ADVANCING DEFENSE INNOVATION

Increasing U.S. Department of Defense (DoD) Funding for North Carolina Small Business Technology Development & Commercialization

NORTH CAROLINA
BOARD OF SCIENCE, TECHNOLOGY & INNOVATION

REPORT OF THE NORTH CAROLINA DEFENSE INNOVATION TASK FORCE, CONVENED BY THE NORTH CAROLINA BOARD OF SCIENCE, TECHNOLOGY & INNOVATION

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Report of the North Carolina Defense Innovation Task Force,
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March 14, 2022

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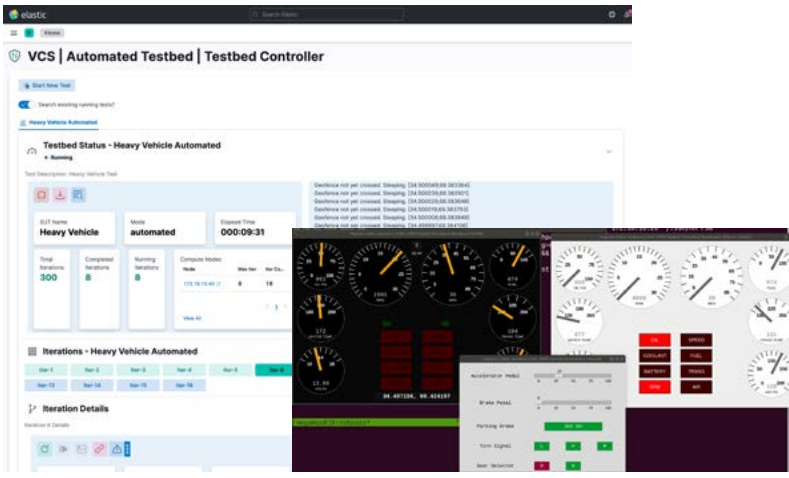
EXECUTIVE SUMMARY

Small businesses are primary generators of technology innovation, and the federally funded Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are the single largest source of early-stage innovative technology development and commercialization funding for small businesses (more than $3.7 billion via 5,000 awards in 2019[1]). Among the 11 federal agencies awarding SBIR/STTR funding, the Department of Defense (DoD) awards the most ($1.8 billion in FY 2019[1]) by far—nearly half the total amount.

In terms of DoD SBIR/STTR funding, North Carolina currently ranks only 20th in the nation, with 1.1% of the U.S. total. However, based on North Carolina's performance on several other related factors—population, gross domestic product (GDP), academic research & development (R&D) funding, business R&D funding, DoD personnel, National Science Foundation (NSF) funding, Department of Health and Human Services (HHS) funding—North Carolina's performance on DoD SBIR/STTR funding should be a rank of at least 8th or 9th nationally, with a dollar amount share somewhere between 3.6% and 4.2% of the U.S. total.

North Carolina has several support organizations that provide assistance with DoD SBIR/STTR applications, but that assistance has historically been relatively small, intermittent, and not strategic. With a well-funded, sustained, strategic assistance effort focused on helping companies become aware of and submit high-quality applications for DoD SBIR/STTR and other DoD technology innovation funding opportunities, North Carolina can achieve and maximize its potential.



Vigilant Cyber Systems, Inc., based in Mount Airy, developed the Cyber Battle Damage Assessment Tool (CyBDAT) to quantify the probabilities associated with cyber-attacks, allowing for the direct comparison of cyber-attacks to kinetic attacks in mission planning. As part of this effort, VCS developed an automated testbed capable of virtualizing Internet of Things (IoT) and Operational Technology (OT) targets, such as automobiles, industrial control systems, avionics, and a wide range of other targets to determine their resiliency against cyber-attacks. This work was funded by the SBIR program and the US Navy.

[1] The latest year for which complete data are available.

To seize this opportunity, the North Carolina Board of Science, Technology and Innovation (BSTI) formed and convened the Defense Innovation Task Force, a time-limited group of experts to define the current overall economic opportunity and impact and develop an actionable strategy, including key performance measures and timelines. Based on detailed empirical research, a survey of North Carolina-based support organizations, and interviews with support organizations in states that perform well in DoD SBIR/STTR funding, the Task Force found and recommends the following:

FINDINGS

- North Carolina has clear potential to significantly increase DoD funding for defense innovation in the state through increased SBIR/STTR awards to business- and academia-based innovators.
- North Carolina also has clear potential to significantly increase DoD funding for defense innovation in the state through other funding mechanisms, including Other Transaction Authority, direct technology acquisition by DoD and military service rapid capability fielding offices, and other sources.
- Expanding defense innovation in North Carolina would contribute directly to growing the defense sector—already the second largest sector of North Carolina's economy—to create jobs, raise the tax base, and improve quality of life in our state.
- North Carolina has numerous highly productive, if under-resourced and under-coordinated, State, private sector, and academia-based innovation resources focused on growing defense innovation—as it does on growing the larger defense economy. Although these resources are highly capable and significantly engaged, their current efforts are not as effective as they could be, due to lack of strategic leadership, operational coordination, effective corporate communications, and adequate and sustained funding.
- North Carolina has other competitive advantages, including the One North Carolina Small Business Phase I Incentive Grant Program and Matching Grant Program, significant capacity in digital engineering and other enabling technologies, and an innovation ecosystem successfully engaged in non-defense-related SBIR/STTRs.
- Failure to take definitive and decisive action to grow defense innovation would result in unrealized potential to expand the innovation ecosystem of our state, which is fundamental to growing the economy, attracting new industry, expanding jobs, raising the tax base, and improving quality of life.
- Growing defense innovation in North Carolina—clearly possible, practical, and impactful with relatively little State investment of leadership and capital—will not happen on its own. High-level State ownership and a strategic, resourced, sustained, and effectively coordinated effort led by a champion at the highest level of State government, are required to fully leverage the opportunity to grow defense innovation, expand the defense economy, and improve quality of life for all in North Carolina.

real-time location data displays on a computer or mobile device:

WISER Systems is a Raleigh-based OEM and developer of hardware and software solutions for autonomous real-time asset tracking utilizing Ultra Wideband (UWB) wireless mesh network localization technology.

Developed with funding from DoD, and unique its ability to operate indoors and out, underground, around metal, and in other challenging conditions where real-time location system technologies traditionally fail to operate—WISER's technology helps defense organizations save time and money by minimizing their need to conduct inventory or look for lost assets like tools, pallets, or even vehicles

RECOMMENDATIONS

The Task Force recommends that the BSTI adopt the following strategic and tactical recommendations and oversee their implementation:

Strategic

The BSTI leadership should:

- Work with the Governor and leadership of the General Assembly to designate a member of the Council of State as ***State Champion***, to lead expansion of defense innovation in North Carolina. Although beyond the scope of this study, this State Champion could also lead the broader State effort to grow the defense economy, of which defense innovation is a significant component.
- Advocate to the Governor, the leadership of the General Assembly, and the State Champion to establish an ***infrastructure*** to conduct fully coordinated strategic and tactical activities to grow defense innovation. This infrastructure would include a lead entity and existing entities—organic to other State agencies and private organizations—coordinated and empowered by the State Champion. A prototype for such an infrastructure is included in Appendix B to this report.
- Advocate to the Governor and the General Assembly to appropriately resource a ***multi-year initiative***—including adequate and recurring funding for the State Champion, the lead entity, and the State elements of this operational infrastructure. This initiative should also include expanding and targeting current programs like the One NC Small Business Program on DoD opportunities, and resourcing creative market engagement, training, mentorship, business development and other activities essential to expanding defense innovation in North Carolina.
- Ensure that the State Champion or lead entity develops, catalogues, and publishes ***metrics*** to assess the activities, outputs, and outcomes associated with expanding defense innovation in North Carolina—with the goal of reinforcing success with additional resources as this sector grows, expands businesses and the economy, and raises the tax base of the state.

Tactical[2]

The lead entity should establish and operationalize an appropriate infrastructure to achieve expansion of defense innovation in North Carolina, which should include:

- ***North Carolina Defense Strategic Review Committee (SRC):*** A strategic partnership to develop and oversee a coordinated, ongoing set of research, planning, and outreach and relationship-building activities at the operational level to marshal North Carolina's academic, industry, and military assets to make the state known as a go-to source of defense R&D, innovation, and commercialization efforts.
- ***North Carolina Defense Innovation Accelerator (DIA):*** A virtual, interagency Defense Innovation Accelerator (DIA) to support and execute the tactical activities recommended by the SRC. It would address all phases, from topic selection, proposal writing, teaming, Phase I, Phase II, and mentoring for Phase III, and Incentive and Matching funding via the One North Carolina Small Business Program administered by the BSTI.
- ***North Carolina Defense Technology Advocacy Campaign (TAC):*** A well-designed ongoing, multilevel campaign to market North Carolina as a leader in defense and national security innovation, building directly on the strategic work of the SRC and the tactical work of the DIA.

Once implemented, these recommendations will fully enable North Carolina to reach its potential. By maximizing this potential, North Carolina will realize a significant opportunity to be a leading hub of innovation for the U.S. defense industry.

The Rapid Deployable Communications Package (RDCP), developed by Raleigh-based JPS Interoperability Solutions, Inc. (JPS) in response to an Air National Guard requirement, is a tactical, transportable kit capable of providing local interoperability as well as wide-area interoperability over cellular, terrestrial, satellite, or Broadband Global Area Network (BGAN) networks. Communications interfaces available to the local operator include land-mobile radio, push-to-talk over cellular, or connection to remotely distributed systems.

[2] See Appendix B for more details on each of these tactical recommendations.

BACKGROUND

North Carolina has one of the strongest military presences in the nation, with more than 145,000 personnel representing five branches of the military, representing the 4th largest military footprint in the country. North Carolina also has an active network of companies, universities, government, and economic development organizations providing products and services to support the bases, personnel, and veterans. Despite the state's strong military presence and active innovation ecosystem, however, total dollars in defense contracts spent on North Carolina's businesses and research organizations rank the state as only 22nd in the country, and only 2% of the defense contracting dollars in the state are in research & development (R&D).[3]

As the defense industry is disrupted through an increasing number of innovation initiatives and structural changes, North Carolina has a significant opportunity to position itself as a place for nontraditional innovation to capture an increased share of U.S. Department of Defense (DoD) spending in emerging areas of R&D, products, and services in six key technology areas that are priorities of the DoD and that could be the basis for forming technology cluster areas for North Carolina.

Economic data analysis shows[4] that while North Carolina is a small overall market for defense business in each of these key priority technology areas, it is among the fastest growing states in the nation for jobs in the target areas. Specifically, over the past five years the state ranked 1st in economic growth in data and knowledge management and human performance, 2nd in power and advanced manufacturing, and 6th in autonomous systems.[5] Additionally, North Carolina has a high concentration of jobs in research and services related to the six technology areas compared with the national average.

Small businesses are primary generators of technology innovation, and the federally funded Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are the single largest source of early-stage technology development and commercialization funding for small businesses (more than $3.7 billion via 5,000 awards 2019).[6] Among the 11 federal agencies that provide SBIR/STTR funding, DoD accounts for nearly half of that funding, with $1.8 billion in awards in the most recent fiscal year for which complete data are available **(Figure 1)**. Notably, however, and as indicated in more detail below, North Carolina ranks well below the top states in DoD SBIR/STTR funding and garners far less DoD SBIR/STTR funding than would be expected based on national patterns and its performance with other federal agencies. Clearly, North Carolina has untapped economic potential on this front. By maximizing this potential, North Carolina could realize a significant opportunity to be a leading hub of innovation for the U.S. defense industry.

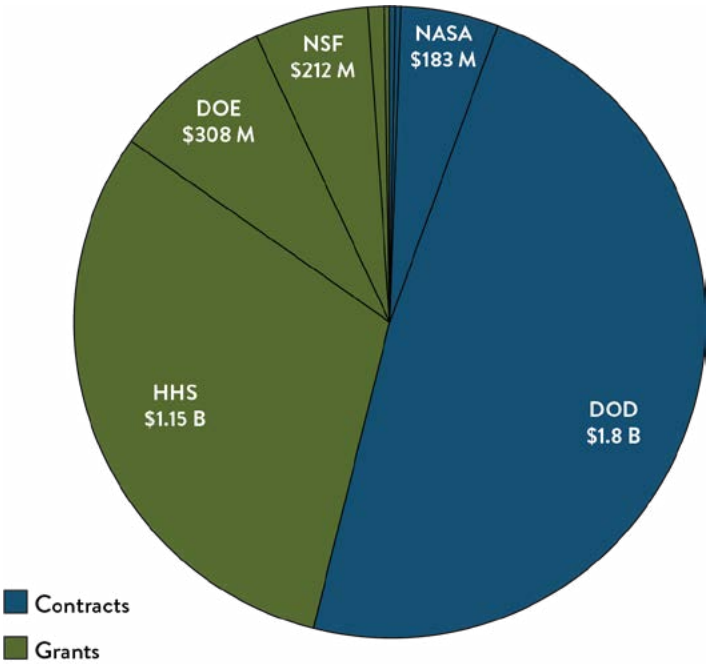
FIGURE 1A. FY 2019 SBIR/STTR Budgets by Agency

AGENCIES	BUDGET
Department of Defense (DoD)*	$1.80 B
Department of Health and Human Services (HHS)**, including the National Institutes of Health (NIH)	$1.15 B
Department of Energy (DOE), including Advanced Research Projects Agency – Energy (ARPA-E)	$308 M
National Science Foundation (NSF)	$212 M
National Aeronautics and Space Administration (NASA)	$183 M
U.S. Department of Agriculture (USDA)	$30 M
Department of Homeland Security (DHS)	$17 M
Department of Commerce: National Oceanic and Atmospheric Administration (NOAA)	$9.5 M
Department of Education (ED)	$8.4 M
Department of Transportation (DOT)	$5.2 M
Department of Commerce: National Institute of Standards and Technology (NIST)	$3.9 M
Environmental Protection Agency (EPA)*	$3.6 M

* Budgeted Amount; other Agencies Obligated Amount

** Provides grants and contracts

FIGURE 1B. FY 2019 SBIR/STTR Budgets by Agency



Source: https://www.sbir.gov/sites/default/files/SBA_SBIR_Overview_March2020.pdf.

[3] Defense Alliance of North Carolina 2020 and U.S. DoD Office of Local Defense Community Cooperation 2021.

[4] The priority technology areas are advanced manufacturing, autonomous systems, data and knowledge management, human performance, materials, and power.

[5] Defense Alliance of North Carolina 2020. Materials was the only sector to experience a decline, mirroring national trends.

[6] U.S. Small Business Administration 2020. See Appendix A for more information about the SBIR & STTR programs.

CHARGE

To seize this opportunity, and based on preliminary research and interviews conducted during fall 2020,[7] the North Carolina Board of Science, Technology and Innovation (BSTI)[8] recommended the formation of a time-limited (six-month) Defense Innovation Task Force to undertake the following two tasks:

1. Explore North Carolina's opportunity to increase the development of innovative defense-relevant technologies, particularly through increasing the number of DoD-funded SBIR and STTR awards and to a lesser extent other DoD technology development grants or other funding mechanisms.[9]
2. Recommend execution-ready, high-impact activities that the BSTI may undertake in a primary role and potentially with partner organizations, ideally with measurable goals and effects achievable in not more than a two-year time frame.[10]

Led by BSTI member Scott Dorney, acting as a liaison to the BSTI, with staff support from John Hardin, Executive Director of the Office of Science, Technology & Innovation (OSTI) and other OSTI staff, the Defense Innovation Task Force, comprised of 14 members (Appendix B) held four meetings during spring and summer 2021. During this time, Task Force members:

- Defined the current overall economic opportunity and impact.
- Developed an actionable strategy, including key performance measures and timelines.
- Identified associated state investment necessary for budgetary purposes.

To do so, the Task Force organized into the following four subcommittees:

TABLE 1. Task Force Subcommittees

SUBCOMMITTEE	CHARGE	MEMBERS[11]
1. Data & Metrics	Measure the size of defense innovation funding opportunities, North Carolina's current performance realizing those opportunities (including geographic & topical dispersion within North Carolina), and propose targets — i.e., where's the money, how much is it, how much is North Carolina getting, and how much should North Carolina aim to get (based on its size, its DoD presence, and its university and business capacity to conduct R&D and innovation)?	John Hardin Kathie Sidner Fiona Baxter
2. Infrastructure & Resources	Determine & document which North Carolina support organizations and resources currently address, could address, or have addressed historically, defense innovation funding opportunities, in what ways, and to what extent — i.e., how is/has been North Carolina structured/organized to pursue the opportunities, when, what has/hasn't worked, and why?	John Ujvari Nicole Fox Denny Lewis
3. Best Practices & Models	Determine which other states and organizations (both public and private) are or have been successful in securing defense innovation funding opportunities, in what ways, and to what extent — i.e., what is working in other locales, how, and what could be developed and implemented in North Carolina?	Luke Burnett Sam Tetlow Gary Edge Tad Dunn
4. Outreach & Relationships	Determine what opportunities exist to develop deeper relationships, communications, and support at multiple levels (federal government [both legislative and executive branches], state government, industry, military leaders), the benefits doing so, and how to develop them — i.e., how can North Carolina have a coordinated, multilevel, ongoing set of relationships that make it a known, go-to source of defense innovation R&D and commercial efforts?	Nick Justice Bill Herrold Scott Dorney Dennis McGurk

[7] Members of the BSTI's Innovation Programs subcommittee interviewed nearly twenty stakeholders to gain their insights into Phase I and Phase II SBIR and STTR funding awarded to North Carolina's small businesses, particularly the distribution of funding across the federal agencies that award those grants. The purpose of the interviews was to determine whether there are strategic opportunities to change the distribution.

[8] As a State-authorized 25-member advisory board appointed by the Governor and General Assembly and administered by the Office of Science, Technology & Innovation (OSTI) at the North Carolina Department of Commerce, the BSTI encourages, promotes, and supports scientific, engineering, and industrial research applications in North Carolina. Its mission is *to improve the economic well-being and quality of life of all North Carolinians through advancing science, technology, and innovation*. The BSTI is focused on accelerating North Carolina's next generation of technology and technology companies. It investigates new areas of emerging science and technology, conducts studies on the competitiveness of North Carolina industry and research institutions in these fields, and works with the North Carolina General Assembly and the Governor to put into place the infrastructure that keeps North Carolina on the cutting edge of science, technology and innovation.

[9] Other funding mechanisms include but are not limited to Other Transaction Authority Agreements (OTAs) and Assistance Agreements (AAs). SBIR and STTR funding mechanisms were the primary (80%) focus, while the other funding mechanisms were an exploratory (20%) focus.

[10] With regard to other funding mechanisms beyond SBIR/STTR, the BSTI requested an impact assessment for North Carolina, which may consider, among other factors, probability of success of the effort and in changing the perceptions of North Carolina for DoD-related, early-stage business, impact, geographic dispersion of opportunities within the state, likelihood of the BSTI to successfully lead or compete in a 1-2 year time period, etc., and a ranked recommendation of projects the BSTI might undertake that would also be helpful (i.e., projects that the BSTI can consider going deeper on or actively and primarily championing).

[11] Members' titles and organizational affiliations available in Appendix B.

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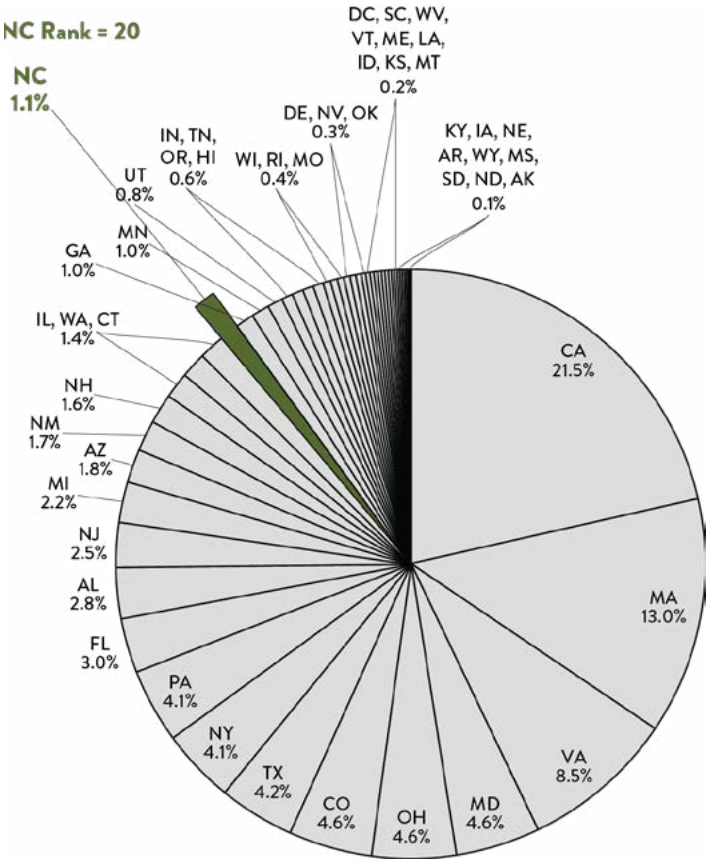
SBIR/STTR FUNDING PERFORMANCE TO DATE

The SBIR and STTR programs have operated since 1983 and 1992, respectively. Since 1983, over the entire lifetime of these programs, North Carolina ranks 20th in the U.S. in DoD SBIR/STTR Phase I and Phase II funding, accounting for 1.1% of the U.S. total for such funding **(Figure 2)**. Together, five states account for slightly more than half of the U.S. total market—California (21.5%), Massachusetts (13%), Virginia (8.5%), Maryland (4.6%) and Ohio (4.6%). Each of next 14 states ahead of North Carolina—Colorado, Texas, New York, Pennsylvania, Florida, Alabama, New Jersey, Michigan, Arizona, New Mexico, New Hampshire, Illinois, Washington, and Connecticut—accounts for between 4.6% and 1.4% of the U.S. total.

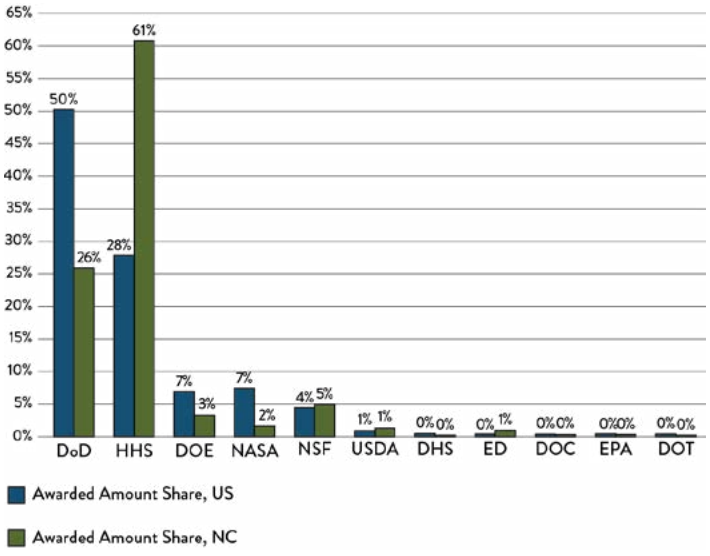
Viewing this funding breakdown by federal agency share provides more context for North Carolina's performance nationally **(Figure 3)**. Specifically, for the U.S. overall, DoD SBIR/STTR funding accounts for 50% of all SBIR/STTR funding across the U.S., consistent with its 50% share of overall SBIR/STTR funding shown in Figure 1. In contrast, for North Carolina, DoD SBIR/STTR funding accounts for 26% of its overall SBIR/STTR funding, which is half as much as would be expected based on the U.S. pattern. For the Department of Health and Human Services (HHS),10F the second-largest SBIR-STTR-awarding agency,[12] however, the pattern is significantly different. Nationally, HHS SBIR/STTR funding accounts for 28% of all SBIR/STTR funding, slightly under its 30% overall SBIR/STTR funding shown above in Figure 1. In contrast, North Carolina's HHS SBIR/STTR funding accounts for 61% of its overall SBIR/STTR funding, which is more than twice as much as would be expected based on the U.S. pattern.

FIGURE 2. DoD SBIR/STTR Phase I & Phase II Funding, State Share of U.S. Total, 1983-2021



Source: https://www.sbir.gov/reports.

FIGURE 3. Phase I & II SBIR/STTR Award Amount Share by Agency, U.S. & North Carolina, 1983-2021

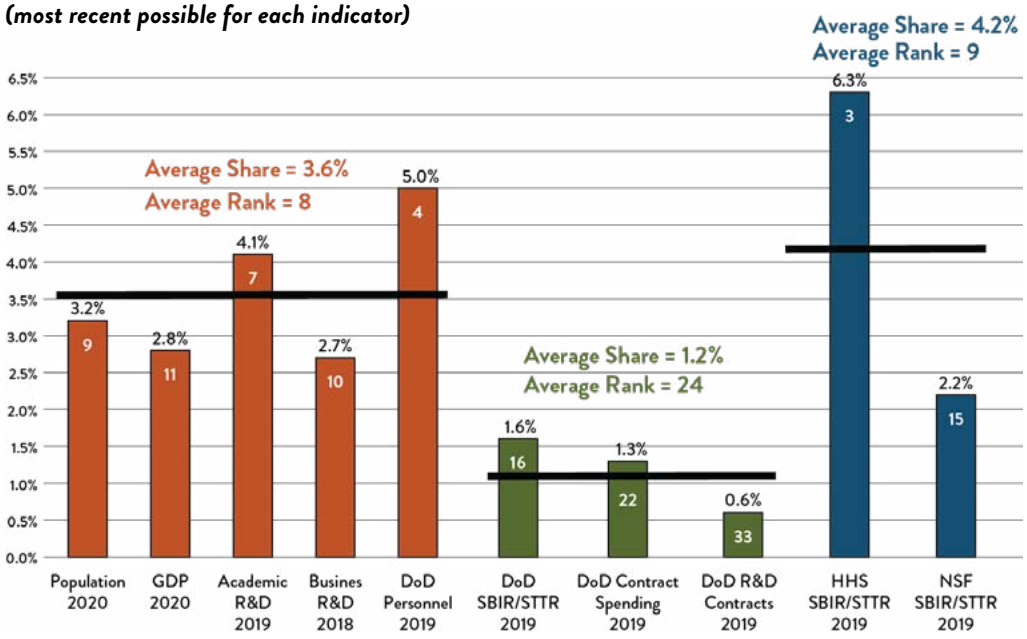


Source: https://www.sbir.gov/reports.

[12] See Figure 1.

A comparison with other relevant indicators provides even more context for North Carolina's current performance on DoD SBIR/STTR funding **(Figure 4)**. As shown in the orange bars, North Carolina ranks 9th in U.S. population (3.2% of U.S. total), 11th in Gross Domestic Product (GDP – 2.8% of U.S. total), 7th in Academic R&D funding (4.1% of U.S. total), 10th in Business R&D (2.7% of U.S. total), and 4th in DoD stationed personnel (5% of U.S. total). Each of these ranks and shares is significantly higher than North Carolina's performance on key DoD-focused indicators. As shown in the green bars, in 2019 North Carolina ranked 16th on DoD SBIR/STTR funding (1.6% of U.S. total)[13], 22nd in DoD contract spending (1.3% of U.S. total), and 33rd in DoD contracts (.6% of U.S. total). These ranks and shares are also significantly lower than North Carolina's performance with SBIR/STTR funding from two other major federal agencies, HHS and the National Science Foundation (NSF). As shown in the blue bars, North Carolina ranks 3rd in HHS SBIR/STTR funding (6.3% of U.S. total) and 15th in NSF SBIR/STTR funding (2.2% of U.S. total).

FIGURE 4. North Carolina Share of U.S. Total, Selected Indicators, Various Years
(most recent possible for each indicator)



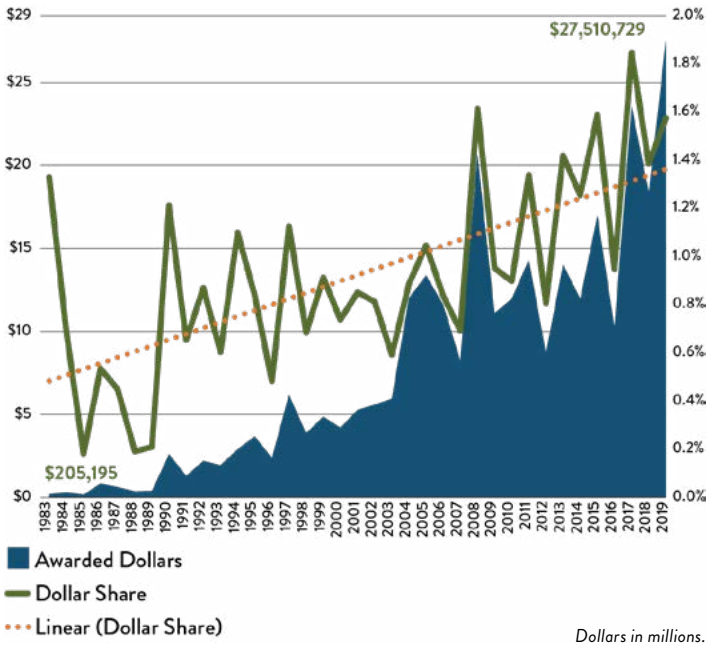
Sources: https://data.census.gov/cedsci/table?q=p1; https://www.bea.gov/iTable/index_regional.cfm; https://ncses.nsf.gov/pubs/nsf21314; https://ncses.nsf.gov/pubs/nsf21312; https://oea.gov/defense-spending-state-fiscal-year-2019; https://www.sbir.gov/reports.

Together, the indicators in Figure 4 suggest that a realistic target for North Carolina's performance with respect to DoD SBIR/STTR funding would be a rank of at least 8th or 9th nationally and a dollar amount share somewhere between 3.6% and 4.2% of the U.S. total.[14] ***In award and dollar terms, this would entail more than doubling the annual number of DoD SBIR/STTR awards from 66 to over 120, and more than doubling the annual dollar amount of $27,510,729 to over $65,000,000 annually.***

Reaching these levels would significantly augment a foundational element of North Carolina's defense innovation ecosystem—small business technology development and commercialization—serving as a base and catalyst for additional defense innovation activities by larger business and DoD.

North Carolina's amount of DoD SBIR/STTR funding and the correlating share of the U.S. total have, in fact, increased steadily over time, yet the rate of that increase is not fast enough to reach the target amounts in the previous paragraph rapidly **(Figure 5)**. Doing so would require an intervention that would significantly increase both the number and quality of DoD SBIR/STTR proposals annually, and in turn significantly increase the number of DoD SBIR/STTR awards to North Carolina small businesses.

FIGURE 5. DoD SBIR & STTR Phase I and Phase II Awards, North Carolina Awarded Dollars and Dollar Share of U.S. Share, 1983-2019



Dollars in millions.

Source: https://www.sbir.gov/reports.

[13] This rank and share is higher than what is shown in Figure 2, reflecting a slight improvement in North Carolina's performance over time. See Figure 5 for more detail regarding North Carolina's performance over time. Additionally, when the 2019 SBIR/STTR funding data are normalized by state gross domestic product (GDP), North Carolina's rank drops to 22nd.

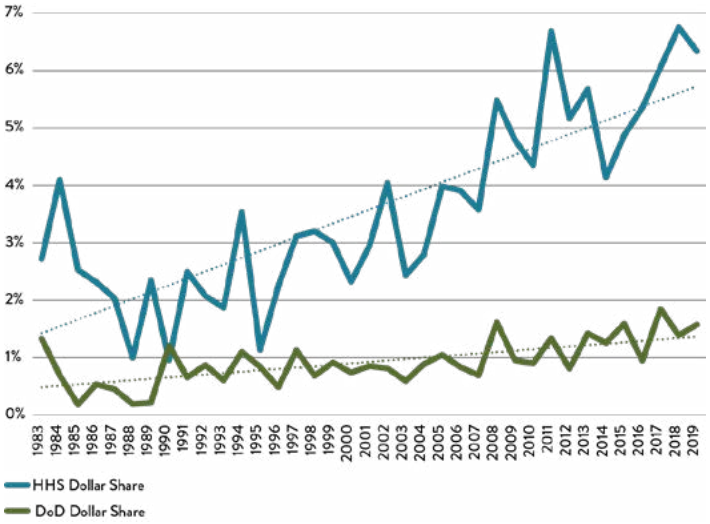
[14] As shown in Figure 2, a ranking at this level would put North Carolina in the range of 4.1 percent of the US total.

While such an increase would be difficult, there is precedent for it in North Carolina for SBIR/STTR awards from another key federal agency **(Figure 6)**. Between 1983 and 2019, the rate of increase in North Carolina's HHS SBIR/STTR award share of the U.S. total HHS SBIR/STTR award share is approximately triple the rate of increase for DoD SBIR/STTR awards. There are several reasons for this, most of which relate to the state's concerted, coordinated, and sustained significant investments and efforts to support and bolster North Carolina's academic and industry capabilities in the life science sector. An additional heightened, coordinated, well-resourced and sustained focus on DoD could yield comparable results for defense innovation in North Carolina.

It should also be noted that for the top three states in DoD SBIR/STTR funding (California, Massachusetts, Virginia), their share of the U.S. total has decreased over time **(Figure 7)**. Additionally, states such as Ohio and Maryland, whose shares are much closer to the realistic targets for North Carolina, have increased their market shares faster than North Carolina has. Overall, the pattern has been for the DoD SBIR/STTR market to become less concentrated in a small number of leading states over time, suggesting North Carolina may have an opportunity to increase its market share of DoD SBIR/STTR funding going forward.

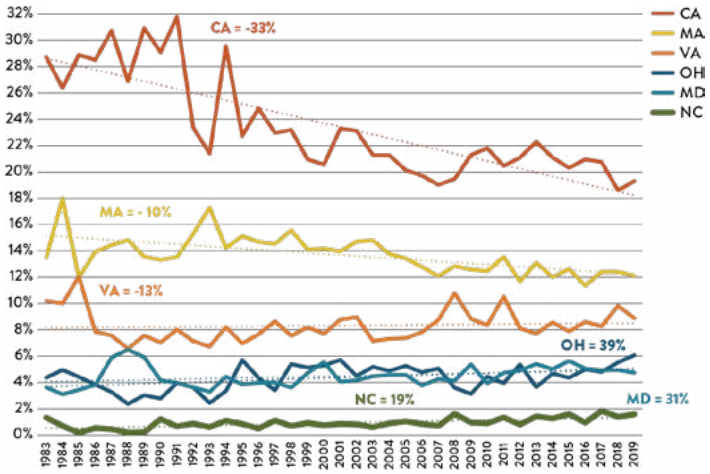
The innovative Vadum Inc. Multi-shot Robotic EOD Disrupter (MRED) was developed for the US Army under a DoD SBIR award and is the leading technology for acquisition in an upcoming Program of Record (POR). MRED is mounted to the arm of various unmanned ground vehicles (UGV), such as the L3Harris T7 (inset), delivering precision-aimed projectile and water shots to disable suspicious improvised explosive devices (IEDs). Remote operation enables stand-off capability and shot-type selection, providing for soldier safety and mission efficacy.

FIGURE 6. DoD and HHS SBIR & STTR Phase I and Phase II Awards, North Carolina Share of U.S. Share, 1983-2019



Source: https://www.sbir.gov/reports.

FIGURE 7. DoD SBIR/STTR Phase I and Phase II Awards, Top State Share of U.S. Share, 1983-2019



Source: https://www.sbir.gov/reports.

Within North Carolina, between 1983-2019 a total of 190 small businesses have received DoD SBIR/STTR awards **(Figure 8)**. This equates to slightly more than five businesses per year receiving awards. Of those 190 businesses, 10 (or 5%) account for over 50% of the awards. This high rate of concentration, while not unusual for DoD SBIR/STTR awards (see more detail below), suggests that, at a minimum, North Carolina could increase its market share by increasing the overall number of businesses winning DoD SBIR/STTR awards. Additionally, if North Carolina could increase both the number of companies winning multiple DoD SBIR/STTR awards and the conversion rate of Phase I to Phase II awards,[15] it could significantly increase its market share of such awards overall.[16]

Finally, the distribution of DoD SBIR/STTR funding across North Carolina suggests there is an opportunity for greater geographic diversity in those awards **(Figure 9)**. While businesses in a total of 26 counties have received DoD SBIR/STTR awards, three of those counties account for more than 75% of the award dollars—Wake (38%), Durham (22.3%), and Iredell (17.1%). The county with the next largest share is Forsyth (4.4%).

North Carolina has an opportunity to leverage high-tech innovation pockets in other geographic regions of the state to increase DoD SBIR/STTR funding in more counties. While those opportunities will likely be proportional to the number of innovative small businesses in those regions, a concerted focus in those regions could catalyze untapped potential.

Clearly, this is a significant opportunity for North Carolina. We have the expertise to rank in the top 3 for HHS awards, but despite having the 4th largest number of DoD personnel in the country and an active innovation ecosystem, rank only 20th for DoD SBIR/STTR funding. By increasing the input and "touch points" of these DoD personnel throughout the technology development process, North Carolina could increase the effectiveness and efficiency of that process, leading to increased technology commercialization.

Blue Ridge Research and Consulting, LLC (BRRC), based in Asheville, was part of a research team that developed innovative measurement and analysis methods using Near-field Acoustic Holography (NAH) to provide high-quality acoustic characterization of jet noise. The design includes a 150-channel NAH measurement array and data acquisition system, as well as a state-of-the-art holography processing capability. The effort resulted in scan-based measurements along a single plane that were then used to produce a three-dimensional holographic representation of the sound radiation. This research effort was performed in support of the Air Force Research Laboratory with support from SBIR awards, and resulted in subsequent DoD contracts for BRRC.

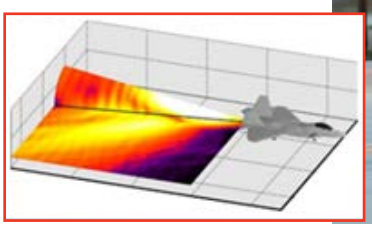
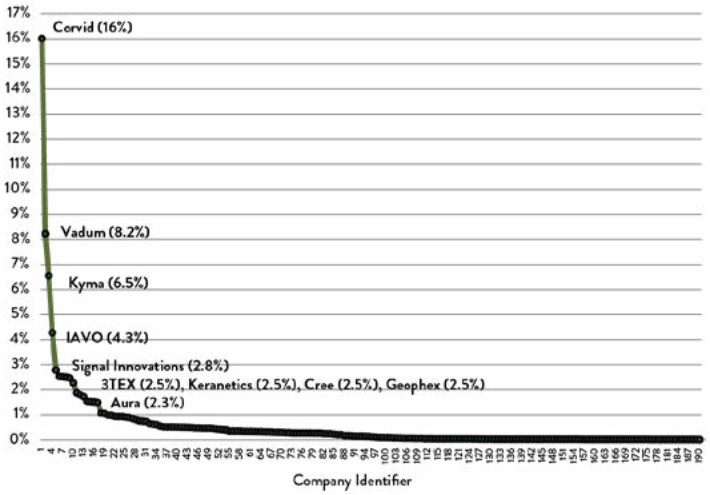
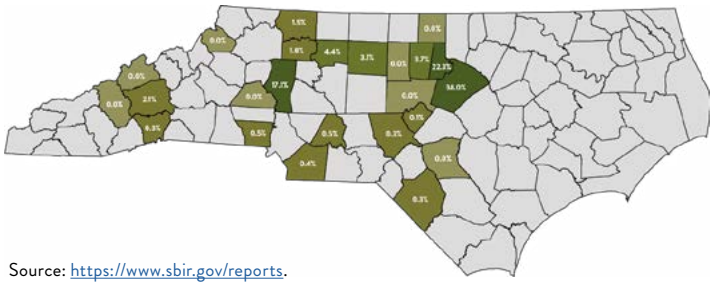


FIGURE 8. Ten North Carolina Companies (out of 190 total) Account for 50% of DoD SBIR/STTR Funding to North Carolina, 1983-2019



Source: https://www.sbir.gov/reports.

FIGURE 9. North Carolina DoD Phase I & II SBIR/STTR Award Share by County, 1983-2019



Source: https://www.sbir.gov/reports.

[15] See appendix A for a discussion of the differences between Phase I and Phase II awards, including the size of the awards.

[16] A similar analysis by Task Force staff of DoD SBIR/STTR funding across businesses in California, Massachusetts, and Virginia (the top three DoD SBIR/STTR states) indicates that the distribution of DoD SBIR/STTR funding across businesses in North Carolina is noticeably more concentrated. In other words, compared to those other states, the "market" for DoD SBIR/STTR funding in North Carolina is more concentrated. This suggests that leading states in DoD SBIR/STTR funding have a wider range of businesses with have a significant presence in the DoD SBIR/STTR funding market.

OTHER DOD MECHANISMS SUPPORTING SMALL BUSINESS INNOVATION

SBIRs and STTRs are not the only mechanisms DoD uses to support the development of early-stage innovative technologies. Other mechanisms include Assistance Agreements (AAs) and Other Transaction Authority agreements (OTAs), among others.

These other mechanisms have become an increasingly popular tool for acquisition officials since the 2016 National Defense Authorization Act encouraged their use,[17] and DoD continues to show an increased level of interest in using alternative contracting authorities for its innovation investments.[18] In FY 2019, the amount of funding awarded through OTAs ($4.8 billion) was nearly four times as much as was awarded through SBIRs/STTRs ($1.3 billion) **(Figure 10)**, and funding awarded through OTAs continued on an upward trend in recent years. Between FY 2017 and 2019, the average annual amount of DoD innovation investment that used OTAs more than doubled.[19]

While it is unclear whether this pattern will continue,[20] it is important to note that many of the recommendations outlined in this report, while tailored to the SBIR/STTR programs, would also help North Carolina small businesses be more competitive for OTAs and other funding mechanisms.

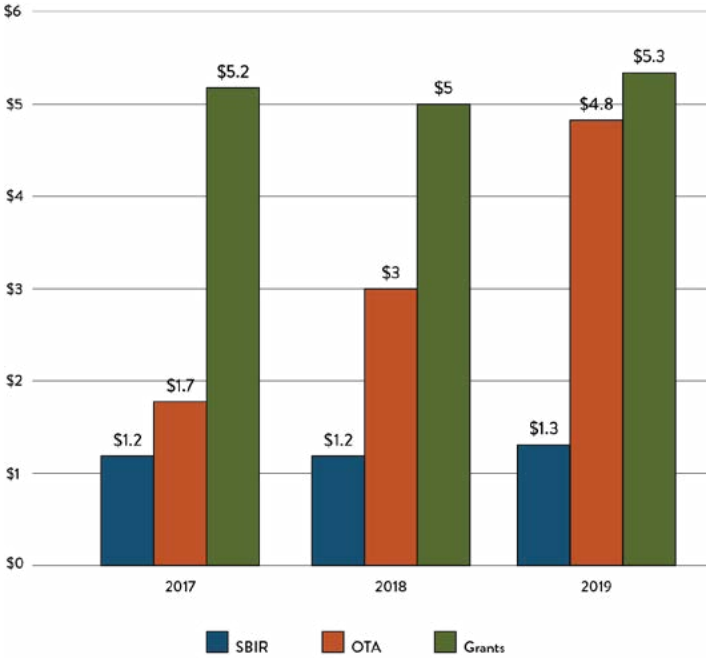
Additionally, a notable difference between SBIRs/STTRs and OTAs is that the former are limited to small businesses, whereas even the largest defense primes are eligible to receive OTA funding. The majority of OTA obligations in recent years have been awarded to consortia (consisting, for example, of nonprofits, academic institutions, or contractors), accounting for 57 percent of DoD OTA obligations between FY 2015 and FY 2019.[21]

Within North Carolina, university R&D supported by DoD is also strong and growing and may provide the basis for additional DoD SBIR/STTR funding.[22] Over the ten-year period since FY 2010, Duke University, Wake Forest University, and the 16 institutions comprising the UNC System received over $1.5 billion in R&D funding from DoD sponsors (roughly $155 million annually)[23]. Among those 18 institutions, Duke University, NC State University, UNC-Chapel Hill, and Wake Forest University were the top four performers, accounting for over 90% of DoD-funded sponsored awards.

There is potential, however, to attract more DoD funding, including through SBIR/STTRs and other mechanisms, at the next tier of universities (UNC Charlotte, NC A&T, East Carolina, UNC Wilmington, Fayetteville State, and UNC Greensboro). Several of these institutions have capabilities within schools of engineering, computer science/ data analytics, business, health/ human performance, and physical sciences that align well with DoD needs. And ECU, UNC Wilmington, and Fayetteville State University are located within regions of the state where DoD SBIR/STTR activities are very low to non-existent and could likely be increased.

There are strong collaborations among North Carolina-based universities (i.e., DoD funds flow from multiple North Carolina universities to others) and between North Carolina universities and RTI International on DoD-sponsored projects. North Carolina has an opportunity to leverage these collaborations to bring significant value (multi-disciplinary, multi-performer efforts) to DoD funders.

FIGURE 10. DoD Innovation Obligations, 3-Year Moving Average, FY 2017 – FY 2019



Source: https://content.ndia.org/-/media/vital-signs/2021/vital-signs_2021_digital.ashx, page 28.

[19] National Defense Innovation Association 2021.

[20] Usage of OTAs could come under more intense scrutiny as they become more popular. If Congress decides that DoD is using OTAs excessively or inappropriately, they could compel DoD to curtail their use.

[21] Schwartz and Peters 2019.

[22] University faculty who form small businesses are eligible to apply for SBIR/STTR funding via those businesses.

[23] Internal contract and award data are from university sponsored programs offices at the UNC System, Duke University, and Wake Forest University. These data include research awards to these institutions from DoD agencies during the period FY2010 to June 2021. In most instances, these internal award data do not reflect whether an effort is an SBIR/STTR project, but rather provide a broader view of DoD-funded efforts at the universities.

INFRASTRUCTURE AND RESOURCES DEVOTED TO THE EFFORT

Before recommending ways to increase the number of DoD-funded SBIR/STTR awards, it is important to inventory relevant North Carolina support organizations and resources that can help, and have helped, advance such efforts.

To that end, the Task Force's Infrastructure & Resources subcommittee utilized surveys, research, and team knowledge about DoD funding to determine how North Carolina organizations and resources are structured and organized to pursue DoD opportunities that impact North Carolina businesses, as well as what challenges North Carolina small businesses face with respect to those opportunities.

The survey examined the North Carolina support organizations or universities who currently address, have the ability to address, or have historically addressed, defense innovation funding opportunities within North Carolina, with the aim of gaining insights about their efforts and efficacy in engaging with and assisting North Carolina entities to pursue DoD SBIR/STTR opportunities. The subcommittee initially identified more than 75 such organizations, and after reviewing the list of organizations in detail, the subcommittee contacted a targeted subset based on those organizations' known level of participation with DoD funding opportunities, past or present.

The final subset of participants in the survey included the following 29 North Carolina businesses or universities that have or had worked with DoD programs or DoD funding in the past or currently:

TABLE 2. Respondents: Infrastructure and Resources Survey 1

Advance Mobility Collective	CED - Council for Entrepreneurial Development
Defense Alliance of North Carolina (DANC)	Duke - Clinical and Translational Science Institute
Duke - Innovation and Entrepreneurship	Duke University - Office of Government Relations
Duke - Office of Licensing and Ventures	Duke University System
East Carolina University (ECU)	Economic Development Partnership North Carolina
Eva Garland Consulting	First Fight Venture Center (FFVC)
Joint School of Nanoscience & Nanoengineering	North Carolina Military Affairs Commission
North Carolina A&T State University - Commercialization Office	North Carolina Defense Technology Transition Office
North Carolina State - Office of Research Commercialization	NCIDEA
North Carolina State University - Poulton Innovation Center	North Carolina Military Business Center
ProposalHelper	WCU - Rapid Center
RIoT (Regional Internet of Things)	RTI International
SCORE	UNC System - Defense and Military Partnerships

With over 12 years of research and development in Winston-Salem, North Carolina's Innovation Quarter, KeraNetics harnesses the power of human-derived keratin proteins to support the management of partial thickness skin wounds.

Developed with support from DoD SBIR funding, Keranetics's products can be used to treat catastrophic battlefield wounds soldiers get in combat.

Those organizations provided answers to the following nine questions:

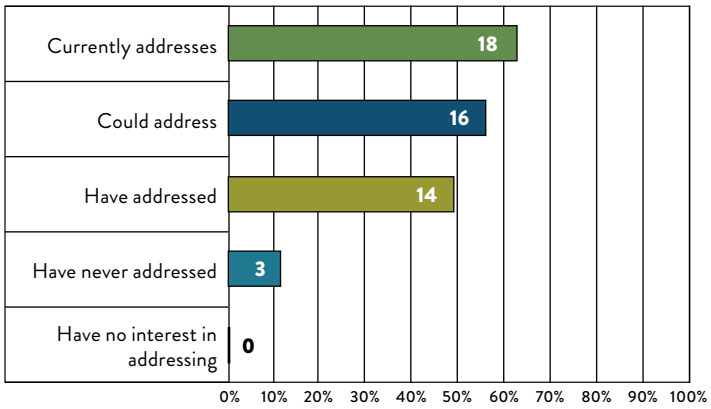
1. Organization/Company Name.
2. What best describes your organization?
3. Does your organization currently address, could address, or have addressed defense innovation funding opportunities?
4. What does your organization do for your base?
5. To what extent does your organization understand how to find, pursue, and win innovation opportunities within the Department of Defense?
6. Do members or clients of your organization have, or are they developing, any innovative technology?
7. If yes to the previous, what describes your members' technical readiness level (TRL)?
8. What do you think are the biggest impediments to business growth? What are the biggest impediments to doing business with the federal government?
9. Can you recommend other organizations we should talk with that are innovating or assisting those that are? If so, please list in the space below.

The following charts show the findings of the survey and assisted in the development of a second, follow-up survey to discover further impediments that North Carolina organizations may have in locating, pursuing, and wining DoD funded efforts.

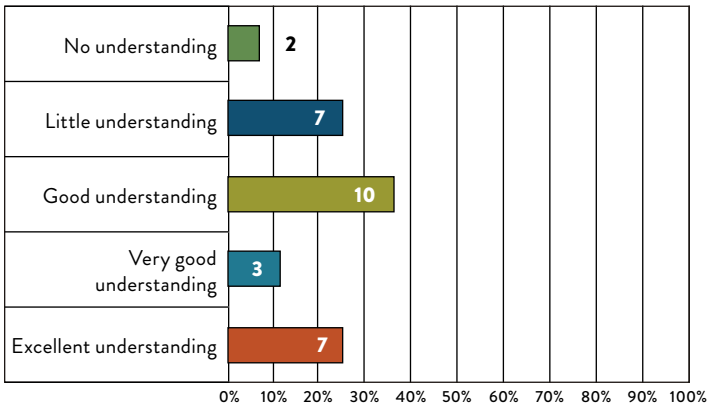
TABLE 2. Findings: Infrastructure and Resources Survey 1

(Organizations were asked to check all that apply)

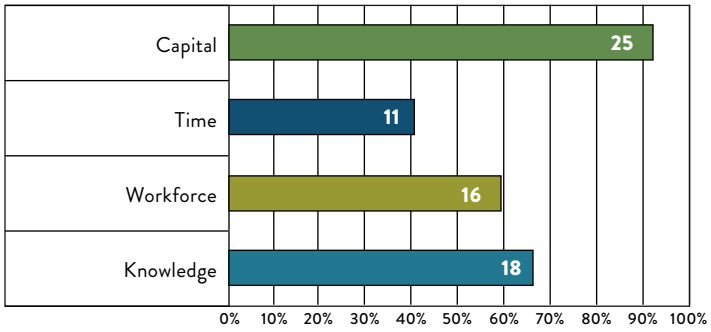
Does your organization currently address, could address, or have addressed defense innovation funding opportunities?



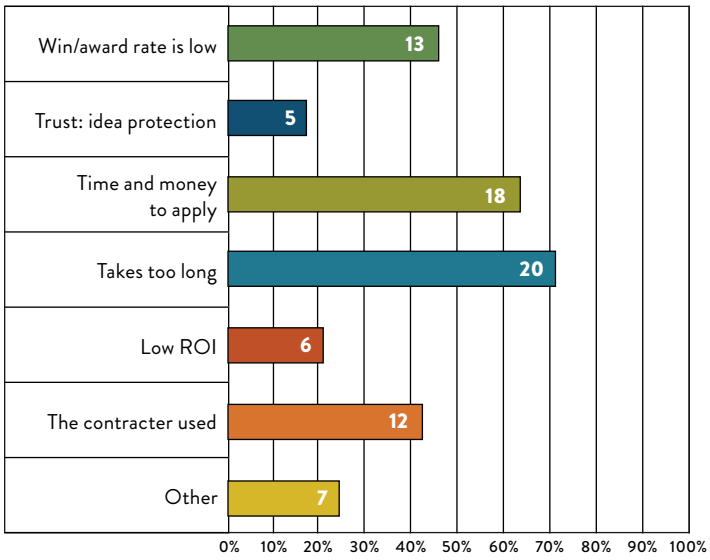
Does your organization have a current understanding of how to find, pursue, and win innovation funding opportunities within the DoD.



Organizations in North Carolina noted the biggest impediments to business growth:



Organizations in North Carolina believe these are the biggest impediments to doing business with the Federal Government:



Based on the first survey's results, the subcommittee developed a second survey to explore the first survey's findings in more detail with a subset of the first survey group. The follow-up survey targeted 15 organizations based on their initial responses to the first survey and included the five questions below to delve more deeply into what organizations are currently doing and or seeking to advance their DoD funding opportunities, as well as to discover impediments as to why North Carolina is not leveraging more DoD funding prospects.

The following 15 firms were selected for the second survey, and 14 responded.

TABLE 3. Respondents: Infrastructure and Resources Survey 2

Defense Alliance of North Carolina (DANC)	Duke University - Clinical and Translational Science Institute
Duke University - Office of Government Relations	East Carolina University (ECU)
Eva Garland Consulting	First Flight Venture Center (FFVC)
North Carolina A&T State University - Commercialization Office	North Carolina Defense Technology Transition Office (DEFTECH)
North Carolina Military Business Center	RIoT (Regional Internet of Things)
SCORE	UNC-Charlotte – VC of Research & Econ Dev.
UNC-Chapel Hill - VC of Research	UNC System - Defense and Military Partnerships
VPD Government Solutions	

The second survey included the following five questions:

Questions (with summary thematic responses below)

1. **Describe the limitations/impediments that you and your constituents face when considering DoD funding opportunities (including, but not limited to, capital, time, workforce and knowledge of the process).**
   - **Capital** — The cost of doing business or investing in Phase I and Phase II proposal preparation
   - **Knowledge** — In particular of DoD, including the funding opportunities, how to work through the DoD system, how to write proposals specific to DoD, and how to connect with DoD program/decision makers; awards are sometimes denied based on application errors rather than technical merit
   - **Workforce** — Finding the right people at the right time, and business development teams with the required expertise
   - **Time** — In particular to create a proposal, submit a proposal, and wait for the final award to begin work
2. **To help get over these existing limitations, what are some additional resources you need to increase the effectiveness of companies/faculty in pursuing Department of Defense funding opportunities?**
   - Infrastructure that connects proposers and DoD to find alignment between research being conducted that could fulfill DoD missions
   - Education/seminars specific to DoD grant writing processes
   - Library of successful proposals
   - Awareness of federal marketplace—integrate a predictive focus
   - Distribute funding opportunities more widely
3. **How would you like to better engage with, learn about, or participate with DoD funding opportunities?**
   - Invite variety of program managers to help educate potential proposers
   - Increase effectiveness and efficiency of faculty-industry-military partnerships
   - Learn about funding opportunities via information distribution
   - Increase inter-university communication connectivity
4. **What do you think the State of North Carolina could do to increase the number of innovators pursuing and winning DoD funding opportunities?**
   - Increase connectivity of DoD program staff with North Carolina innovators and legislators through research expositions or database of DoD-related research capabilities in the state
   - Increase information distribution on funding opportunities and communication on successful wins by North Carolina companies
   - Build informal networks of like-minded innovators, including entrepreneurially minded veterans
   - Connect innovators with funding resources and technical resources
   - Incentivize DoD-related research, specifically academic-industry partnerships
   - Direct funding, for example, matching grants, reimbursements for grant writing assistance, microgrants, increased funding to FFVC and SBTDC
5. **What other organizations, if any, do you work with and find valuable in helping you pursue DoD R&D funding opportunities?**

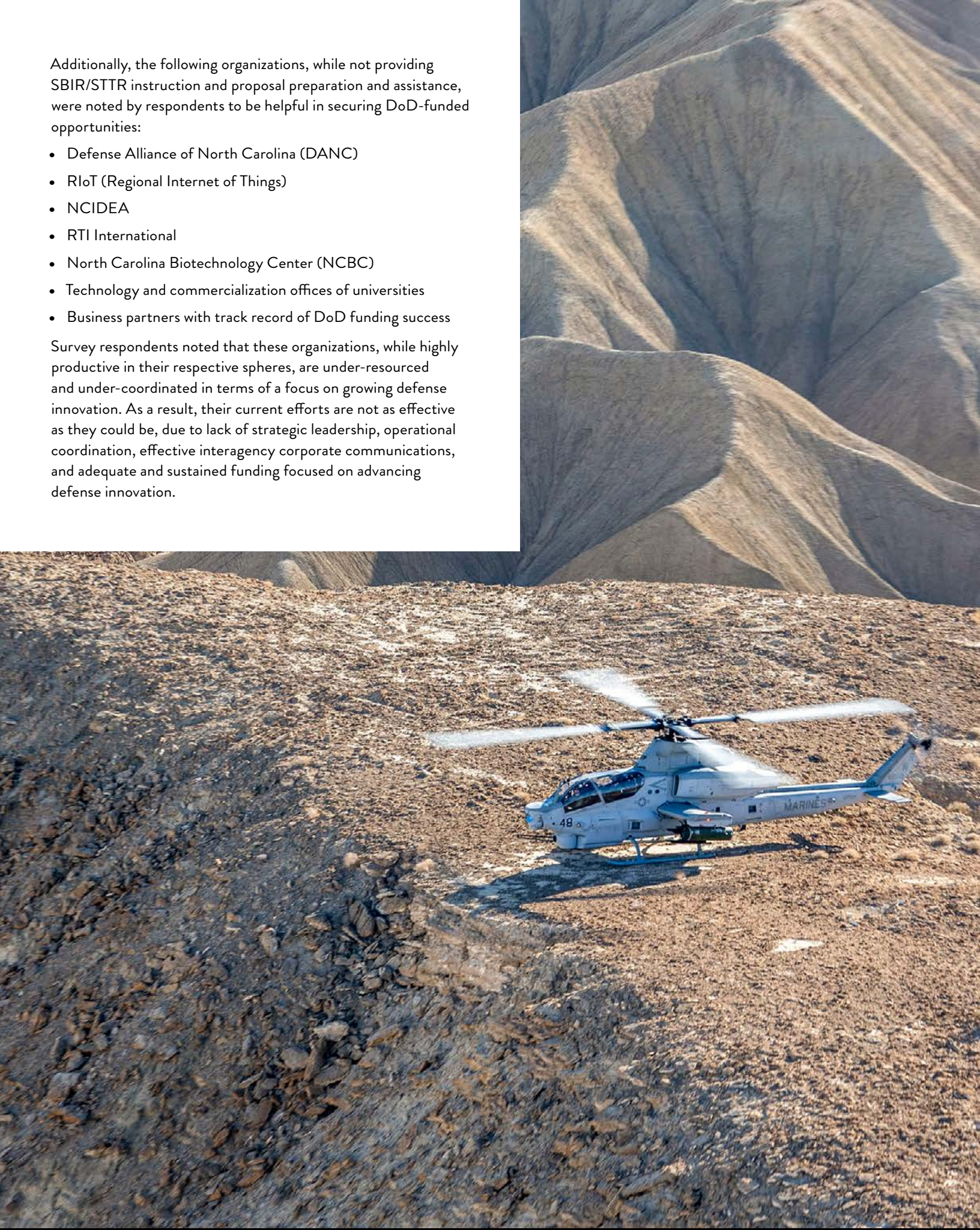
After a complete review of survey responses, and based on the working knowledge of subcommittee members, the subcommittee determined that the following five organizations provide the largest amount of targeted SBIR/STTR assistance to a wide variety of organizations, to include training, mentoring, and assistance with proposal preparation and submission to DoD:

- North Carolina Small Business Technical Development Center (SBTDC)
- North Carolina Military Business Center (NCMBC)
- North Carolina Defense Technology Transition Office (DEFTECH)
- First Flight Venture Center (FFVC)
- VPD Government Solutions

Additionally, the following organizations, while not providing SBIR/STTR instruction and proposal preparation and assistance, were noted by respondents to be helpful in securing DoD-funded opportunities:

- Defense Alliance of North Carolina (DANC)
- RIoT (Regional Internet of Things)
- NCIDEA
- RTI International
- North Carolina Biotechnology Center (NCBC)
- Technology and commercialization offices of universities
- Business partners with track record of DoD funding success

Survey respondents noted that these organizations, while highly productive in their respective spheres, are under-resourced and under-coordinated in terms of a focus on growing defense innovation. As a result, their current efforts are not as effective as they could be, due to lack of strategic leadership, operational coordination, effective interagency corporate communications, and adequate and sustained funding focused on advancing defense innovation.



THE UNIQUE CHALLENGES OF DOD

A clear overarching message that emerged during the BSTI's research leading up the Task Force, as well as in the discussions and research of the Task Force, is that among the various federal agencies awarding SBIR/STTR funding, DoD presents several challenges that must be understood and addressed in order for small businesses in North Carolina to maximize their potential to secure DoD SBIR/STTR funding. The four most notable and distinctive challenges include the following:

- **Relationships with DoD Program Managers Are More Important:** Whereas other federal agencies like HHS/NIH and NSF select projects for funding using more structured peer-review processes with panels of experts that generally consist of a mix of government scientists, industry experts, and research scientists, DoD sometimes uses a much more informal peer-review process, with the final decision sometimes up to a single program manager. Survey respondents, Task Force members, and experts interviewed by the BSTI preceding the Task Force's formation repeatedly emphasized that most North Carolina small businesses lack an understanding of the "blocking and tackling" (independent of the quality of the proposal) required to submit a successful SBIR/STTR proposal to DoD. In the words of one respondent, "most don't get it." DoD wants to work with known, proven companies and is "absolutely okay with continuing to fund relatively mature companies over and over and over again."[24] The following quotes from interviewees expressed similar sentiments that relationships matter a lot with DoD:

  "[DoD is] much more inclined to fund companies it has funded previously."

  "[It is] critical for companies to communicate with the technical point of contact within the agency who wrote the solicitation."

  "[It is] hard to have one-offs with DoD."

- **Unlike Many Agencies, DoD awards SBIR/STTR funding via Contracts, not Grants:** Grants are relatively flexible, allowing considerable latitude to project investigators to advance a national objective, address a public problem, serve a public purpose, or stimulate an activity that is of interest to the awarding agency. In contrast, contract awards are a binding agreement whereby a performer (business or university) provides the government a deliverable, a well-defined good or service that will be of direct benefit to the government. With grants, the principal investigator has more freedom to adapt the project and the outcome, as there is no legally binding requirement to achieve specified results. The payment method is also more flexible, often using a "drawdown" system. By contrast, a contract is a binding agreement between a buyer and seller to provide specific goods or services in return for compensation. The scope of the work is relatively inflexible. There are frequent reporting requirements and payments are based on deliverables and milestones.[25] Overall, these differences between grants and contracts are notable because North Carolina's R&D strengths are primarily in academic R&D (ranking 5th nationally in academic R&D expenditures as a share of state GDP in 2019), with North Carolina universities performing more than five times as much federally funded R&D as the state's industry sector does. Because grants are the primary funding mechanism the federal government uses to fund academic R&D, most of the state's researchers performing federally-funded R&D are far less accustomed to contracts as a funding mechanism.

[24] The quotes included in this section, while representative of the sentiments of those interviewed, may not reflect the actual practices of DoD. They are included to illustrate the perceptions (correct or not) that many businesses have of DoD.

[25] https://www.sbir.gov/tutorials/program-basics/tutorial-6#.

- **DoD is Large and Complex, and Most North Carolina Small Businesses and Support Organizations Don't Understand it:** DoD SBIR/STTR programs are spread across the three services and seven agencies involving widely different missions, ranging from missile defense to Navy submarines to Army support for special forces to the special needs of the Defense Advanced Research Projects Agency (DARPA). As a result, DoD takes a very decentralized approach to its SBIR/STTR programs. Similarly, to the extent North Carolina universities, consultants, grant writers, etc., are organized to influence the SBIR/STTR proposal process, they have focused more on, and are optimized for, what they know best—i.e., the more academically focused agencies, such as HHS and NSF. The following quotes from interviewees expressed similar sentiments:

  "DoD is large, complex, and can be frightening to small companies; for many, DoD is a 'black box.'"

  "[The] differentiation within DoD is vast and frightening for some; each agency has its own SBIR and is unique."

  "NIH/NSF funds what you want to study; DoD funds what they want you to study."

  "SBIR proposals that work in HHS won't necessarily work for DoD."

- **Historically, North Carolina's success in SBIR/STTR awards is with HHS, not DoD** (as shown in Figures 3, 4 and 5, above), which interviewees expressed several times:

  "[North Carolina's distribution of funding across agencies] is very related to North Carolina's university R&D and industry strengths (e.g., life sciences, IT); people tend to stick with the agencies they know; DoD isn't a well-known funding agency for North Carolina small businesses."

  "Many SBIR support efforts in North Carolina (by universities or consultants) have focused on the low-hanging fruit (e.g., biotech); we haven't really tried to tackle the higher-hanging fruit."

  "Money from some agencies [like DoD] is likely being 'left on the table' or 'unclaimed' by North Carolina companies."

BEST PRACTICES & MODELS FROM INSIDE AND OUTSIDE NORTH CAROLINA

The Best Practices subcommittee of the North Carolina Defense Innovation Task Force was charged with identifying other state programs and practices that could be used by North Carolina to bridge the NIH/DoD funding gap discussed above. There is no need to reinvent the wheel. Other states have developed programs to assist small companies pursue SBIR/STTR funding, which provides the Task Force a set of field-tested data points and lessons learned that can be tailored into a set of recommendations for North Carolina.

The subcommittee identified and interviewed thought leaders at the U.S. Small Business Administration (SBA) and key SBIR/STTR support personnel in competitive states such as Texas, Florida, and Massachusetts, as well as a new SBIR program in Oklahoma that is based on a highly successful program by a company in Virginia.[26]

Interview Questions

Using a semi-structured interview process, subcommittee members engaged each of the support personnel above and discussed the following five questions:

1. Is there a focal point in the state that leads to improving DoD SBIR/STTR performance?
2. What programs are in place, and what types of support are offered (e.g., conferences, mentorship, focus on winning Phase Is, matching funds, etc.)?
3. How involved are military commands and Original Equipment Manufacturers (OEMs) in the state?
4. How they know they are succeeding—i.e., what metrics do they use to measure performance and impact?
5. What lessons have they learned?

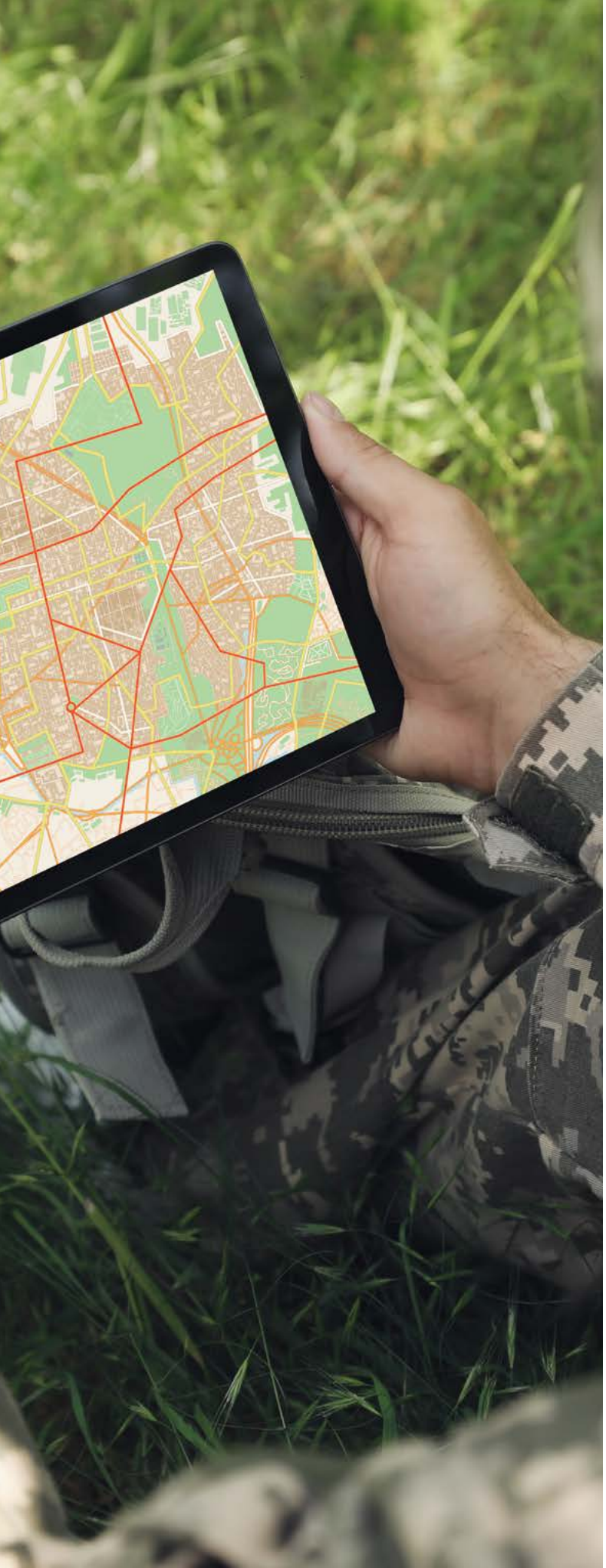
Guiding Principles for Success

Based on the interviews above, as well as on their own experiences in North Carolina companies with a high degrees of success in winning DoD SBIR/STTR funding,[27] the members of the Best Practices & Models subcommittee outlined the following five guiding principles that should underlie the Task Force's recommendations to maximize success:

1. **Focus, Integration and Alignment are Key:** Program success largely rests on leveraging the clustered expertise and technology areas in which a state excels, integrating efforts, and aligning and coordinating resources/organizations to fill gaps and address weaknesses. Interviewees expressed that it is important to survey and map a state's assets to produce a complete picture of the existing research capacity/capabilities and the infrastructure that supports small business innovation. The process should reveal technology and expertise clusters that could be leveraged to brand the state's unique value to the military. Ideally, these technologies would be relevant to different industries and agencies, for example a biometric sensor that can be used both in civilian hospitals and on the military battlefield. Interviewees noted that geographic clusters have been instrumental in improving DoD SBIR/STTR win rates, as businesses located next to military commands can better support their customer (e.g., medical device company next to a military medical center). This type of cluster appears to be defined by a specific technology area because of the targeted mission and needs of military commands. Conversely, in regions that attract defense funding due to the large number of university spinouts, research & development focus areas are more numerous and diverse.
2. **Enhance Active, Expert Technical Support:** Successful third-party initiatives to support pursuing SBIR/STTR contracts should not be passive in nature (e.g., format templates, tutorials, brochures, etc.). Rather, successful models require an active partnership/instruction/mentorship approach. Mentorship from personnel with a track record of SBIR/STTR success is an invaluable, while simple, low-cost approach. Furthermore, the experts should be successful in winning DoD SBIR grants to offer lessons learned and to act as a conduit for communication between the innovator and the funder. They should be capable of finding overlap in a researcher's expertise or technology's capability and how that fulfills a defense need. The experience is important because of the differences between DoD and other agencies. At least one state noted that hiring several full-time, experienced, dedicated staff that can form on-going 1-on-1 relationships was noted to increase the DoD SBIR/STTR award win rate significantly.

[26] The selected states and individuals were recommended as good models and points of contact by Brittany Sickler, Senior Advisor for the SBIR/STTR Program at the U.S. Small Business Administration. These include: Bijo Matthew, the Regional Director of the Small Business Development Center (SBDC) of South-West Texas and University of Texas at San Antonio; Dan Lilly, Small Business Innovation Research (SBIR) Advisor, University of Massachusetts Small Business Development Center; Michael Tentkowski, Director of the Office of Commercialization at Florida State University and former Director of the Florida Innovation Park; Tom O'Neal, Vice President of Research & Commercialization at the University of Central Florida; Tom Wavering, Director of the Oklahoma Catalyst Program who led SBIR efforts at Luna Innovations in Virginia (awarded 676 total SBIRs).

[27] As shown in Figure 10, members of the Best Practices & Models subcommittee represent three of the top-10 DoD SBIR/STTR award-winning small businesses in North Carolina: Corvid (1st), Vadum (2nd), and Kyma (7th), accounting for more than 25% of the awards.

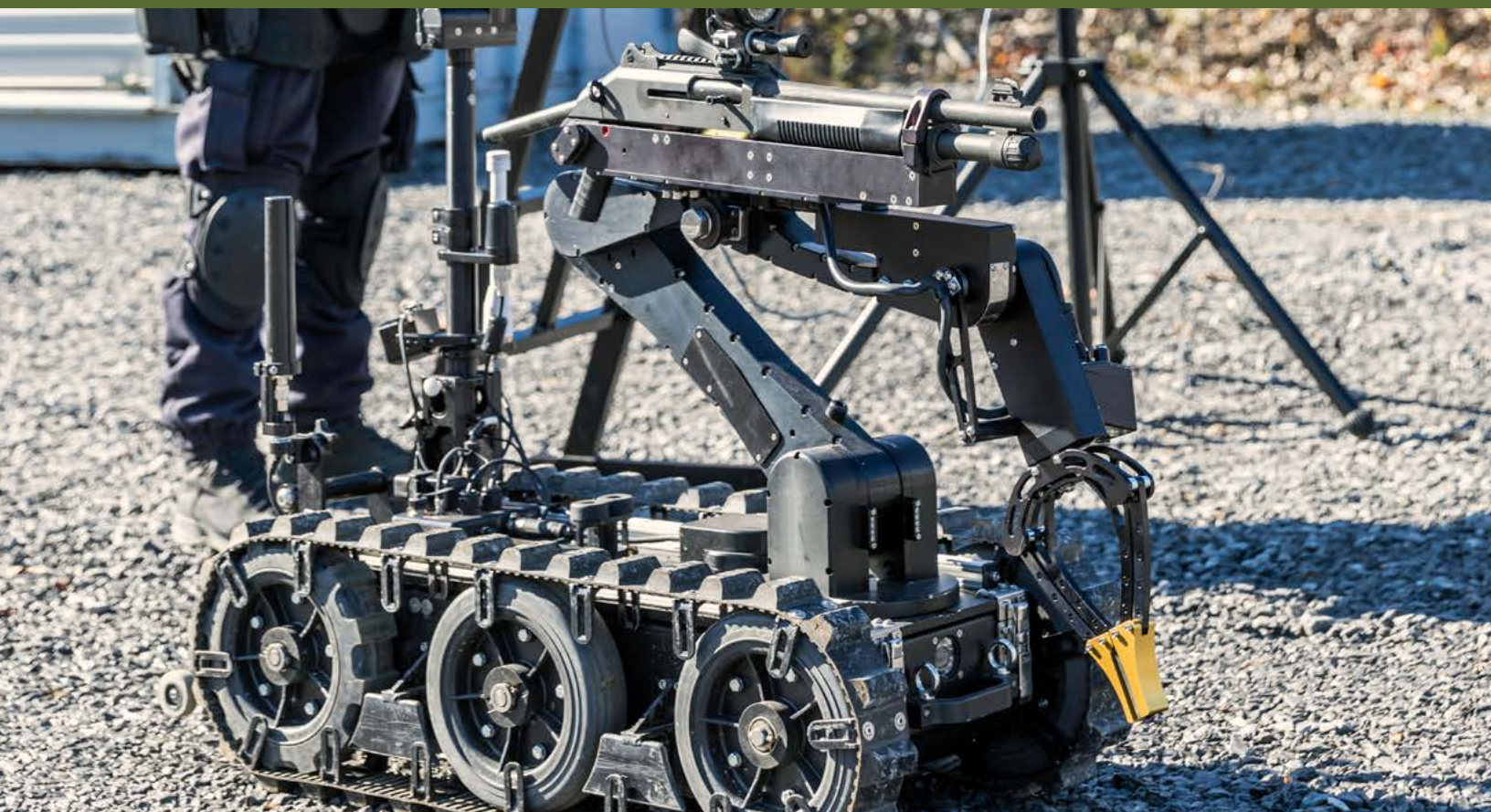


3. **Ensure a Clear Pathway to Success:** While support for companies pursuing SBIR/STTR Phase I awards is important, resources should focus as much or more on attaining Phase II awards, and, when applicable, Phase III (commercialization). Phase I applications should demonstrate achievable deliverables, due to the relatively short performance period. Courses and training should focus on preparing businesses to maintain momentum in progressing to next phase, whether it is Phase II, Phase III, or engaging with venture capital personnel or other investors. Small business support organizations should maintain contact with companies throughout this time. Matching grants are useful in bridging the "valley of death" between Phase I and Phase II. These grants can also be used to incentivize different outcomes, for example increasing the number of DoD SBIR/STTR applications, promoting a particular research area, or increasing university partnerships.

4. **Leverage Commercial Partnerships to Support Commercialization:** Often, involvement from large defense companies (Northrop, Raytheon, Lockheed, etc.) helps reduce risks when transitioning to SBIR/STTR Phase II and provides a clearer path to open commercialization. Establishing partnerships between small businesses and large defense contractors increases the success rate of the small business and reduces risk for the larger organization. Through letters of support or other partnership mechanisms with larger companies, the small business demonstrates a potential pathway to commercialization, which is especially important to DoD reviewers. And it is more economical for large companies to conduct R&D by acquiring successful companies instead of spending their own capital. One respondent noted that they observed these partnerships to occur through word of mouth within small ecosystems composed of venture capitalists and startup companies. Knowing the correct people to talk to and connect with is critical.

5. **Leverage Military Commands Focused on Technology Procurement:** Having a defined and specified customer increases likelihood of SBIR/STTR awards, and relationships need to be established before SBIR/STTR proposals are submitted. Industry partnerships can be facilitated by introducing small businesses to local or regional military commands that have established relationships with large defense contractors. Hosting conferences or expositions to showcase technologies and on-going R&D efforts of small firms is one way to make these introductions. Another shared best practice was having Small Business Development Center (SBDC) staff serve as points of contact for military science advisors to keep advisors updated on the latest technologies being developed. This helps science advisors find needed solutions faster and gives the small business exposure. Besides military research commands, creating working relationships with operational research commands, non-DoD federal labs, and specific government research personnel may improve chances to win SBIR/STTR grants or lead to future opportunities that may.

FINDINGS AND RECOMMENDATIONS



FINDINGS

Based on the investigative process outlined above, the Task Force established the following findings:

- North Carolina has clear potential to significantly increase DoD funding for defense innovation in the state through increased SBIR/STTR awards to business- and academia-based innovators.
- North Carolina also has clear potential to significantly increase DoD funding for defense innovation in the state through other funding mechanisms, including Other Transaction Authority, direct technology acquisition by DoD and military service rapid capability fielding offices, and other sources.
- Expanding defense innovation in North Carolina would contribute directly to growing the Defense sector—already the second largest sector of North Carolina's economy—to create jobs, raise the tax base, and improve quality of life in our state.
- North Carolina has numerous highly productive, if under-resourced and under-coordinated, State, private sector, and academia-based innovation resources focused on growing defense innovation—as it does on growing the larger defense economy. Although these resources are highly capable and significantly engaged, their current efforts are not as effective as they could be, due to lack of strategic leadership, operational coordination, effective interagency corporate communications and adequate and sustained funding.
- North Carolina has other competitive advantages, including the One North Carolina Small Business Phase I Incentive Grant Program and Matching Grant Program (which is not currently targeted at DoD innovation opportunities), significant capacity in digital engineering and other enabling technologies, and an innovation ecosystem successfully engaged in non-defense-related SBIR/STTRs.
- Failure to take definitive and decisive action to grow defense innovation would result in unrealized potential to expand the innovation ecosystem of our state, which is fundamental to growing the economy, attracting new industry, expanding jobs, raising the tax base, and improving quality of life.
- Growing defense innovation in North Carolina—clearly possible, practical, and impactful with relatively little State investment of leadership and capital—will not happen on its own. High level State ownership and a strategic, resourced, sustained, and effectively coordinated effort led by a champion at the highest level of State government are absent, and are potentially essential to fully leverage the opportunity to grow defense innovation, expand the defense economy, and improve quality of life for all in North Carolina.

STRATEGIC RECOMMENDATIONS

The Task Force recommends that the BSTI adopt the following recommendations and oversee their implementation:

- The BSTI leadership should work with the Governor and leadership of the General Assembly to designate a member of the Council of State as ***State Champion***, to lead expansion of defense innovation in North Carolina. Although beyond the scope of this study, this State Champion could also lead the broader State effort to grow the defense economy, of which defense innovation is a significant component.
- The BSTI leadership should advocate to the Governor, the leadership of the General Assembly, and the State Champion to establish an ***infrastructure*** to conduct fully coordinated strategic and tactical activities to grow defense innovation. This infrastructure would include a lead entity and existing entities—organic to other State agencies and private organizations—coordinated and empowered by the State Champion. A prototype for such an infrastructure is included in Appendix B to this report.
- The BSTI leadership should advocate to the Governor and the General Assembly to appropriately resource a ***multi-year initiative***—including adequate and recurring funding for the State Champion, the lead entity and the State elements of this operational infrastructure. This initiative should include sufficient recurring funding to sustain the current operations of elements of this infrastructure, to expand and target current initiatives and programs like the One NC Small Business Program on DoD opportunities, and to resource creative market engagement, training, mentorship, business development and other activities considered essential by this infrastructure to expanding defense innovation and the defense economy in North Carolina.
- BSTI leadership should ensure that the State Champion or lead entity develops, catalogues, and publishes ***metrics*** to assess the activities, outputs, and outcomes associated with expanding defense innovation in North Carolina—with the goal of reinforcing success with additional resources as this sector grows, expands businesses and the economy, and raises the tax base of the state.

TACTICAL RECOMMENDATIONS

The Task Force recommends that the lead entity, once designated, establish and operationalize an appropriate infrastructure to achieve expansion of defense innovation in North Carolina, as fully outlined in Appendix B. Key elements of the recommended infrastructure include:

- **North Carolina Defense Strategic Review Committee (SRC):** A strategic partnership to develop and oversee a coordinated, ongoing set of research, planning, and outreach and relationship-building activities at the operational level to marshal North Carolina's academic, industry, and military assets to make the state known as a go-to source of defense R&D, innovation, and commercialization efforts.
- **North Carolina Defense Innovation Accelerator (DIA):** A virtual, interagency Defense Innovation Accelerator (DIA) to support and execute the tactical activities recommended by the SRC. It would address all phases, from topic selection, proposal writing, teaming, Phase I, Phase II, and mentoring for Phase III, and Incentive and Matching funding via the One North Carolina Small Business Program administered by the BSTI.
- **North Carolina Defense Technology Advocacy Campaign (TAC):** A well-designed ongoing, multilevel campaign to market North Carolina as a leader in defense and national security innovation, building directly on the strategic work of the SRC and the tactical work of the DIA.

APPENDIX A: OVERVIEW OF THE SBIR AND STTR PROGRAMS[28]

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are highly competitive programs that encourage domestic small businesses to engage in Federal Research/Research & Development (R/R&D) with the potential for commercialization. Through a competitive awards-based program, SBIR and STTR enable small businesses to explore their technological potential and provide the incentive to profit from its commercialization. Also known as *America's Seed Fund*, the programs are one of the largest sources of early-stage capital for technology commercialization in the United States.

Established in 1982 in response to concerns regarding America's economic competitiveness, the SBIR program was authorized through the Small Business Innovation Development Act. The Act required federal agencies with research budgets over $100 million to reserve a portion of their annual budgets for innovative activities—specifically, through SBIR awards. Then, in 1992 after recognizing the need to expand public/private sector partnerships between small businesses and nonprofit U.S. research institutions, the STTR program was established. The STTR program requires the small business to formally collaborate with a nonprofit research institution in innovative R&D.[29] Government agencies with R&D budgets of $1 billion or more are required to set aside a portion of these funds to finance the STTR activity.

Both the SBIR and STTR programs award monetary grants in different phases, namely:

- **Phase I**, the startup phase, makes awards of totaling between $50,000-$250,000 and ranging from six months (SBIR) to one year (STTR) for exploration of the technical merit or feasibility of an idea or technology.
- **Phase II** awards grants of up to $1 million, for as many as two years to facilitate expansion of Phase I results and drive new technologies towards commercialization. Typically, only Phase I awardees are eligible for a Phase II award.
- **Phase III.** The SBIR/STTR programs do not fund Phase III. At some Federal agencies, Phase III may involve follow-on non-SBIR/STTR funded R&D or production contracts for products, processes or services intended for use by the U.S. Government.

Eleven federal agencies award SBIR grants and five federal agencies award STTR grants. Over $3.7 billion in SBIR and STTR grants were awarded in FY2019 (with SBIR grants totaling $3.28 billion and STTR grants totaling $453 million):

SBIR & STTR Awarding Agencies & FY2019 Awards

Department of Defense	$1.80 B
Department of Energy	$308 M
Department of Health and Human Services	$1.15 B
National Aeronautics & Space Administration	$183 M
National Science Foundation	$212 M

SBIR Awarding Agencies & FY2019 Awards

Department of Agriculture	$30 M
Department of Commerce	$13.4 M
Department of Education	$8.4 M
Department of Homeland Security	$17 M
Department of Transportation	$5.2 M
Environmental Protection Agency	$3.6 M

As of the date of this report, more than 187,000 SBIR/STTR awards have been made during the programs' lifetime, totaling more than $59 billion.

[28] Source: SBIR.gov.

[29] While the SBIR program does not require collaboration with a nonprofit research organization, for an STTR award, the small business must perform at least 40% of the work and the partnering research institution must perform at least 30% of the work. Research institutions eligible to participate in the STTR program include nonprofit colleges or universities, domestic nonprofit scientific/research organizations, and federally funded R&D centers.

APPENDIX B: RECOMMENDED INFRASTRUCTURE FOR GROWING DEFENSE INNOVATION

MOBILIZING FOR SUCCESS: DESIGN, CONTEXT, AND RECOMMENDATIONS

As outlined above, the Task Force's second charge was to recommend execution-ready, high-impact activities that the BSTI may undertake in a primary role and potentially with partner organizations, ideally with measurable goals and effects achievable in not more than a two-year time frame.

Design

The Task Force specified that its recommendations conform to the following four design criteria:

- Build upon the state's existing strengths in the public sector, private sector, and university-based R&D and innovation capacity
- Clearly and directly target one or more of the identified sectors, opportunities, challenges and/or gaps
- Minimize the creation of new organizations and structures, public or private
- Efficiently and effectively use public and private funds to generate impact

CONTEXT

The Task Force specified that, in order to effectively grow defense innovation in North Carolina, future tactical activities should focus on targeting DoD innovation opportunities at the congruence of the predominant technical specializations and capacity of public and private innovators in the state, in addition to the:

- Modernization priorities of DoD, as identified by the Under Secretary of Defense for Research and Engineering (https://www.cto.mil/modernization-priorities);
- Modernization priorities of the military services, as established by the Secretaries of those Departments and their respective force modernization commands;
- Sectors recommended in the North Carolina Defense Innovation Opportunity and Capacity Inventory, to be conducted by a service provider contracted by the lead entity or its agent (see below);
- Sectors identified in the *North Carolina Defense Asset Inventory and Target Industry Cluster Analysis* (February 2020), funded by the NC Military Affairs Commission and executed for DANC by RTI International. While focused on future DoD acquisition sectors (versus innovation) with corresponding capacity in North Carolina, this Analysis provides context for targeting defense innovation opportunities. The Analysis concluded that "Concentrating growth activities on six technology areas important to the DoD will help North Carolina focus and leverage resources for an intentional, strategic approach with a better likelihood for success," and recommended focus on acquisition opportunities in the following six sectors:[30]
    - **Advanced Manufacturing** – Overall, North Carolina is the second fastest growing state in the United States in the industry sectors that make up Advanced Manufacturing; over five years the state saw 30% growth in jobs compared to 4% nationally. There is a large in-state supply chain and pipeline of graduates.
    - **Autonomous Systems** – North Carolina has a select set of companies that can support autonomous systems, which tend to be located in Charlotte and other major urban centers. However, supporting firms are located throughout the state. Shipbuilding in the eastern part of the state and component manufacturers across the state represent important supporting industries with the potential to support an autonomous systems cluster in North Carolina.
    - **Data and Knowledge Management** – This is the largest and fastest growing sector among the target cluster areas in the state, and North Carolina is the fastest growing state in the country in jobs in this area. This sector has the largest in-state supply chain and the largest percentage of purchases in-state in this area.

[30] Going forward, these six areas may change, and additional areas may be added.

- **Human Performance** – Based on industry classifications, North Carolina is the fastest growing state in the United States in human performance. A robust human capital pipeline of research-focused advanced degrees in biosciences is one of the state's strengths. Assets in human performance are distributed across the state, ranging from Charlotte, to the Piedmont Triad, to the Research Triangle, to Greenville.[31]
- **Materials** – North Carolina's assets in textile R&D and manufacturing lay the groundwork for future high-tech performance materials and engineered functional fabrics industry, facilitated by the Nonwovens Institute and connected to NC State University's Advanced Functional Fabrics of America manufacturing innovation center. The Research Triangle Nanotechnology Network is 1 of 16 sites created in 2015 by the NSF and includes nanofabrication and characterization capabilities.
- **Power** – North Carolina is a national leader in job growth in power, ranking 2nd in growth from 2013 to 2018. There is a large in-state supply chain and human capital pipeline. The presence of a major utility headquarters (Duke Energy in Charlotte) is an important asset for growth in the power sector, and the state is a leader in growth technologies, including power electronics, clean tech and the Internet of Things (IoT).

- Cultivating these technology areas and others will leverage and strengthen North Carolina's existing defense innovation base. To further strengthen North Carolina's competitive advantage, the lead entity should consider encouraging and supporting digital engineering approaches to provide an integrated method across disciplines to support lifecycle activities from concept through disposal.[32] As noted in DoD's *Digital Engineering Strategy Guide*, the DoD vision for digital engineering is to modernize how the Department designs, develops, delivers, operates, and sustains systems. By further embracing and advancing development of the state's already-significant digital engineering capacity, North Carolina would be optimally positioned to meet the rapidly evolving needs of DoD across multiple technology sectors.

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[31] Notably, in July 2021 a newly launched consortium led by RTI International and comprised of more than 25 North Carolina-based academic, industry, nonprofit and state government organizations, formed the North Carolina Center for Optimizing Military Performance (NC-COMP). The Center brings together expertise in research, medicine, health, fitness, engineering, materials, and manufacturing, to allow for accelerated creation and deployment of solutions that fill critical performance gaps and offer world-class human performance solutions to DoD. For more information, see https://www.rti.org/centers/optimizing-military-performance.

[32] DoD defines digital engineering as an integrated digital approach that uses authoritative sources of system data and models as a continuum across disciplines to support lifecycle activities from concept through disposal. This approach includes incorporating technologies such as advanced computing, big data analytics, artificial intelligence, autonomous systems, and robotics to improve the engineering practice. Transitioning to digital engineering will address long-standing challenges associated with complexity, uncertainty, and rapid change in deploying and using U.S. defense systems.

TACTICAL RECOMMENDATIONS

The State should designate, resource, and empower a lead entity, and should implement the three tactical recommendations outlined below.

Lead Entity

The lead entity would implement the tactical recommendations, including establishing the infrastructure outlined below. The Office of Science, Technology and Innovation and the Defense Technology Transition Office, components of the Department of Commerce and the NC Military Business Center, respectively, could serve as the lead entity; however, the State should establish and empower the lead entity as it determines appropriate. Once established, the lead entity would guide this infrastructure, its "element lead(s)," and its constituent and partner organizations to achieve the strategic goal of expanding defense innovation in North Carolina, with oversight from the BSTI.

Specifically, the lead entity would ensure that the infrastructure vigorously recruits and engages private, public and academic sector innovation capacity into the defense market, and identifies, connects and helps this capacity to pursue the most appropriate, competitive, winnable and lucrative defense-related innovations opportunities. These operations would lead to a significant growth in defense innovation activity and new SBIR/STTR and other federal R&D funding in North Carolina. With strong endorsement and support by the General Assembly and Governor, the lead entity should coordinate a multi-year initiative.

Tactical Recommendations

The three tactical recommendations below build on the strategic context and are consistent with the four design criteria outlined above.

1. STRATEGIC ELEMENT: *STRATEGIC REVIEW COMMITTEE (SRC)*

RECOMMENDED ACTION: The lead entity should establish a Strategic Review Committee (SRC) to establish—and continuously orient the Defense Innovation Accelerator (DIA, see below) on—strategic objectives. The SRC will develop and oversee a coordinated, ongoing set of research, planning, and outreach and relationship-building activities at the strategic level to orient North Carolina's academic and industry-based R&D capacity on the most lucrative defense sectors, and to make the state known as a go-to source for defense R&D, innovation, and commercialization efforts.

CHALLENGE/GAP ADDRESSED: Despite being a leader in science, technology & innovation and having the 4th largest military footprint in the country, North Carolina is not a leader in defense innovation. This gap between assets and outcomes results primarily from a lack of strategy, focus, and sustained effort. An intentional, strategic partnership approach will catalyze, inform, organize, and drive activities concentrated on key tip-of-the spear technologies important to the DoD for which North Carolina is well positioned, such as the six technology areas identified by DANC, among others.

Too often, the development of technology is profiled as a vertical market application within a single industry without seeking broad application of the science. A convergence of multiple technologies will advance the development of the systems of the future (e.g., autonomous systems, advanced manufacturing facilities) that share downstream supplier requirements. Technology applied in this manner creates technical and economic multiplier effects that can be lost when narrowly considering individual technologies in isolation. By considering the opportunities to create multiple solutions based on one technology for adjacent or even broader horizontal markets activity in conjunction with other emerging technologies, North Carolina can gain greater market share within the DoD funding space.

IMPLEMENTATION DETAILS:

- **Basics:** Composition of the SRC would consist, at a minimum, of representatives from government (state and federal, civilian and military), industry (large and small), academia, and support organizations (public and private). The SRC members would meet at least quarterly.
- **Organization(s):** Engage contracted service provider(s) as needed to develop strategic work plans/products. Chaired by a representative of the constituent organizations elected by all the representatives. Staff support could be provided by DEFTECH. Contract service provider(s) would develop strategic work plans/products.
- **Timeframe:** Beginning in Q2 2022 and then ongoing.

RECOMMENDED FUNDING:

- **Amount:** $200,000 in year one, $100,000 annually thereafter, for staff and operational expenses, including contract service provider(s).
- **Source:** State appropriations and/or external grants from foundations, private sources, or the federal government.

EXPECTED OUTCOMES:

- Develop a *strategic target list* of DoD innovation and modernization priorities and sectors for exploitation by the DIA. The SRC would produce this target list with the assistance of DEFTECH staff, the DIA, and a contracted service provider, who will produce a North Carolina Defense Innovation Opportunity and Capacity Inventory based on that provider's analysis of DoD opportunities and North Carolina innovation capacity using the sources identified in the Strategic Context above.
- Develop and publish a comprehensive North Carolina defense *technology forecast* to evaluate end-use and supply chain overlap in the target technology sectors, from sources including, but not limited to, the North Carolina Defense Asset Inventory and Target Industry Cluster Analysis.
- Ensure that the *target list* and *technology forecast* focus on sectors/opportunities that offer long-term portfolio growth both in DoD and commercial markets, versus individual investments.
- Recommend tactical activities and provide ongoing oversight and guidance to the lead entity and the DIA regarding operations to leverage targeted defense innovation sectors and opportunities.
- Ensure and expedite development of robust technology clusters, seeded by leveraging DoD innovation and R&D opportunities.
- Ensure more accurate accounting of the attributes of a host of emerging technologies to determine their true costs, benefits, and opportunities as a portfolio, rather than as individual investments.
- Greater integration and alignment opportunities that result in understanding of the true potential of emerging technologies and markets.

2. OPERATIONAL ELEMENT: *NORTH CAROLINA DEFENSE INNOVATION ACCELERATOR (DIA)*

RECOMMENDED ACTION: The lead entity should establish, engage, and resource partner entities in a virtual, interagency Defense Innovation Accelerator (DIA) to support and execute the tactical activities recommended by the SRC. It would address all phases, from topic selection, proposal writing, teaming, Phase I, Phase II, and mentoring for Phase III, and Phase I Incentive and Matching funding via the One North Carolina Small Business Program administered by OSTI on behalf of the BSTI.[33]

CHALLENGE/GAP ADDRESSED: While North Carolina has several organizations and initiatives focused on SBIR/STTR education and training, or on DoD business opportunities, none have focused specifically on the intersection of DoD SBIRs/STTRs and other defense innovation funding opportunities in a well-resourced and sustained manner.

IMPLEMENTATION DETAILS:

- **Basics:** Drawing on existing entities (see "Composition," below) and operating in conjunction with DEFTECH (suggested "element lead") in-house resources, the DIA would:
    - Plan, coordinate and execute daily operations in support of SRC-established strategic objectives.
    - *Strategic target list* – support the SRC in developing a target list of DoD innovation and modernization priorities/sectors for exploitation.
    - *Capacity analysis* – identify, recruit, engage and document in a client management database the capabilities of existing and highly functioning academia- and industry-based R&D and innovation assets in North Carolina within targeted sectors.
    - *Demand analysis:*
        - Identify and establish relationships with targeted DoD agencies that issue SBIR/STTR, OTA and other innovation opportunities within targeted sectors.
        - Establish relationships with targeted OTA consortia, encourage engagement by businesses in these consortia, and elicit opportunities available only to consortia members.
    - *Opportunity distribution* – identify, document and electronically distribute specific innovation opportunities from targeted agencies to the innovation ecosystem.
    - *Training and mentoring* – provide experience-based training & mentoring on writing and executing DoD SBIR/STTR programs and other DoD technology funding mechanisms and to provide a persistent effort and resources. It would provide advice and mentoring to innovators regarding all phases, from aspects of pursuing DoD SBIR/STTR, OTA, and other innovation opportunities, from agency and topic selection, to teaming and proposal writing, to grant administration.
    - *Technical assistance* – provide one-on-one assistance to innovators in topic selection, teaming, proposal development for Phases I, Phase and II, and mentoring for Phase III, and Incentive grant administration.
    - *Resourcing* – pwrovide information, connections and matching funding via assistance in securing financing to support innovation activities from angel investors, venture capitalists, and public and private sources of capital, including the One North Carolina Small Business Program.

[33] The Incentive Program provides grants to North Carolina small businesses to reimburse them for expenses associated with applying for Phase I SBIR/STTR grants. In the 2021 legislative session, the North Carolina General Assembly enacted legislation to increase that reimbursement amount to $12,000 for businesses in Tier 1 and 2 counties and $6,000 for businesses in Tier 3 counties. This funding could be used to reimburse businesses for their expenses associated with education, training, and grant writing for Phase I applications to DoD. The legislation also allows up to 10% of the funding allocated to the Incentive Program to be used to support education and outreach efforts, which can include supporting the efforts of the DIA. The Matching Program provides grants to businesses to match funds they receive via a Phase I SBIR/STTR Phase I award and to encourage the businesses to apply for Phase II awards. In the 2021 legislative session, the North Carolina General Assembly enacted legislation to increase that amount to $200,000. This funding can be used to match Phase I SBIR/STTR grants from DoD.

- **Organization(s):** The DIA would engage and resource the following to execute its mission:
  - DEFTECH (suggested element lead):
    - Lead and coordinate DIA activities and fund supporting partners.
    - Promote engagement by innovators in the DoD innovation market.
    - Maintain a database of academia- and industry-based innovators in North Carolina who successfully engaged in the DoD innovation market – the innovation ecosystem.
    - Maintain a database of current DoD SBIR/STTR, OTA and other innovation opportunities.
    - Maintain a database of forecasted DoD SBIR/STTR, OTA and other innovation opportunities.
    - Announce DoD innovation opportunities to the innovation ecosystem.
    - Electronically match and notify, in real time, targeted SBIR/STTR, OTA and other opportunities to North Carolina innovators.
    - Connect matched innovators to training/mentoring, technical assistance, financing and other resource providers.
    - Maintain a library of previously distributed innovation opportunities, proposals and awards, to facilitate future awards and to document return on investment.
    - Perform other operations recommended by the SRC or needed to expand DoD innovation awards in North Carolina.
  - University of North Carolina (UNC) System:
    - Promote DoD innovation market.
    - Develop and provide to DEFTECH a catalog of university-based innovators and ongoing research, for inclusion in the client management database.
    - Assist DEFTECH in distributing innovation opportunities to university-based innovators.
    - Perform other operations in support of DEFTECH and the DIA.
  - SBTDC:
    - Provide intake training for innovators on DoD SBIR/STTR processes.
    - Develop and provide to DEFTECH a catalog of industry-based innovators prepared to engage in SBIR/STTR projects, for inclusion in the client management database.
    - Perform other operations in support of DEFTECH and the DIA.
  - First Flight Venture Center
    - Provide training, mentoring and technical assistance services to innovators pursuing DoD SBIR/STTR, OTA and other innovation opportunities.
    - Perform other operations in support of DEFTECH and the DIA.
  - Contracted service provider(s) – under contract from DEFTECH, providers may:
    - Develop input for the DEFTECH database of potential DoD innovators.
    - Develop input for the DEFTECH databases of current and forecasted DoD SBIR/STTR, OTA and other innovation opportunities.
    - Assist DEFTECH in establishing relationships with OTA consortia, DoD agencies that issue SBIR/STTR opportunities, etc.
    - Perform other operations in support of DEFTECH and the DIA.
  - Situational DIA constituent entities – will support and engage with DEFTECH and DIA as needed:
    - Business incubators and accelerators statewide.
    - Duke, Wake Forest, and other private universities, for academia-based innovation resources.
    - Community colleges, for workforce support.
    - NCMBC business development, technical advisor and other resources.
- **Timeframe:** Beginning in Q2 2022 and then ongoing.

RECOMMENDED FUNDING:

- **Amount:** $300,000 in year one, $400,000 annually thereafter, for staff and operational expenses, including contract service provider(s).
- **Source:** State appropriations and/or external grants from foundations, private sources, or the federal government.

EXPECTED OUTCOMES:

- As outlined above, development, implementation and/or maintenance of operations, databases, and related resources, to include but not limited to a client management database, an R&D opportunity matching and notification portal, education and training seminars, recorded sessions, library of successful proposals, mentors, service providers and consultants, workforce resources, prime contractors and commercial partners, DoD program managers, etc.
- 50%-100% increase in DoD SBIR/STTR Phase I applications after one year, increasing by significant percentages per year thereafter.
- 50%-75% increase in DoD SBIR/STTR Phase I awards after one year, increasing by significant percentages per year thereafter.
- 50%-100% increase in DoD SBIR/STTR Phase II applications after two-three years, increasing by significant percentages per year thereafter.
- 50%-75% increase in DoD SBIR/STTR Phase II awards after two-three years, increasing by significant percentages per year thereafter.

3. ADVOCACY ELEMENT: *NC DEFENSE TECHNOLOGY ADVOCACY CAMPAIGN (TAC)*

RECOMMENDATION ACTION: Under the direction of the lead entity and the DIA, and drawing on existing organizations in the state, develop and execute a well-designed ongoing campaign to market North Carolina as a leader in defense and national security innovation. The campaign should develop deeper relationships, communications, and support at multiple levels—including federal government (both legislative and executive branches, elected officials and staff), state government, industry, and military leaders; specify the benefits of doing so and how to develop them; and build directly on the strategic work of the SRC and complement the tactical work of the DIA.

CHALLENGE/GAP ADDRESSED: In the 2018 Army competition among states for the location of the new Army Futures Command (AFC) Headquarters, North Carolina ranked 2nd among the competitors. In the post-award debriefings that followed, the Army noted that while North Carolina has the capability to develop next-generation capabilities for the Army, a key reason it did not win the AFC competition is that it needed do a better job of telling its story (relative to DoD) and empowering others to tell that story. This point—the need for North Carolina to tell its story—was echoed multiple times during the interviews the BSTI conducted preceding the Task Force's formation and reinforced by Task Force members. Awareness and understanding are necessary for, and precedent to, support.

IMPLEMENTATION DETAILS:

- **Basics:** Once developed, information content for the campaign would be updated as needed and then campaign messengers (see Organization(s) below) would undertake activities such as mapping and engaging with North Carolina's federal delegation and state legislature members and staff on key oversight committees to support critical programs, participating in organized industry trade shows/conferences and governmental events, and engaging with federal agency staff regarding the interests and capabilities of North Carolina small businesses and academic institutions.
- **Organization(s):** DEFTECH, EDPNC (Business Development Manager, Defense Industry), and the North Carolina Department of Commerce (Office of Science, Technology & Innovation) provide staffing and develop information content for the campaign. DANC, the BSTI, the federal and State government relations offices from the UNC system, Duke University, and Wake Forest University, and others would be the messengers conducting outreach and advocacy to the target audiences.
- **Timeframe:** Beginning in Q2 2022 and then ongoing.

RECOMMENDED FUNDING:

- **Amount:** $100,000 annually, primarily for staff and operational expenses.
- **Source:** State appropriations and/or external grants from foundations or private sources.

EXPECTED OUTCOMES:

- Development of marketing campaign information and materials.
- Increased placement of North Carolina defense innovation marketing materials in selected media and online.
- Increased instances of outreach by campaign messengers.
- Increased perception of North Carolina as a leader in defense and national security innovation, as evidenced by increased defense innovation-focused opportunities for existing businesses (particularly SBIR/STTR awards and other DoD funding mechanisms) and the development and recruitment of additional defense innovation-focused businesses.

APPENDIX C: MEMBERS OF THE DEFENSE INNOVATION TASK FORCE

Name	Title	Organization
Fiona Baxter	Associate Executive Director	Industry Expansion Solutions, North Carolina State University
Luke Burnett	CEO	Keranetics, Inc.
Scott Dorney (Chair)	Executive Director	North Carolina Military Business Center (NCMBC)
Tad Dunn	Head of Strategy and Business Development	Corvid Technologies, LLC
Gary Edge	Former CEO	Vadum, Inc.
Nicole Fox	SBIR/STTR Program Manager	Army Research Office (ARO)
John Hardin (Staff)	Executive Director	Office of Science, Technology & Innovation, North Carolina Commerce
Bill Herrold	Principal	Washington Office Group
Nick Justice	Director, Office of Research & Innovation; Executive Director, Power America Institute; retired U.S. Army Major General	North Carolina State University; U.S. Army
Denny Lewis	Director, Defense Technology (DEFTECH)	North Carolina Military Business Center (NCMBC)
Dennis McGurk	DoD Strategic Account Executive	RTI International
Kathie Sidner	Director, Defense & Military Partnerships	UNC System Office
Sam Tetlow	Founder and CEO	Grant Engine
John Ujvari	SBIR Program Specialist, Technology Development & Commercialization Team	North Carolina Small Business & Technology Development Center (SBTDC)

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