 billion across 13,221 awards. This category addresses foundational defense needs such as energy systems, logistics platforms, and deployable infrastructure. While the average award size in this domain ($588,659) is modest relative to others, the volume of awards highlights its essential role in sustaining military readiness.

Cyber & Security Technologies, despite comprising the smallest number of awards (2,854), had the highest average award amount at $643,862. This concentration of funding reflects the DoD's recognition of cyber defense as a domain of asymmetric risk and high strategic value. Investments in this area often target advanced encryption, AI-enabled threat detection, and resilient network architectures. This asymmetry means that even low-cost cyberattacks from non-state actors or smaller adversaries can inflict significant damage on critical systems, making cybersecurity a high-leverage priority for national defense.

Space & Aerospace ranked second in total funding, with $4.65 billion allocated across 7,528 awards and an average award size of $617,535. These figures highlight the high costs and strategic importance of aerospace investments, particularly in areas like satellite infrastructure, launch capabilities, and space-based surveillance.

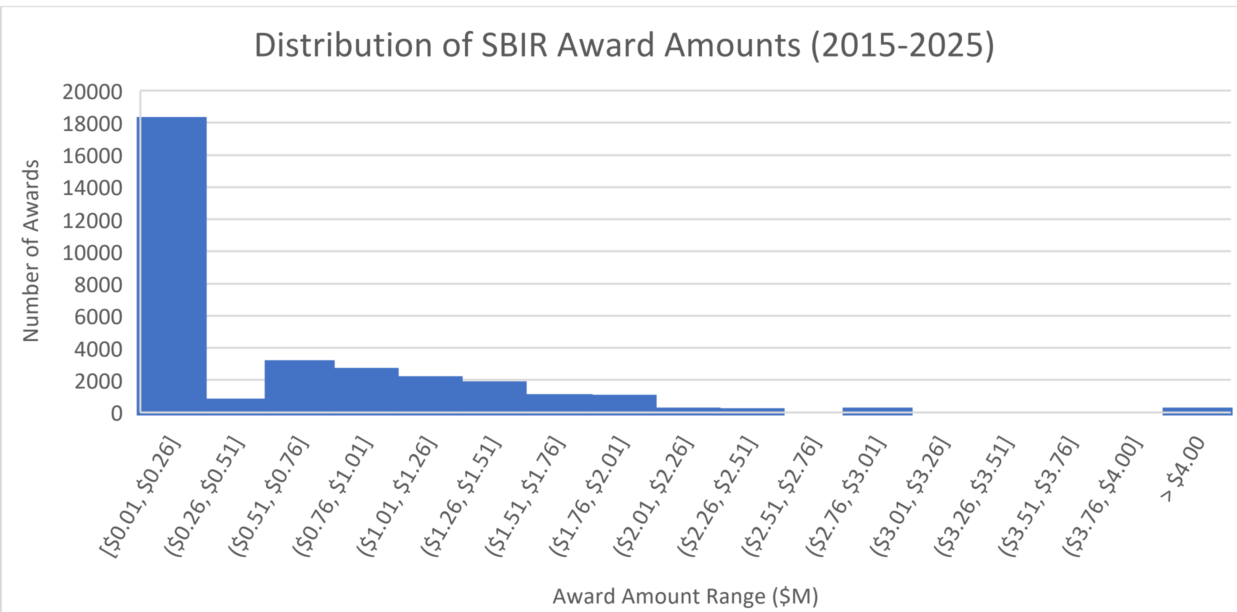
Several other technology domains also received substantial SBIR investment. Weapons & Defense Systems accounted for 5,171 awards totaling approximately $3.08 billion, with an average award size of $594,783. Robotics & Autonomous Systems received $3.05 billion across 4,976 awards, averaging $612,268 per award. The AI & Data Systems category, which includes projects related to machine learning, predictive analytics, and algorithmic decision-making, was awarded $2.01 billion through 3,327 contracts, with an average award value of $602,695.

Medical & Biotech projects received $1.81 billion across 3,129 awards, averaging $577,744 and the other category, including 6,736 projects, was awarded approximately $3.70 billion in total funding, with an average award size of $549,113. This distribution highlights the breadth of the DoD's SBIR engagement while also revealing its willingness to invest across both conventional and interdisciplinary domains.

While infrastructure remains the dominant investment area in terms of volume, higher-value awards are consistently directed toward more technologically advanced or strategically sensitive sectors such as cybersecurity, space, AI, and robotics. The DoD's SBIR funding patterns show operational needs and also a forward-leaning orientation toward emerging domains that are likely to define the future of warfare.

Figure 1

Distribution of SBIR Award Amounts (2015–2025)



Note. This histogram displays the frequency distribution of DoD SBIR awards by funding range. Most awards fall under $250,000, with a long tail of higher-value awards, illustrating the program's emphasis on early-stage, low-risk innovation.

Table 1

DoD SBIR Awards by Category (2015–2025)

Category	Number of Awards	Total Funding ($)	Average Award ($)
Operations & Infrastructure	13221	7782659369	588658.9
Space & Aerospace	7528	4648806011	617535.34
Other	6736	3698825702	549113.08
Weapons & Defense Systems	5171	3075625092	594783.43
Robotics & Autonomous Systems	4976	3046647246	612268.34
AI & Data Systems	3327	2005164621	602694.51
Cyber & Security Technologies	2854	1837582687	643862.19
Medical & Biotech	3129	1807759773	577743.62

Note. This table summarizes the number of awards, total funding, and average award size across eight technology categories. Operations & Infrastructure received the highest total funding, while Cyber & Security Technologies had the highest average award amount.

t-Test Results

An independent-samples t-test was conducted comparing Operations & Infrastructure and Cyber & Security Technologies to examine whether statistically significant differences exist in average SBIR award sizes. These two categories were selected for comparison because Operations & Infrastructure represents the largest volume of awards and reflect broad foundational needs, while Cyber & Security Technologies, though smaller in volume, reflects a concentrated area of strategic investment with the highest average award size.

As shown in Table 2, Cyber projects had a higher mean award amount ($643,862.19) than Operations & Infrastructure ($588,658.90). This gap is notable given the strategic emphasis on cybersecurity in recent defense policy.

However, the inferential results do not support the conclusion that this difference is statistically significant. The calculated t-statistic of -1.6 suggests that the observed difference in means is small relative to the within-group variance. The corresponding p-value of 0.1096 exceeds the standard significance threshold of $\alpha = 0.05$, indicating that the null hypothesis — no difference in means — cannot be rejected.

Although Cyber projects tend to receive larger individual awards, this result implies that the observed difference could possibly be due to random variation. It does not provide sufficient evidence to conclude that Cyber funding patterns are categorically different from those of Operations & Infrastructure. These findings remain useful when interpreted alongside ANOVA and regression results, which more clearly delineate funding priorities across all categories.

While the t-test alone does not establish a statistically significant distinction, it provides an important entry point for understanding how investment strategies differ in scale versus volume. Operations & Infrastructure funding appears to support a high number of lower-value awards aimed at sustaining core capabilities, whereas Cyber awards — though fewer — suggest a targeted emphasis on depth over breadth. This distinction becomes especially relevant when paired with regression results indicating Cyber as a significant predictor of increased funding, reinforcing the notion that strategic technologies may receive larger, more concentrated investments even if not statistically distinct in isolated comparisons.

Table 2

t-Test Results: Operations & Infrastructure vs. Cyber & Security Technologies

Comparison	***Mean Funding - Operations ($)***	***Mean Funding - Cyber ($)***	***t-Statistic***	***p-Value***	***Significance***
Operations & Infrastructure vs. Cyber & Security Technologies	*588658.9*	*643862.19*	*-1.6*	*0.1096*	*Not Significant*

Note. This table compares mean award values between the two categories. Although Cyber projects had a higher mean, the difference was not statistically significant ($p = 0.1096$).

ANOVA Results

A one-way analysis of variance was conducted to determine whether average award sizes differed significantly across the eight technology categories. This test assesses whether the observed differences in category means are greater than would be expected by chance alone.

As shown in Table 3, the ANOVA produced an F-statistic of 3.138 with an associated p-value of 0.0026. Because the p-value is below the conventional alpha threshold of 0.05, the null hypothesis of equal means across all groups is rejected. This result confirms that statistically significant differences exist in average award amounts between at least some of the categories included in the analysis.

The presence of statistically significant variation supports the conclusion that the DoD does not allocate SBIR funding uniformly across domains. It appears to strategically emphasize certain areas — such as Cyber & Security Tech and Space & Aerospace — with higher per-award investments. These differences likely reflect broader modernization goals and evolving operational priorities.

It is important to note that while the ANOVA identifies the presence of statistically significant differences across categories, it does not specify which groups differ from each other. A post-hoc test would be necessary to make those pairwise comparisons. Although a post-hoc analysis was not performed in this study, the results still support the broader narrative of targeted funding prioritization by the DoD.

Table 3

ANOVA Results for Mean Funding Across Technology Categories (2015–2025)

Metric	Value
F-statistic	3.138
p-value	0.0026
Significance	Yes ($p < 0.05$)

Note. This figure illustrates the differences in average SBIR award size across eight technology categories. The F-statistic (3.138) and p-value (0.0026) indicate that these differences are statistically significant.

Time Series Analysis

A year-by-year analysis was conducted for each technology category from 2015 to 2024 to examine how DoD SBIR funding evolved over time. The year 2025 was excluded to ensure a complete annual comparison, as data for 2025 is only partial at the time of analysis. This time series evaluation highlights both long-term investment trajectories and short-term inflection points linked to strategic and global events.

Total SBIR funding increased substantially over the ten-year period, as shown in Figure 2, particularly after 2020. Early years (2015–2017) reflect relatively stable investment levels across most categories. A slight decline in 2018 corresponds with the implementation of the 2018 National Defense Strategy, which shifted DoD focus toward great-power competition, likely resulting in short-term reallocation of funding priorities (United States Government, 2018).

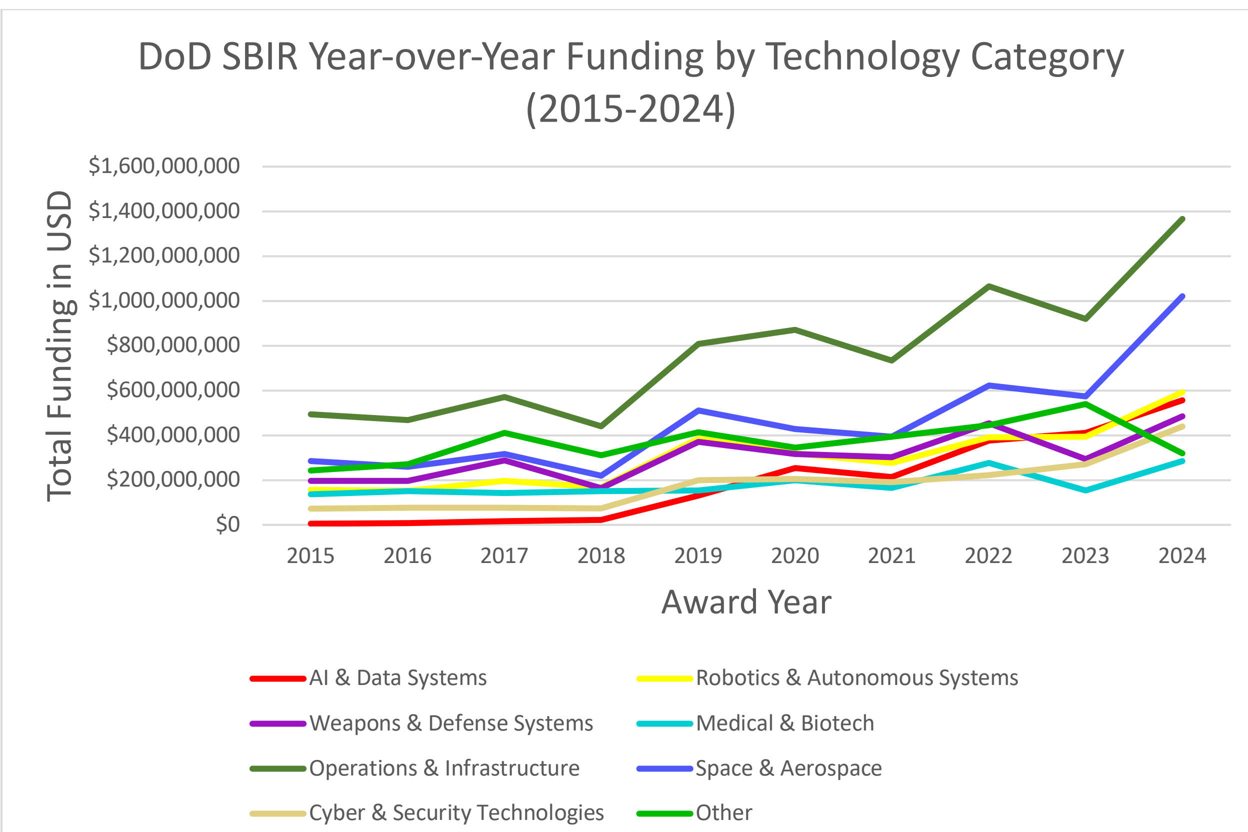
There is a sharp dip in 2020, coinciding with the onset of the COVID-19 pandemic. This drop likely reflects pandemic-related disruptions in contract execution, supply chains, and workforce capacity. Funding increased in the beginning in 2021 across most categories, with steep gains in Space & Aerospace, Cyber & Security Technologies, and AI & Data Systems.

Operations & Infrastructure consistently remained the highest-funded category throughout the period which reinforces its foundational role in defense logistics and energy systems. However, from 2021 onward, Space & Aerospace experienced a dramatic upward trend, reflecting expanded DoD investment in satellite defense and aerospace innovation. Cyber & Security Technologies also maintained a steady upward trajectory, likely in response to escalating cyber threats and the increasing complexity of digital warfare.

The "Other" category shows a gradual decline in funding over the period. This may indicate a more focused allocation strategy in clearly defined technology domains. This narrowing of investment scope reflects the DoD's shift toward prioritizing high-impact, future-oriented capabilities.

Figure 2

DoD SBIR Year-over-Year Funding by Technology Category (2015–2024)



Note. This line chart shows total SBIR funding by category across nine years. A decline in 2020 corresponds with the COVID-19 pandemic, while post-2021 surges are observed in Space & Aerospace, Cybersecurity, and AI-related domains.

Regression & Forecasting

The regression analysis provides a forward-looking view of DoD SBIR funding trends, highlighting which technology categories are positioned for continued or increased prioritization through 2030. Although the model's R^2 value of 0.009 indicates that year and category together explain only a small portion of the overall variance in award amounts, the results still offer meaningful directional insights.

Award Year is a statistically significant predictor ($p < .001$), confirming that total funding levels have increased over time. This trend aligns with the DoD modernization priorities, which have accelerated since 2018 in response to global competition and shifting warfare paradigms. As shown in Table 4, categories such as AI & Data Systems, Cyber & Security Technologies, and Space & Aerospace exhibit strong positive coefficients and statistically significant p-values, suggesting they have driven much of this upward momentum.

AI & Data Systems ($p = .017$) reflects the rising operational role of artificial intelligence, in experimentation and in deployed capabilities for decision support and surveillance. Cyber & Security Technologies ($p = .009$) indicates the DoD's emphasis on digital resilience, a trend reinforced by escalating cyber threats and state-sponsored intrusions. Space & Aerospace ($p = .020$) also emerges as a strategic growth area, consistent with increased investment in response to geopolitical rivalry in space.

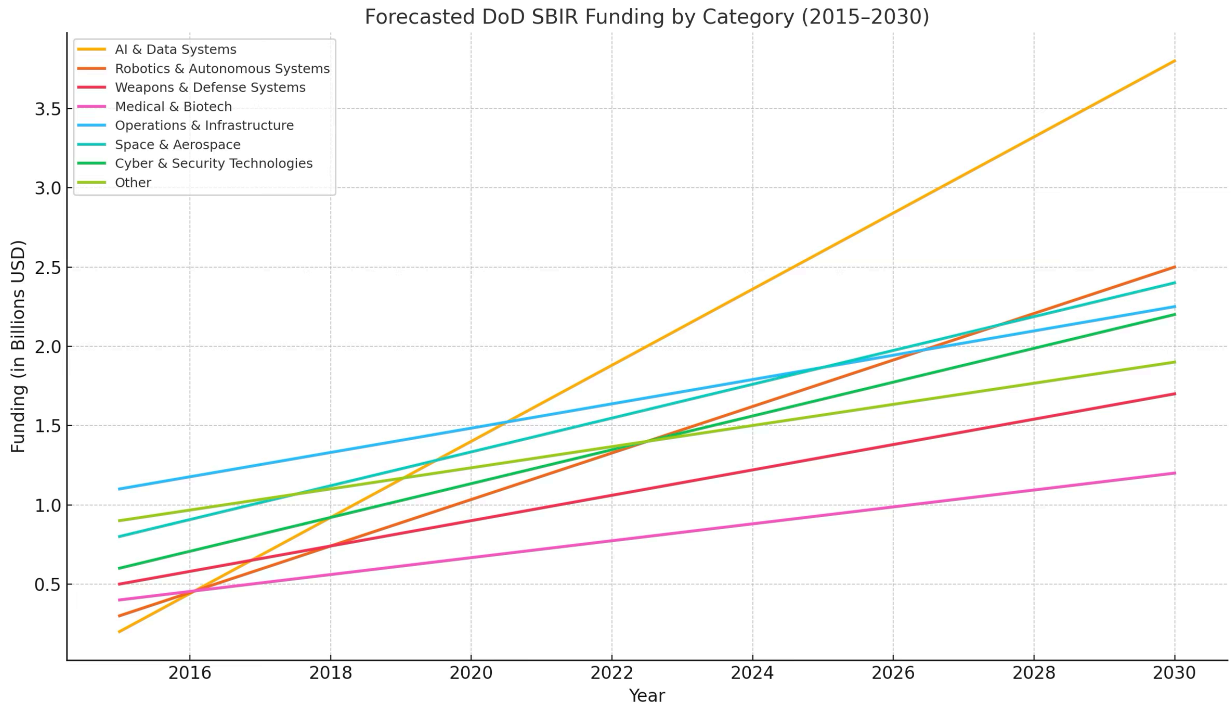
Categories such as Robotics & Autonomous Systems ($p = .184$), Medical & Biotech ($p = .446$), and Operations & Infrastructure ($p = .688$) did not reach statistical significance in the model. This does not imply these areas lack relevance; rather, their funding patterns have been less consistent or more application specific. Robotics investments, for example, may be tied to individual programs rather than long-term strategic initiatives, leading to greater variance in year-over-year allocations.

These regression findings are shown in Figure 3, which shows a forecast of DoD SBIR funding trends by category through 2030. The chart projects annual totals based on linear regression models, showing the clearest upward trajectories in AI & Data Systems, Cyber & Security Technologies, and Space & Aerospace. These categories not only had statistically significant coefficients in the regression analysis but also exhibit steeper forecasted slopes, visually reinforcing their strategic rise in DoD investment. The comparatively flatter lines for categories such as Medical & Biotech and Operations & Infrastructure highlight their more stable or plateauing trajectories, despite their foundational role or response-specific relevance. Both categories receive consistent year-over-year support. This reliability for small businesses, combined with potentially lower competition, offers a strategic foothold into the defense market — particularly for solutions that address long-standing operational or health-related needs.

The model suggests that funding for AI, Cybersecurity, and Aerospace is likely to remain strong through 2030. These domains directly support anticipated future defense challenges, including algorithmic warfare and digital threat containment. While Operations & Infrastructure is expected to maintain steady funding due to its foundational nature, its growth trajectory may lag these emergent priorities.

Figure 3

Forecasted DoD SBIR Funding by Category (2015-2030)



Note. This line chart projects funding trajectories by technology category using linear regression from historical award data. Steeper slopes in AI, Cybersecurity, and Aerospace reflect stronger forecasted growth based on statistically significant predictors.

Table 4

Regression Results for Award Amount by Technology Category (2015–2025)

Category	Unstandardized Coeff.	Standard Error	t-Statistic	p-Value	95% CI Lower	95% CI Upper
Award Year	34199.706	2231.207	15.328	< .001	29826.447	38572.965
AI & Data Systems	-48656.39	20386.407	-2.382	0.017	-88523.599	-8607.18
Robotics & Autonomous Systems	22386.96	16855.685	1.328	0.184	-10650.887	55424.807
Weapons & Defense Systems	19024.835	16728.063	1.137	0.255	-13762.867	51812.537
Medical & Biotech	16018.77	21026.101	0.762	0.446	-25193.267	57230.806
Operations & Infrastructure	5737.95	14293.431	0.401	0.688	-22277.772	33753.672

Space & Aerospace	34744.571	14959.598	2.323	0.020	5423.135	64066.008
Cyber & Security Technologies	55338.705	21037.548	2.63	0.009	14104.233	96573.177
Other	4912.493	20279.377	0.242	0.809	-34835.933	44660.918

Note. Regression model includes award year and categorical variables for each technology area. Statistically significant categories ($p < .05$) include AI & Data Systems, Cyber & Security Technologies, and Space & Aerospace.

Bias Analysis

The dataset offers a comprehensive view of SBIR award distribution, however, potential sources of systemic bias warrant consideration. Award allocation may favor repeat contractors or established firms with greater proposal-writing resources and potentially skew funding toward incumbents and away from emerging innovators. Geographic disparities may also exist, as firms located near major defense hubs or research institutions may have structural advantages in securing awards. The classification process itself introduces bias risk, particularly for interdisciplinary or ambiguously worded abstracts that may have been placed in the “Other” category. These factors could distort category-level funding trends and obscure underrepresented innovation sectors. While not directly quantifiable within the current dataset, recognizing these limitations is critical for interpreting funding patterns and for refining future analyses to include additional variables such as firm age, location, and prior award history.

Awards vs. Funding Patterns

Table 5 compares the number of awards to complement the regression analysis, total funding, and average award size across technology categories. Operations & Infrastructure received the highest number of awards (13,221) and the largest cumulative funding ($7.78 billion). However, the average award size in this category remains moderate at $0.59 million. Cyber & Security Technologies received significantly fewer awards (2,854) yet achieved the highest average award value ($0.64 million). Space & Aerospace ranks second in total funding ($4.65 billion) despite receiving only about half the awards of Operations & Infrastructure. Its average award size of $0.62 million places it among the highest. These patterns reinforce the earlier regression findings and suggest that the DoD's investment approach favors both scale and selectivity.

This distribution prompts a strategic consideration for investors: does a less than 9% increase in average award size justify choosing a category with over 10,000 fewer awards? Operations & Infrastructure offers a wide base of contracts with consistent funding which makes it well-suited for a risk-averse portfolio that prioritizes stability, volume, and institutional continuity. Sectors like Cyber & Security Technologies, Space & Aerospace, and AI & Data Systems receive fewer awards but have some of the highest average values. These patterns suggest a more selective and higher-stakes funding approach which may appeal to investors seeking concentrated bets in areas with accelerated innovation and commercial crossover potential. The funding landscape supports both strategies, but the optimal choice depends on whether the priority lies in minimizing risk or maximizing upside. This tradeoff between volume and value reflects the earlier regression results, where total funding and average award size were significant predictors of investment patterns. The upward trajectory, particularly in AI, reinforces its position as a high-growth sector where the relatively low number of awards presents the opportunity for high-risk, high-reward potential compared to broader, lower-variance subcategories like Operations & Infrastructure.

Table 5

Number of Awards vs. Total Funding (2015–2025)

Category	Awards	Total Funding ($B)	Avg. Award ($M)

Operations & Infrastructure	13221	7.78	0.59
Space & Aerospace	7528	4.65	0.62
Weapons & Defense Systems	5171	3.08	0.6
Robotics & Autonomous Systems	4976	3.05	0.61
AI & Data Systems	3327	2	0.6
Medical & Biotech	3129	1.81	0.58
Cyber & Security Technologies	2854	1.84	0.64
Other	6736	3.7	0.55

Note. This table presents the number of awards, total SBIR funding in billions, and average award size in millions across technology categories. Cyber & Security Technologies and Space & Aerospace stand out for high average award values despite fewer awards.

Conclusion

The DoD appears to be concentrating resources into fewer, more transformative technologies. Cybersecurity has the highest average award size despite receiving the fewest contracts which suggests a strategic preference for depth over breadth in domains with asymmetric risk. This highlights the importance of aligning proposals with targeted mission needs for emerging firms and demonstrating potential for scalable operational impact. It signals clear verticals for investors where government backing is stable and growing — a proving ground for dual-use technologies that later find commercial use.

The trends identified here also provide a basis for proactive positioning. Companies with capabilities in orbital systems, threat detection, machine learning, or resilient infrastructure should consider these categories as footholds for sustained SBIR engagement. Areas like Medical & Biotech and Robotics — while not statistically insignificant — appear less likely to receive sharply accelerating funds without major external catalysts or policy shifts.

This study does have limitations. The regression model explains only a small portion of funding variance ($R^2 = 0.009$), suggesting that other factors — such as project maturity, contractor track record, or phase level — may drive award size. Even within these constraints, the statistical signals are strong enough to support directional conclusions.

Defense stakeholders can use this data to refine pipeline strategies, tailor SBIR submissions to funding trajectories, and assess where new investment aligns with institutional momentum. With geopolitical volatility accelerating and technological edge increasingly seen as a determinant of deterrence, the DoD's SBIR program provides a measurable blueprint of its long-term vision.

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