



OEA TECH TRANSFER STRATEGY & FEASIBILITY STUDY

*Final Report - Accelerating Defense Tech
Transfer in Washington State & Options for
Creating an Incubation Center of Excellence*

August 31, 2016

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Department of Commerce



Executive Summary

An Assessment of WA's Defense Sector Technpole

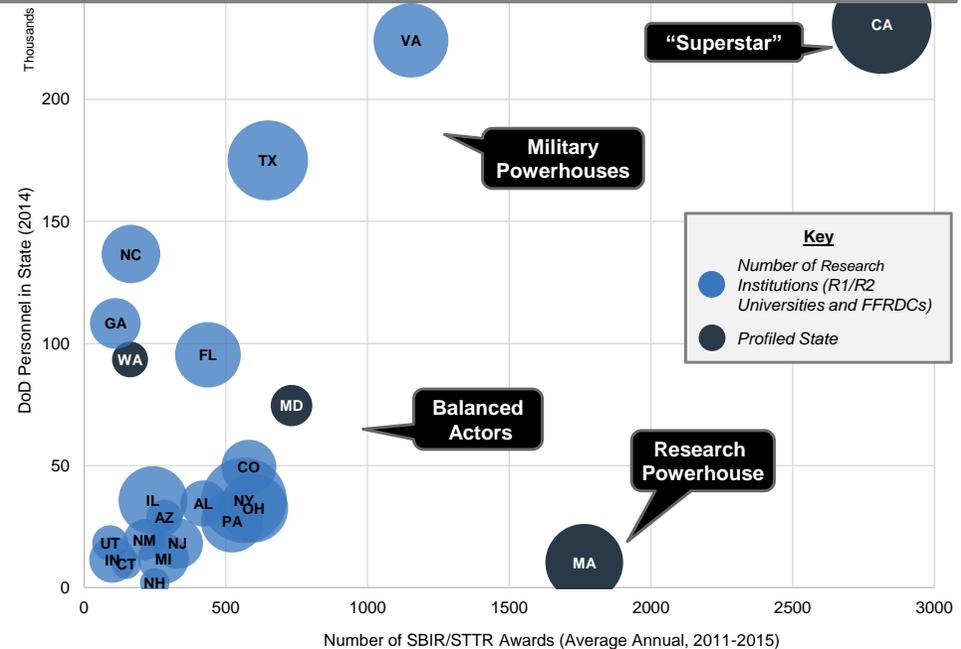
The intent of this effort was to create plan to mitigate impacts of federal defense budget cuts on WA. PA Consulting began by benchmarking WA against other states via outreach sessions and research.

PA found that WA defense stakeholders are interested in state support to *identify partners, market local IP, track federal requirements and secure contracts, and compete for top talent.*

This input aligned with PA's research, which compared WA to other states based on DoD personnel levels and technical competencies, DoD contract awards, numbers of R&D facilities, and volume of relevant SBIR/STTR awards (see right).

WA has a large military presence and prominent research institutions, but lags in SBIR/STTR awards, an indicator of research, tech transfer, and commercialization. Several factors may be to blame:

1. A lack of mechanisms to drive collaboration amongst stakeholders
2. A perception that federal contracting is too hard or offers limited near-term payback, particularly vs. other markets
3. A less technically oriented military population than states with similar presences (e.g., MD, where NSA drives many spinoffs)



In its assessment of technopoles in each category above, PA found that many leading states have established “Centers of Excellence” (COEs) focused on driving defense sector innovation

WA should begin addressing stakeholder identified gaps by establishing a COE to drive military and defense sector coordination, and provide resources to help small businesses obtain federal funding

Executive Summary (Continued)

COE Options & Recommendations

After reviewing COEs in leading technopoles across the US, PA created three archetypal models, each allowing incorporation of several identified best practices: 1) focus on regional key differentiators; 2) facilitate funding for innovators, 3) drive cross-sector networking; 4) provide operational support to businesses seeking federal contracts; and 5) get buy-in from state / national leaders

1 – Virtual

- Web platform to include: WA IP clearinghouse, member database, teaming partners, how-to's for funding (e.g., SBIR/STTR, job board, info on DoD requirements or contracting, POCs for USG orgs (e.g., PTAC), and/or links to relevant news content and DoD budget information



2 – Strategic Partnerships

- Web platform, as in 1, augmented by resources from interested partners in WA
- Services via partners (e.g., marketing, legal, accounting, slots in accelerators, coaching on federal contracting, computing or data storage, co-working space and labs, speaker programs, and/or career days

3 – Physical Presence

- Web platform and partner support, as in 1/2, augmented by robust staff and funding
- COE-owned facilities offering: accelerators for businesses seeking USG contracts, career fairs, USG “buyers” speaker series, prototyping space, training contracting, and/or partner matching

PA recommends that WA pursue a variation of COE 2, but urges it to consider the following:

- *Focus:* A hallmark of successful COEs is their focus, either on distinct technology areas (e.g., commercial space launch, which many perceive as a WA strength), or on cross-sector collaboration. Any COE must balance between being too generic, and alienating stakeholders based on specificity.
- *Location:* WA's geographic expanse is challenging, and it may consider an anchor in Seattle (already an “Innovation District”) and satellites elsewhere
- *Stakeholders:* Engage non-traditional defense stakeholders (e.g., Amazon, Vulcan, Inc., Blue Origin)
- *Funding:* Augment federal and state dollars by creating a fund to which partners can contribute on a tax deductible basis

COE 2 offers a relatively low-cost, scalable solution with minimal required up-front investment and a discrete time commitment, and can evolve in parallel with the needs of the state and local stakeholders

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1

PROJECT BACKGROUND

Strategic Context & Objectives

Washington's Department of Commerce received a grant from DoD's Office of Economic Adjustment (OEA) to help mitigate the impacts of declining DoD budgets

The OEA Grant

- The grant, which encompasses this project and others, seeks a proactive response to mitigate the impact of federal defense budget cuts on WA – realizing that the defense sector is a major contributor to its economy, and that DoD and DHS budgets are under pressure, Commerce seeks to better understand:
 1. The extent to which WA companies' revenue is reliant on DoD and DHS funding
 2. The skills and knowledge WA companies need now and in the future to be successful
 3. The impacts on the state of a long-term decline in defense spending
 4. How the State can support its military and defense sector if reductions in national defense spending continue

DoD OEA

- Works with communities that have strong DoD ties
- Helps communities facing challenges (base closure, contractor relocation, etc.)
- Focuses on planning and implementing futures that are sustainable and successful

Technology Transfer (T2)

- Commerce believes defense sector T2 may help improve the resilience of WA's economy
- Per DoD, T2 is: *"The intentional communication of knowledge, expertise, facilities and equipment, and other resources for application to military and non-military systems"**
- T2 includes:
 - Spin-off activities demonstrating commercial viability of DoD-developed tech
 - Spin-on activities demonstrating national security utility of tech developed outside DoD
 - Dual-use S&T that develops technologies having both defense and non-defense applications

As identified in the OEA grant, the President's FY17 budget indicates that spending will continue to be under pressure and that innovation will be critical

- **With defense budgets expected to flatten over the five years of the Future Years Defense Program (FYDP), the long-term cycle of post-WWII spending could soon end**
 - This may alter the fundamental nature of the US defense industry as its customers try to do more with less
 - Despite marginal growth in topline forecasts, the FYDP is historically a poor predictor of outyear spending, and the 2016 Presidential election and a rebounding economy could alter spending in the outyears significantly
- **Topline budgets are forecasted to increase slightly, but DoD acknowledges an inability to reduce all risks, and focuses conventional deterrence of peer threats, capability over capacity (numbers), and innovation**
 - Procurement spending declines by 5.7% for FY17, with cuts to ongoing programs (e.g., Apache helicopters, C-130s) to support investment in modernization, advanced munitions and sensors, hypersonics, space, cyber, etc.
- **RDT&E spend rises at a 3.65% CAGR from FY16-19 (before flattening to FY17 levels) but DoD will need industry to lead on its long-term technology priorities (e.g., directed energy, artificial intelligence, robotics)**
 - The Defense Innovation Initiative seeks to identify innovations and/or existing technologies in the private sector (e.g., Defense Innovation Unit – Experimental [DIUx], DoD-supported Manufacturing Innovation Institutes [MIIs])
- **With a \$47B FY17 request, the Department of Homeland Security is much smaller than DoD but still offers pockets of attractive opportunities for traditional and non-traditional federal contractors**

DoD's innovation initiatives present an opportunity to better align WA's defense sector with emerging technical requirements, and ultimately, increase the resilience of its defense industrial base

This study lays the groundwork for Washington to help achieve DoD's aims of driving greater innovation while enhancing the state's own economic resilience

Objectives

- Better understand the reliance of firms operating in Washington State's defense ecosystem on DoD and DHS funding, their resource needs for meeting DoD, DHS, and other federal requirements, and their strategic visions for maintaining and growing healthy business portfolios amid fiscal constraints, budget uncertainty, and competition
- Identify technology transfer (T2) and commercialization opportunities *from* government entities (e.g., PNNL, UW-APL, WSU-ASL, and Keyport Naval Undersea Warfare Center [NUWC]), *to* private industry, and vice versa
- Develop linkages for industry *to* these federal and state research and development centers

Outcomes

- 1) An actionable strategy to encourage small business incubation specific to the military and defense sector and accelerate the volume and value of related T2, entrepreneurship, and commercialization of research results by:
 - Strengthening linkages between industry and Washington State defense R&D entities
 - Identifying ways to accelerate human capital development
 - Identifying sources for capital, particularly for empowering non-traditional firms (e.g., small business, startups)
 - Providing start-up assistance and training to small businesses
- 2) A feasibility study offering several options to support the strategy through implementation of an *Incubation Center of Excellence for Military and Defense Manufacturing* to accelerate T2, entrepreneurship and commercialization

2

BENCHMARKING WA'S DEFENSE TECHNOPOLE

PA conducted extensive research to benchmark WA's military and defense sector, and its ability to foster and commercialize innovation, against other US states

Approach for Benchmarking

- PA's primary source interviews and desk research as part of this study resulted in insights that led the team to make minor adjustments to the list of factors that the team originally proposed (see Appendix E) as benchmarks to measure WA against other regional technopoles
- Ultimately, the team honed in on a set of objective quantitative factors, as well as a set of more subjective qualitative factors, which it used to benchmark WA against other US states that lead the nation in both military and defense sector innovation, and commercialization of that innovation

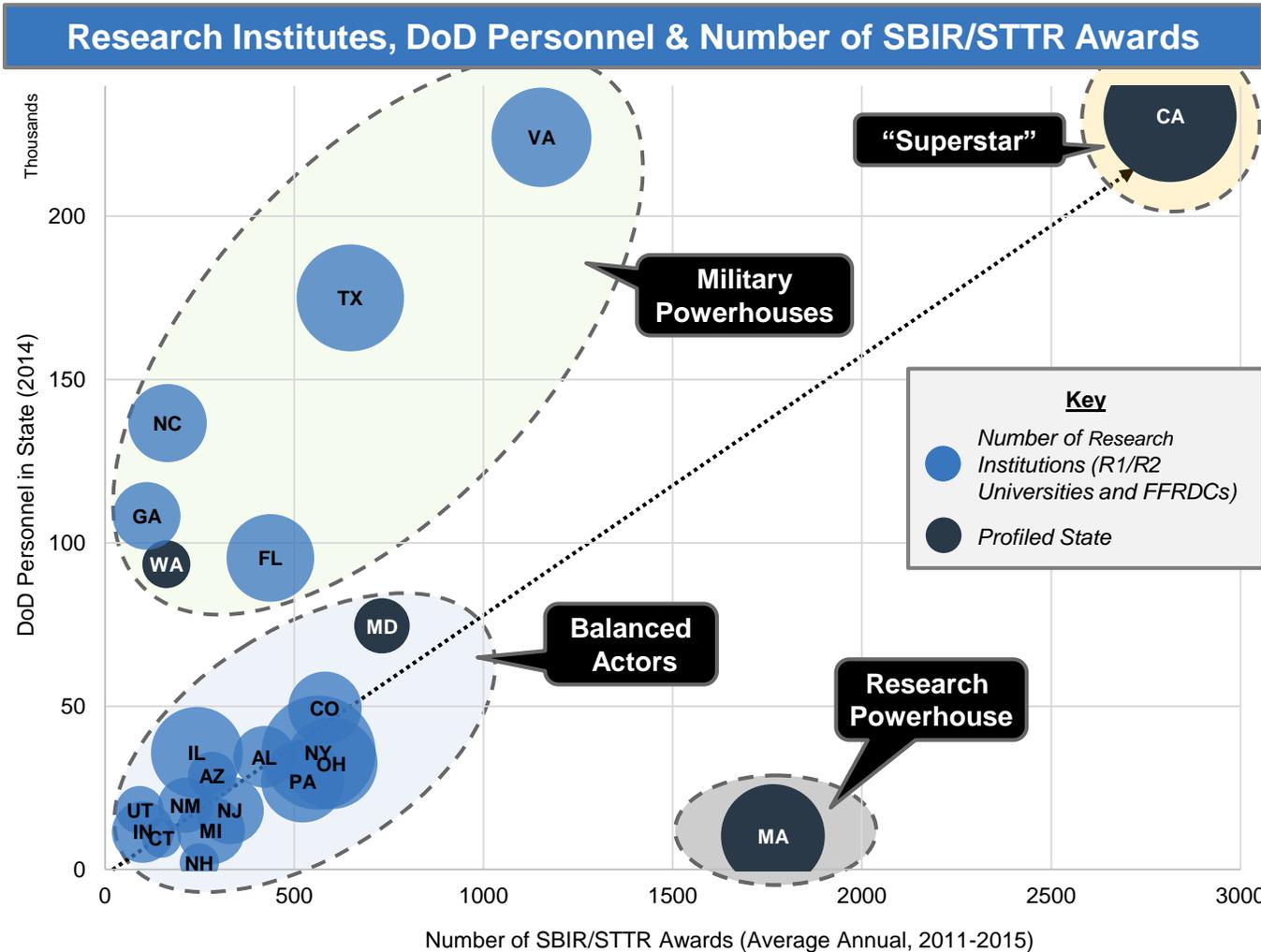
Quantitative Factors

- Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) awards by DoD or DHS component entities within a given state
- DoD contract awards by entities in a given state
- Dependence of a given state's GDP on defense contracts
- The number of DoD personnel (military and civilian) assigned to entities within a given state
- The number of top research entities in a given state (e.g., Carnegie classified R1/R2 research universities, or Federally Funded Research and Development Corporations (FFRDCs))

Qualitative Factors

- The degree to which DoD contracts awarded in a given state derive from the Personnel or Operations & Maintenance (O&M) budget categories, rather than the Research, Development, Technology, and Evaluation (RDT&E) or Procurement categories
- The degree to which a given state's DoD personnel are technically oriented (e.g., focused on concept development, prototyping or testing vs. operations)

PA identified four weight classes characterizing states' defense stakeholder networks – WA, with its large military presence, sits in the “Military Powerhouse” category



Notes

- **PA identified four weight classes characterizing states' defense stakeholder networks**
 - **Military Powerhouses**, like WA, have very large military presence (75K+) and DoD contract spending (~2.5-10% of GDP) and moderate to large research communities
 - **Balanced Actors**, like MD, have low to moderate military presence (less than 75K) and commensurate DoD contract spend, and moderate to large research communities
 - **Research Powerhouses**, with MA as the only notable example, have low military presence (~10K), but a large DoD contract spend and very large research communities
 - **Superstars**, with CA as the only notable example, have very large military presence (200K+) – with a commensurate DoD contract spend and very large research communities
- Note:** 25 states and DC, which either lacked a research center or significant DoD presence or SBIR/STTR awards, do not appear on this chart

Profile of a “Superstar”

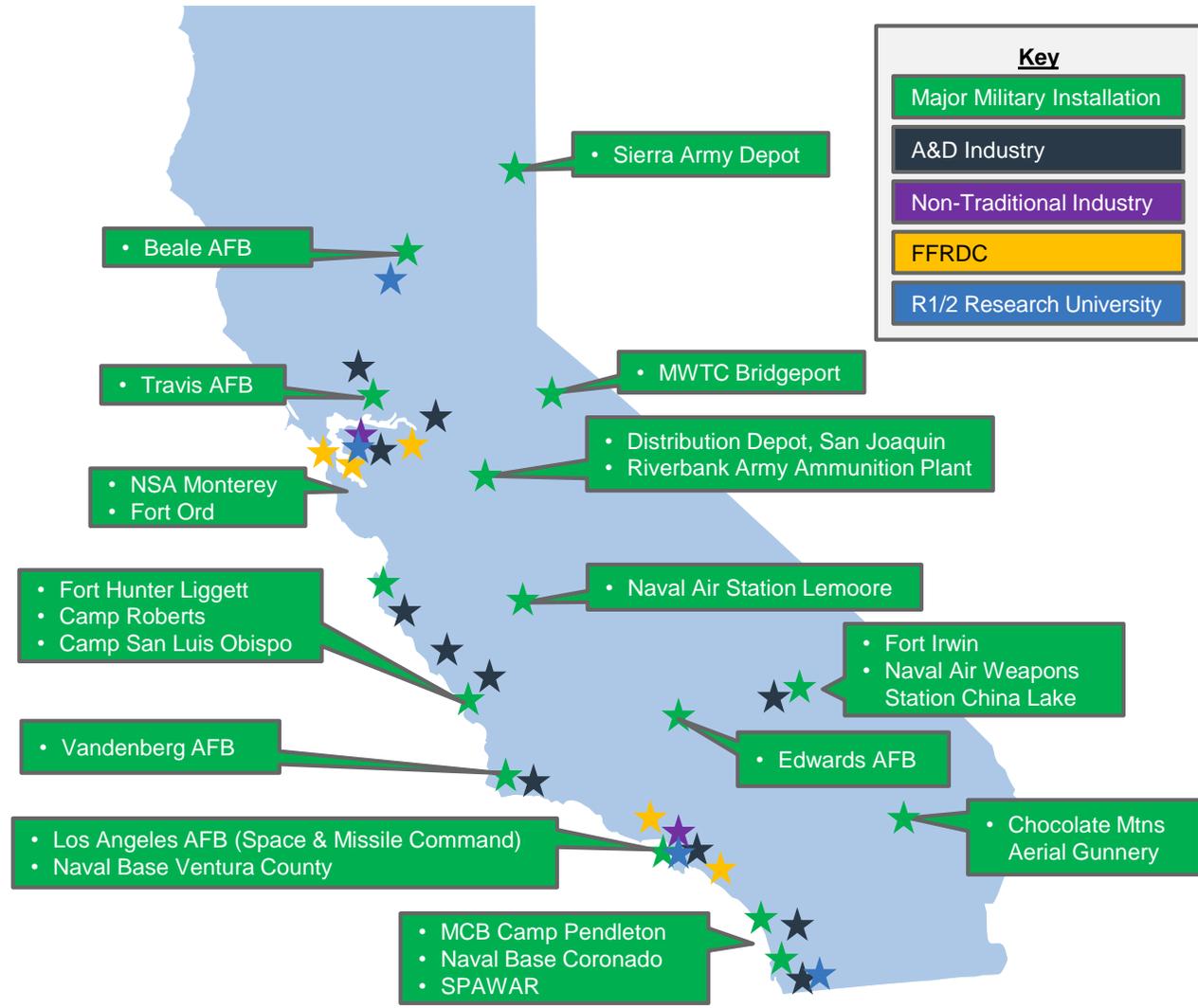
With an enormous DoD presence of ~230,000 at 30 installations, the most SBIR/STTR awards of any state, 11 tier one research universities, and eight FFRDCs, California’s military and defense sector makes it a superstar among US states

- Major defense industry players include:
- AECOM
 - Aerojet Rocketdyne
 - Aerovironment
 - Boeing
 - General Atomics
 - L-3
 - Lockheed Martin
 - Northrop Grumman
 - Rockwell Collins
 - ViaSat

- FFRDCs include:
- The Aerospace Corporation
 - Arroyo Center
 - Jet Propulsion Laboratory
 - Lawrence Berkeley National Laboratory
 - Lawrence Livermore National Laboratory
 - National Defense Research Institute
 - SLAC National Accelerator Laboratory
 - The RAND Corporation

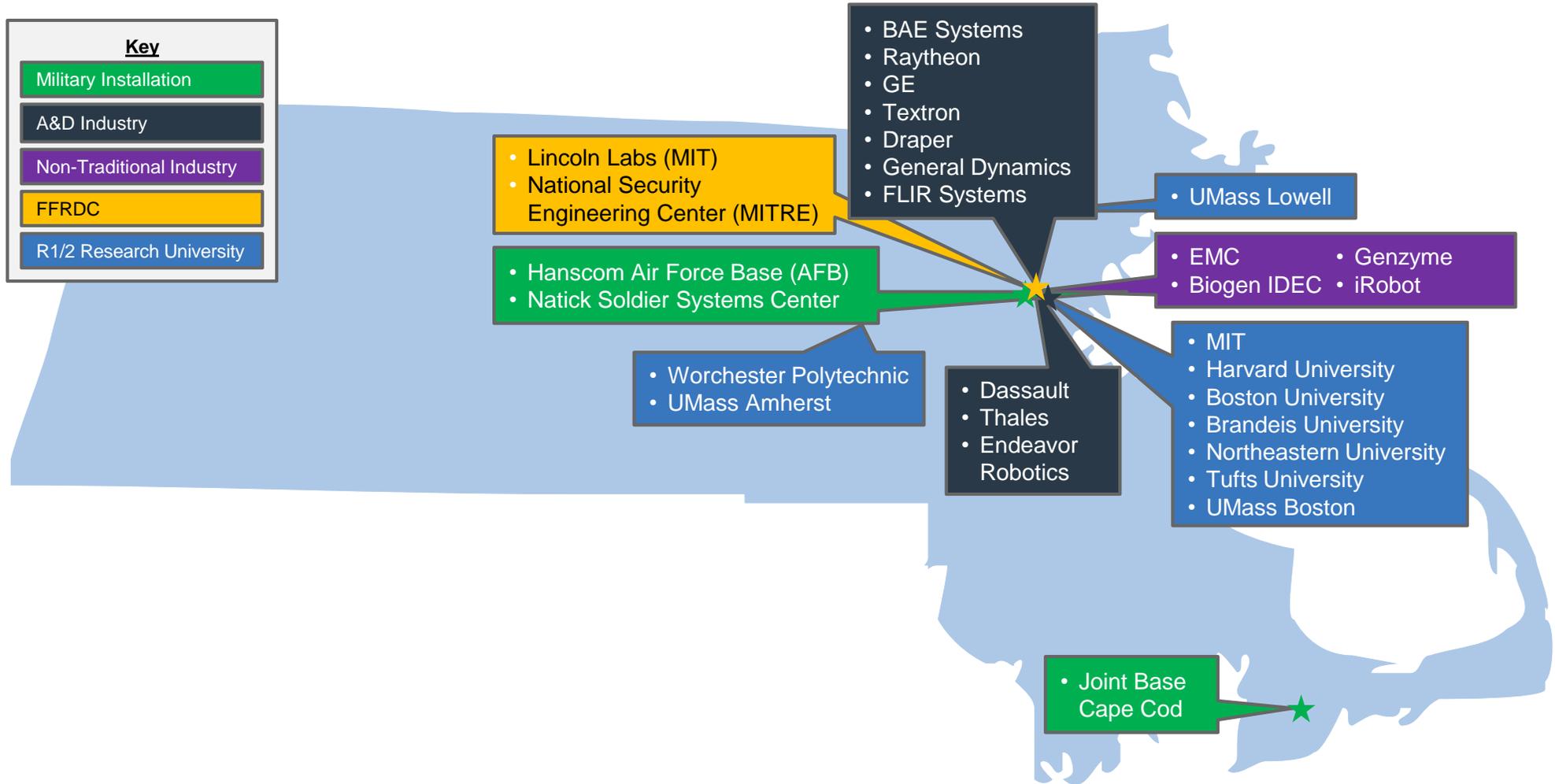
- Other relevant firms include:
- HP
 - Google
 - SpaceX
 - Terra Bella
 - Virgin Galactic
 - Rocket Lab
 - xCor Aerospace
 - Palantir Technologies

- R1 and R2 universities include:
- Caltech
 - Stanford
 - UC Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, Santa Barbara, Santa Cruz, Merced
 - University of Southern California
 - The Naval Postgraduate School
 - Claremont Graduate University
 - San Diego State University



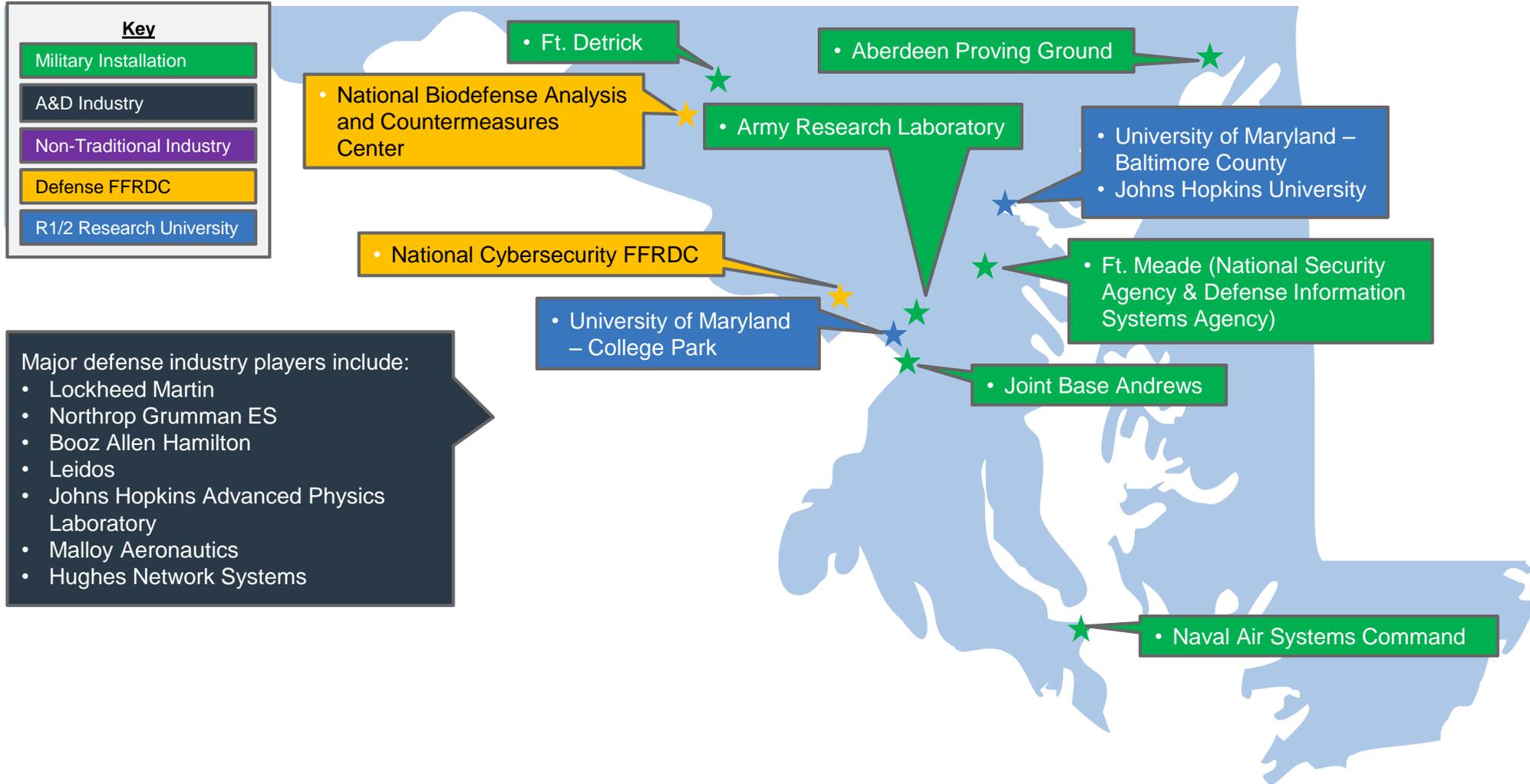
Profile of a “Research Powerhouse”

Though Massachusetts has a relatively small DoD presence of ~10,000, it is a defense technology innovation center due to its concentration of top tier universities, federal research labs, defense firms, and leading cross sector innovators



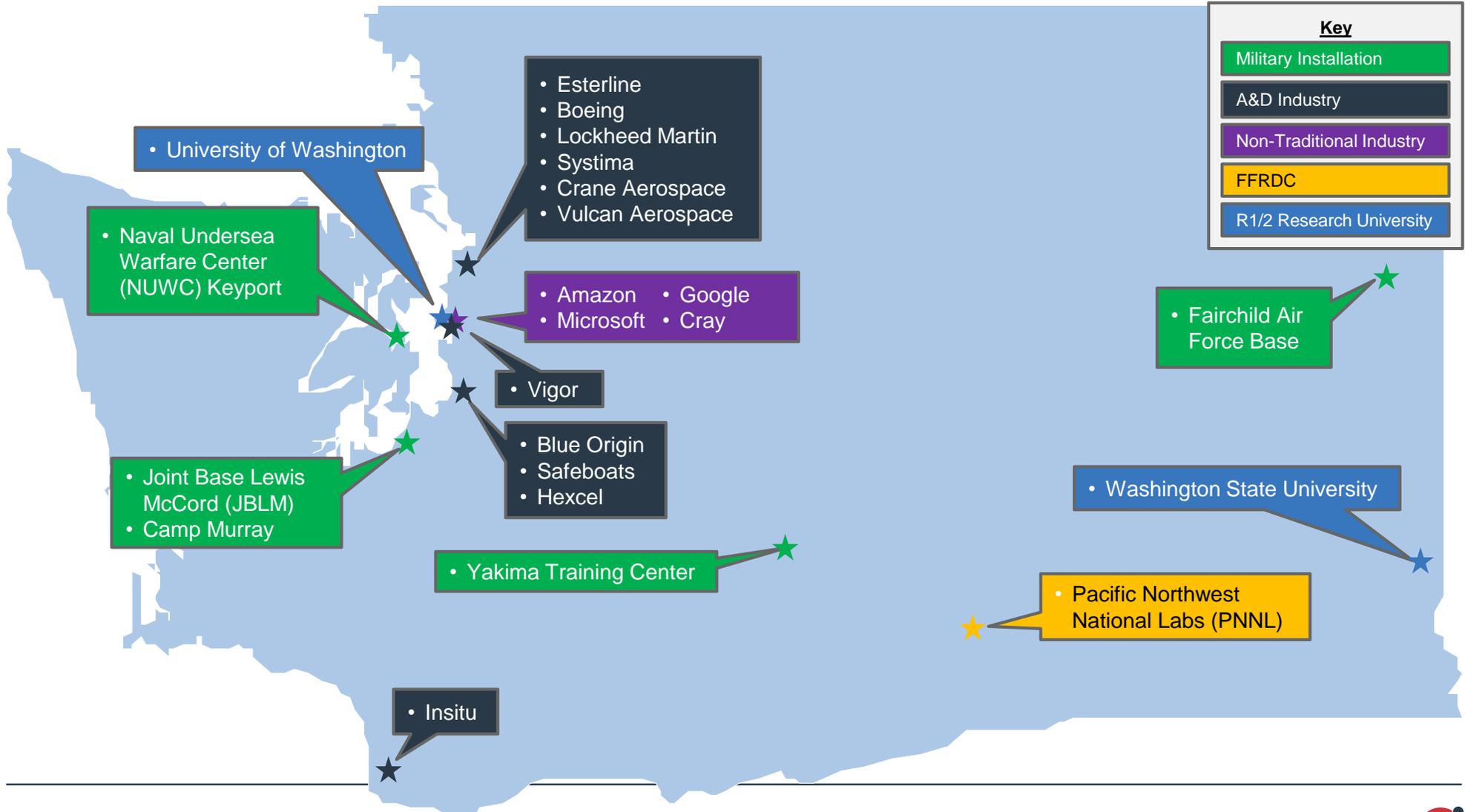
Profile of a “Balanced Actor”

Maryland, with ~75,000 DoD personnel, several highly-technical DoD facilities, three leading research universities, and many prominent defense contractors, led the Balanced Actor category with 732 SBIR/STTR awards from 2011-2015



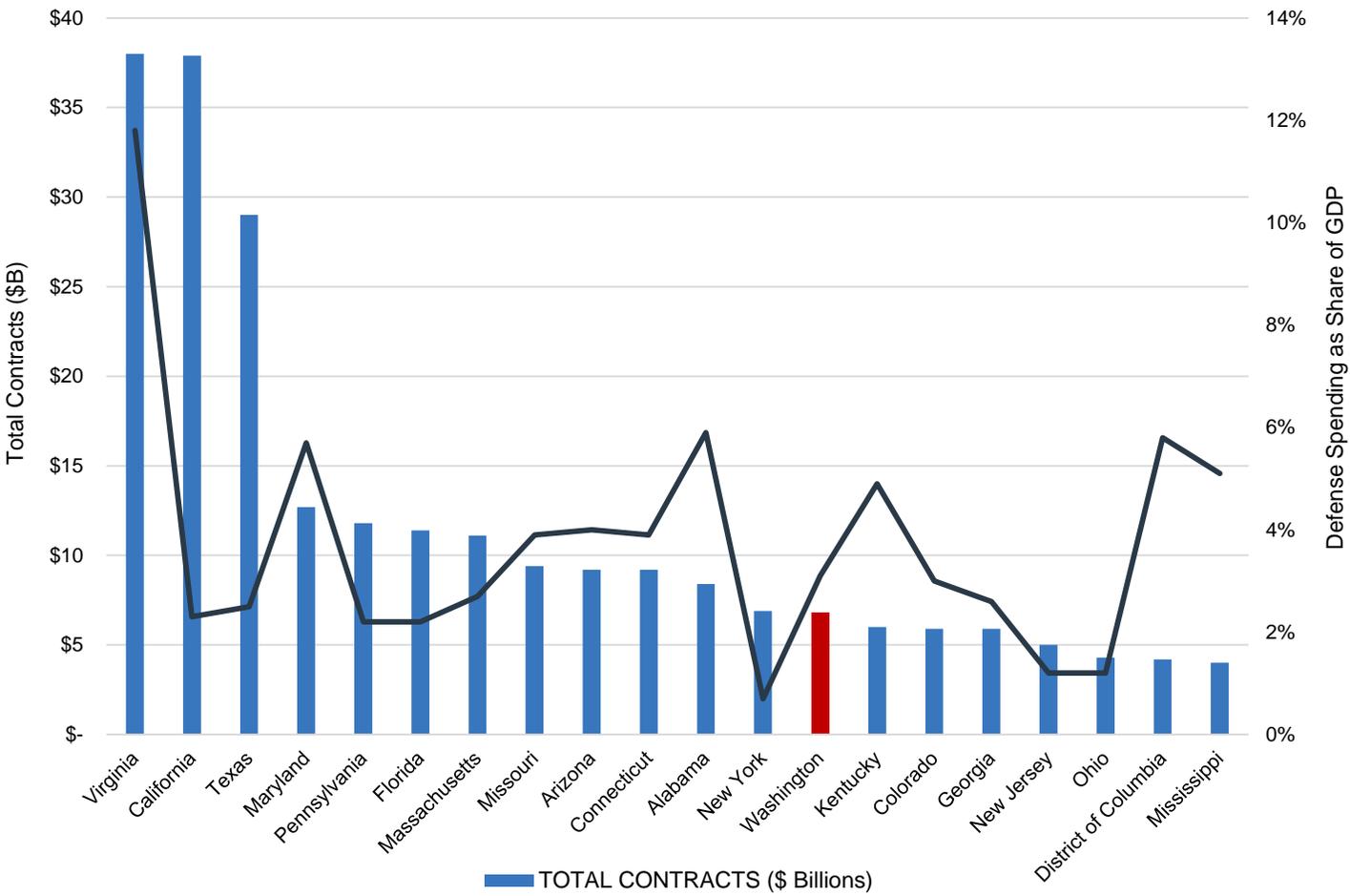
Profile of a “Military Powerhouse”

With 90,000+ DoD personnel, multiple leading aerospace and defense firms, several leading universities, and a prominent federal research lab, Washington is a prominent aerospace and defense technopole



As a “Military Powerhouse,” WA is the recipient of the 8th largest share of DoD contract spending in the nation, but it lags many peers in SBIR/STTR awards

Total DoD Contracts & Share of State GDP (Top 20 States, 2014)



Washington State

- \$6.8B in DoD contract spending in the state in 2014
- 3.1% of state GDP derived from DoD contract spending (8th highest of 50 states/DC)
- 162 = the average number of defense related SBIR/STTR awards on an annual basis
- 19th in the US since 2011 in terms of SBIR/STTR awards, offering insight into the state’s ability to garner federal funding for innovative R&D programs
- Home to several adjacent industries (e.g., commercial space launch providers using new models, tech firms innovating in AI) that offer the potential to add resilience to the state economy



WA's relatively moderate defense industry and R&D presence are offset by untapped commercial capability that has not yet been fully leveraged by the defense industry

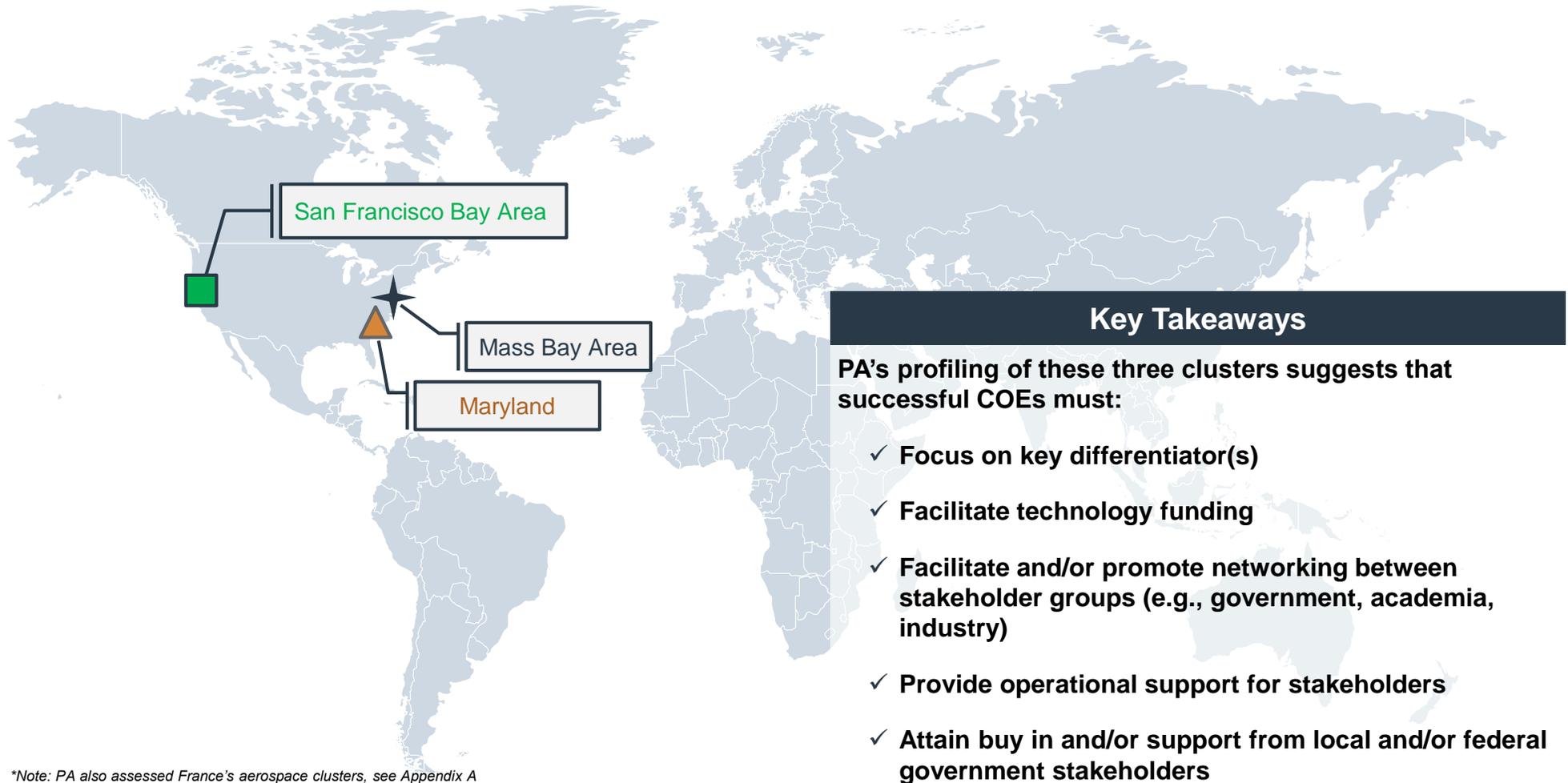
	California "Superstar"	Massachusetts "Research Powerhouse"	Maryland "Balanced Actor"	Washington "Military Powerhouse"
Local A&D Industry	<p>STRONG</p> <ul style="list-style-type: none"> Concentration of military R&D and requirements groups attract industry 	<p>STRONG</p> <ul style="list-style-type: none"> Local tradition of defense electronics innovation has kept firms in area 	<p>STRONG</p> <ul style="list-style-type: none"> Proximity to military customers attracts major defense firms 	<p>MODERATE</p> <ul style="list-style-type: none"> Community of suppliers thanks to strength of comm'l aero
Military Presence	<p>STRONG</p> <ul style="list-style-type: none"> 200K+ DoD personnel 	<p>WEAK</p> <ul style="list-style-type: none"> Only ~10K DoD personnel, but technically oriented 	<p>MODERATE</p> <ul style="list-style-type: none"> ~74K DoD personnel, but technically oriented 	<p>STRONG</p> <ul style="list-style-type: none"> ~90K DoD personnel
Local Non-Traditional Industry	<p>STRONG</p> <ul style="list-style-type: none"> Silicon Valley is a significant asset for CA business community 	<p>MODERATE</p> <ul style="list-style-type: none"> Firms like iRobot, EMC offer synergies with defense sector 	<p>WEAK</p> <ul style="list-style-type: none"> Major non-defense firms are in non-adjacent sectors (e.g., insurance) 	<p>STRONG</p> <ul style="list-style-type: none"> Tech firms (e.g. Amazon, Cray) Comm'l space on the rise
FFRDC/Research Institutions	<p>STRONG</p> <ul style="list-style-type: none"> #1 in SBIR/STTR awards 11 tier one universities; 8 FFRDCs 	<p>STRONG</p> <ul style="list-style-type: none"> #2 in SBIR/STTR awards 8 tier one universities; 2 FFRDCs 	<p>STRONG</p> <ul style="list-style-type: none"> #8 in SBIR/STTR awards 3 tier one universities; 2 DoD FFRDCs 	<p>MODERATE</p> <ul style="list-style-type: none"> #23 in SBIR/STTR awards 2 tier one universities; 1 FFRDC

3

CASE STUDIES IN DEFENSE INNOVATION

Regional Clusters & COE Models

PA assessed a number of leading aerospace and defense technology and manufacturing clusters to identify lessons learned and key success factors



**Note: PA also assessed France's aerospace clusters, see Appendix A*



REGIONAL PROFILE: San Francisco Bay Area

This region, which includes Silicon Valley, is famous for its technological innovation and ability to nurture startups

Regional Attributes



- ✓ **High rate of immigrants with STEM backgrounds contributes to strong regional talent pool; in 2013, 56% of Silicon Valley’s STEM workers with a bachelor’s degree or higher were born outside of the US***
- ✓ **Liberal labor laws limit non-compete contracts and allow workers and their ideas to circulate freely and frequently**
- ✓ **Presence of world-class Stanford University feeds talent pool and local knowledge economy**
- ✓ **Legacy of experimentation and innovation in radio, television and military electronics and aerospace, in part due to presence of Moffett Field**
- ✓ **Strong local venture capital (VC) community supports investments in startups and new technologies**

Key Takeaways

- *Bay Area transitioned since early 20th century from specializing in radio and television to internet and social media*
- *Home to Silicon Valley, known for its robust startup and VC communities*
- *Silicon Valley benefits from knowledge economy generated by nearby Stanford University, as well as the large numbers of STEM-focused immigrants attracted to the area*
- *Lack of robust non-compete restrictions promotes innovative culture*

Key Competencies

- Silicon Valley firms specialize in internet and social media, software and hardware (e.g., computers, mobile devices)
 - Major employers include Google, LinkedIn, Cisco, VMWare, Facebook, HP, Apple, and Twitter





CASE STUDY EVALUATION: Defense Innovation Unit Experimental (DIUx)

Successful COEs must:	Result	Discussion
<i>Focus on key differentiator(s)</i>	<u>MODERATE</u>	<ul style="list-style-type: none"> DoD observed the innovative culture and rapid technology development occurring in Silicon Valley and attempted to fold these attributes into its procurement processes Despite these efforts, a disconnect remains between the defense community and Silicon Valley firms with respect to procurement preferences and business models
<i>Facilitate technology funding</i>	<u>MODERATE</u>	<ul style="list-style-type: none"> Shortcomings in this area have prompted DoD to revise DIUx's format and consider expanding the idea to other geographies DIUx has a pool funding and an Other Transaction Authority (OTA) contract vehicle, but as of summer 2016, only 3 of 20 projects in pipeline were funded since DIUx's standup
<i>Facilitate and/or promote networking between stakeholder groups (e.g. government, academia, industry, etc.)</i>	<u>STRONG</u>	<ul style="list-style-type: none"> DIUx formed with intent to bridge the gap between commercial firms in Silicon Valley and DoD The COE's intent was to socialize DoD requirements with Silicon Valley and provide DoD with insight into transformational commercial technologies DIUx was successful in gaining the commercial tech sectors attention and has created a good foundation to build on for the next iteration of the COE
<i>Provide operational support for stakeholders</i>	<u>WEAK</u>	<ul style="list-style-type: none"> Though DIUx aimed to lower the cost and time required to do business with DoD, it fell short of achieving the conditions most Silicon Valley firms require
<i>Attain buy in and/or support from local and/or national government stakeholders</i>	<u>STRONG</u>	<ul style="list-style-type: none"> The DIUx concept gained backing from state, local and federal government, as well as major Silicon Valley players like Facebook (industry) and Andreessen Horowitz (venture capital)

The first iteration of DIUx was unable to fully bridge the financial and cultural gaps between the defense and commercial sectors

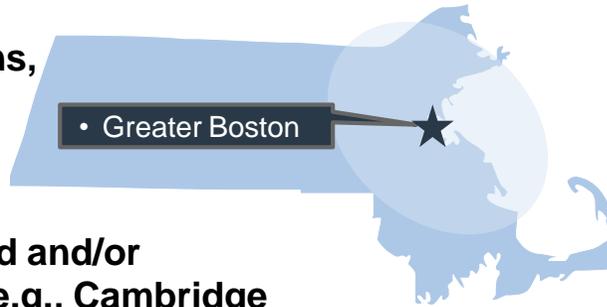


REGIONAL PROFILE: Massachusetts Bay Area

Previously home to the Route 128 technology hub, Greater Boston continues to attract innovators and their partners

Regional Attributes

- ✓ **Eight Boston-area research institutions, including Harvard and MIT, feed into new tech and business incubation**
- ✓ **Stakeholders cultivated a culture of innovation through university affiliated and/or local government-backed resources (e.g., Cambridge Innovation Center, Innovation District, Massachusetts Innovation Bridge)**
- ✓ **Proximity to business and government centers (e.g., NY City and DC)**
- ✓ **Local “end customer” and/or requirements drivers (e.g., Army Natick Soldier Systems Center)**
- ✓ **Federally funded research institutions (e.g., MIT Lincoln Lab, RFT-MII)**



Key Takeaways

Boston endures as a leading innovation center due to its:

- *Proximity to world-class universities which generate new tech and new talent*
- *High concentration of VC firms that tap into small businesses and universities in the area*
- *Engaged local government stakeholders*
- *Presence of DoD stakeholders in region*
- *Close proximity to business (NY) and government (DC) centers*

Key Competencies

- **Robotics: 20+ companies have launched in Massachusetts since 2008**
- **Life Sciences and Biotech: Concentration of start ups attracts large biopharma**
- **Big Data: 100+ big data companies specializing in communications, storage technologies, database software, infrastructure, and applications in state**



CASE STUDY: Revolutionary Fibers & Textiles (RFT) Manufacturing Innovation Institute (MII) / Advanced Functional Fabrics of America (AFFOA)

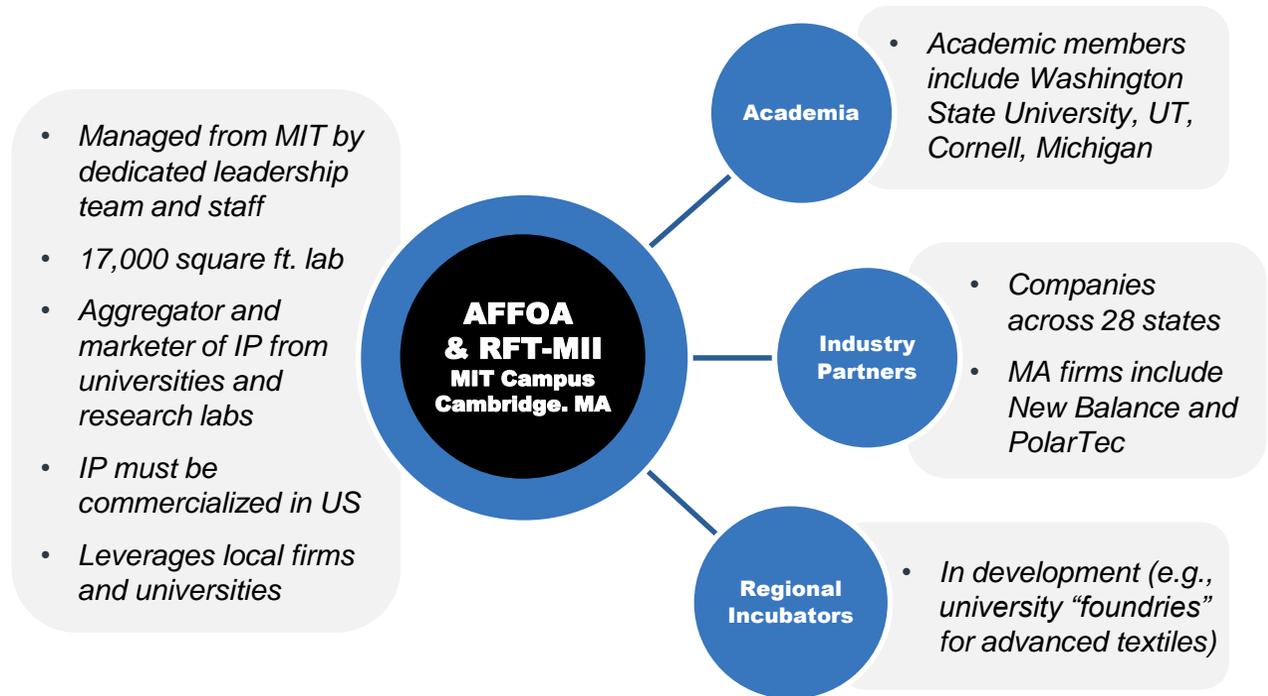
Origination of MIIs

One of nine MIIs established by the Obama administration – one of six with USG funding from DoD

- **Organized under National Network for Manufacturing Innovation (NNMI)**
 - Linked institutes with goal of enhancing US manufacturing, but unique foci
 - Bring together industry, academia, and USG to share resources and collaborate
 - Advanced Manufacturing Program Office coordinates tech transfer and helps companies overcome obstacles
- **MIIs funded by through matching public-private partnership arrangements**
 - 5-year agreement with \$70M from USG
 - USG funding must be matched by non-federal sources at at least 1:1
- **MIIs funded by through matching public-private partnership arrangements**
 - Sponsor agencies include DoD, DoE, Commerce, NASA, NIST, and NSF

Origination of RFT-MII / AFFOA & Business Model

- **Background:** Established in April 2016 based on emerging opportunities to drive advancements at intersection of technology and fiber / fabric (e.g., with sensing, cooling, protection, shelter)
 - Raised \$200M+ to match \$75M of DoD funding within 60 days post RFP release; \$40M pledged by the Governor of Massachusetts; remainder from private sector
 - Relies on distributed network model to access expertise and thought leadership, but expected to generate significant economic growth for MA





CASE STUDY EVALUATION: RFT-MII / AFFOA

Successful COEs must:	Result	Discussion
<i>Focus on key differentiator(s)</i>	<u>STRONG</u>	<ul style="list-style-type: none">• RFT-MII is purely focused on incubating and commercializing new technologies in the realm of functional fabrics and textiles for military, and also civilian applications.
<i>Facilitate technology funding</i>	<u>STRONG</u>	<ul style="list-style-type: none">• RFT-MII will have access to a large pool of funding to advance technologies that fall within the realm of functional fabrics
<i>Facilitate and/or promote networking between stakeholder groups (e.g. government, academia, industry, etc.)</i>	<u>STRONG</u>	<ul style="list-style-type: none">• From Cambridge, MA, RFT-MII will serve as a coordinating node for innovators in advanced fabrics around the United States that span academia, government, and industry. Its IP clearinghouse will also serve as a key means of driving collaboration.
<i>Provide operational support for stakeholders</i>	<u>STRONG</u>	<ul style="list-style-type: none">• RFT-MII will have a staff of ~5, will be able to offer access to a large lab space for research and prototyping, and will manage an IP clearinghouse that it will use to market new concepts to companies interested in commercializing them.
<i>Attain buy in and/or support from local and/or national government stakeholders</i>	<u>STRONG</u>	<ul style="list-style-type: none">• As a Manufacturing Innovation Institute (MII), RFT-MII is directly supported by the US federal government and the DoD. The State of Massachusetts also signaled its strong support through a \$40M commitment of state funding

While only in its nascent stages, RFT-MII will be an extremely focused COE with broad support (and funding from) across multiple levels of government and industry



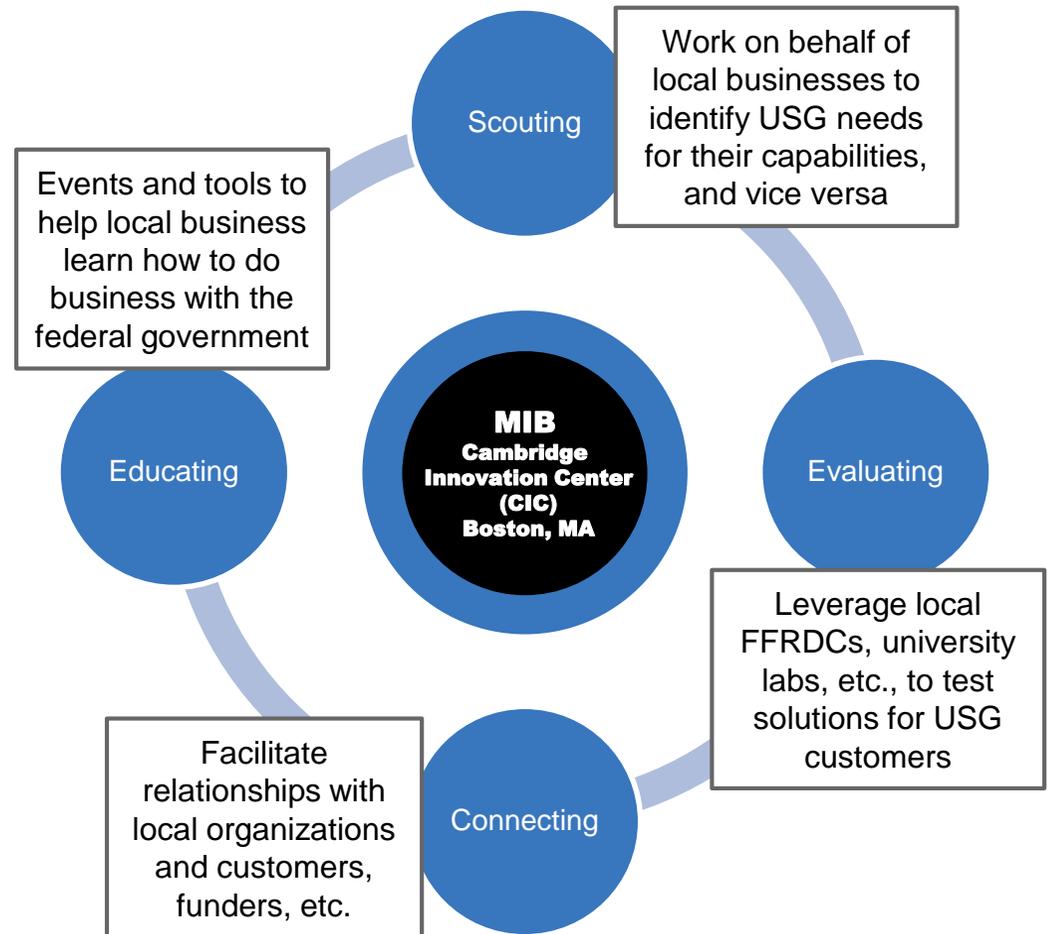
CASE STUDY: Massachusetts Innovation Bridge (MIB)

Origination of MIB

Created by MassDevelopment and MITRE with support from the Governor's office to help local organizations capture USG opportunities

- **Will connect business, non-profits, and academic institutions with the federal government, and vice versa**
 - Located in Boston office of nationally recognized Cambridge Innovation Center (CIC)
 - Led and managed by on-site director (a MITRE employee)
 - Funded on fixed-term basis as a test case
 - Will *not* provide funding to local companies
- **“Scouting, connecting, evaluating, and educating” by:**
 - Assessing challenges relevant to member companies
 - Arranging meetings/tech exchanges to increase visibility
 - Using federally funded labs (e.g., Lincoln Labs) to evaluate emerging solutions for government purposes
 - Educating entrepreneurs on doing business with the USG
 - Connecting local firms with Hanscom AFB, Natick Solider Systems Center, Joint Base Cape Cod
- **Emphasis on specific types of projects**
 - Advanced manufacturing, robotics and automation, cyber security, big data, IT, healthcare, life sciences,

MIB Business Model





CASE STUDY EVALUATION: Massachusetts Innovation Bridge (MIB)

Successful COEs must:	Result	Discussion
Focus on key differentiator(s)	<u>MODERATE</u>	<ul style="list-style-type: none"> The MIB will emphasize several specific technology areas: advanced manufacturing, robotics and automation, cyber security, big data, IT, healthcare, and life sciences. While this list is not exhaustive, it is far broader than many other COEs reviewed as a part of this effort.
Facilitate technology funding	<u>MODERATE</u>	<ul style="list-style-type: none"> The MIB will not provide funding directly to Massachusetts innovators to help them advance technology concepts, but it will be able to leverage its network to help connect innovators with potential funding sources (e.g., venture capital or government contract R&D funding).
Facilitate and/or promote networking between stakeholder groups (e.g. government, academia, industry, etc.)	<u>STRONG</u>	<ul style="list-style-type: none"> Networking will be one of the MIBs primary missions, and it will focus on generating stronger bonds between Massachusetts area companies and the federal government with the specific intent to help the federal identify technology providers, and help those providers better understand the federal government’s needs.
Provide operational support for stakeholders	<u>STRONG</u>	<ul style="list-style-type: none"> The MIB will not offer lab space or access to any manufacturing specific technologies for Massachusetts-based innovators, but it will offer conference space for meetings (e.g., partner matching), hackathons, training on government contracting, and employ partnerships with local labs (i.e., MIT Lincoln Labs) to help the federal government test technologies.
Attain buy in and/or support from local and/or national government stakeholders	<u>STRONG</u>	<ul style="list-style-type: none"> The MIB has direct support from the Governor of Massachusetts and the Secretary of the US Air Force was a speaker at its launch event in 2016.

The MIB offers Massachusetts a low-cost, light footprint means of showcasing local industry, connecting it with end customers, and helping identify funding sources



REGIONAL PROFILE: Maryland

Maryland's proximity to major defense facilities and its world-class universities attract entrepreneurs and innovators

Regional Attributes

- ✓ **Close proximity to Washington DC and home to major defense facilities, including Fort Meade and Naval Air Station Patuxent River**
- ✓ **Aerospace and Defense community of over 9,000 prime contractors, subcontractors and suppliers, including Lockheed Martin, Textron AAI, and GE Middle River Aircraft System**
- ✓ **Leading universities, including the University of Maryland (UMD) – College Park and Johns Hopkins University, generate a large number of technical workers, including computer and research scientists**
- ✓ **Multiple university- and nonprofit-based innovation centers focused on aerospace & defense technologies**



Key Takeaways

- *Maryland a natural center for defense contracting given the number of commands and missions that are managed within its borders*
- *Recognizing the importance of defense to the economy, local government set up funds for tech transfer and incubation (e.g., TEDCO, VOLT)*
- *Favorable funding policies and proximity of end customers attract startups, which in turn attract private investors*
- *Universities (e.g., UMD) foster partnerships with DoD and generate talent interested in the sector and therefore more likely to stay local*

Key Competencies

- Defense and security-focused R&D
- Computer systems and design
- Big data analytics
- Cybersecurity
- Aerospace engineering / mechanics
- Atmospheric and space science
- Satellite technology
- Unmanned (robotics and UAVs)



CASE STUDY: Chesapeake Innovation Center (CIC)

Origination of CIC

The CIC offers members physical office space, a training center, and networking services in the homeland security and national security sectors

- **The CIC was established in 2003 with the mission to “foster innovation and nurture start-up businesses”**
 - Services offered include business development guidance, assistance in locating financing, connections to mentors, access to investors and operational support
- **The CIC has partnered with government, state/local and academic stakeholders to achieve its mission**
 - Government partners include Fort George G. Meade, the National Security Agency (NSA), the Defense Information Systems Agency (DISA), and U.S. Cyber Command
 - Local partners include Maryland Department of Commerce and Maryland Business Incubation Association
 - Academic partners include UMD

CIC Business Model



Technology Focus: CIC members tend to focus on cybersecurity and IT that supports DoD and NSA mission sets



Advisor and Mentorship network: A Board of Directors (five individuals from stakeholder organizations) plus others from the partner community provide guidance to CIC and its members



Location: CIC facility located adjacent to Ft. Meade, which is an advantage to its members focused on cybersecurity and big data



Sustainable Model: Members are charged a monthly fee of \$300-\$1140 per month for use of CIC facilities and services (fees cover CIC’s rental of its current space)



Lean Staff: Less than 10 permanent employees whose salaries are paid for via county funding



Demonstrated Value Proposition: CIC has a strong value proposition for government (end customer) stakeholders and start up members thanks to its networking capabilities



CASE STUDY EVALUATION: Chesapeake Innovation Center (CIC)

Successful COEs must:	Result	Discussion
<i>Focus on key differentiator(s)</i>	<u>STRONG</u>	<ul style="list-style-type: none"> • With facilities located next to Ft. Meade, CIC’s natural focus is on cyber, analytics and big data
<i>Facilitate technology funding</i>	<u>MODERATE</u>	<ul style="list-style-type: none"> • Members of CIC are provided with notifications and advice related to SBIR, STTR and other funding through the COE • CIC also maintains a network of VCs and holds quarterly pitch events to match entrepreneurs with investors
<i>Facilitate and/or promote networking between stakeholder groups (e.g. government, academia, industry, etc.)</i>	<u>STRONG</u>	<ul style="list-style-type: none"> • CIC maintains a network of government (state, local and federal), academic, investor and commercial stakeholders that is available to its members • Given CIC’s proximity to Ft. Meade, major defense firms like Rockwell Collins and IBM, hold unclassified trainings and meetings in CIC’s facilities – this provides additional opportunities for new businesses to make industry connections
<i>Provide operational support for stakeholders</i>	<u>STRONG</u>	<ul style="list-style-type: none"> • CIC focuses on provision of basic business services for entrepreneurs • Services include the use of conference/office space, as well as administrative, marketing, and research support
<i>Attain buy in and/or support from local and/or national government stakeholders</i>	<u>STRONG</u>	<ul style="list-style-type: none"> • Partnerships from state (e.g., Maryland Department of Commerce) and federal (e.g. DISA, NSA) agencies have been critical to CIC’s value proposition and ultimate success

CIC’s strong defense community ties and ability to provide access to funding make it a natural hub for national security-focused startups and their investors

Each analyzed model demonstrates best practices and shortcomings that WA should keep in mind as it explores the establishment of its own COE

<u>Success Factors</u>	DIUx Model (CA)	RFT-MII / AFFOA & Model (MA)	MIB Model (MA)	CIC Model (MD)
Focus on key differentiator(s)	<p>MODERATE</p> <ul style="list-style-type: none"> Focus on Silicon Valley culture Broad brush focus 	<p>STRONG</p> <ul style="list-style-type: none"> Functional fabrics and textiles for military and commercial uses 	<p>MODERATE</p> <ul style="list-style-type: none"> Broad brush focus across multiple sectors 	<p>STRONG</p> <ul style="list-style-type: none"> Focus on mission sets found at Ft. Meade
Facilitate technology funding	<p>MODERATE</p> <ul style="list-style-type: none"> Processes in place, but limited success disbursing funds 	<p>STRONG</p> <ul style="list-style-type: none"> Funded via public-private partnership arrangements 	<p>MODERATE</p> <ul style="list-style-type: none"> Provides matchmaking rather than direct funding 	<p>MODERATE</p> <ul style="list-style-type: none"> Regular VC meetings Support in attaining SBIR funding
Facilitate and/or promote networking between stakeholder groups	<p>STRONG</p> <ul style="list-style-type: none"> Socialized DoD priorities with Silicon Valley 	<p>STRONG</p> <ul style="list-style-type: none"> IP clearinghouse will serve as a means of driving collaboration 	<p>STRONG</p> <ul style="list-style-type: none"> Connecting local firms with Hanscom AFB, Natick, etc. 	<p>STRONG</p> <ul style="list-style-type: none"> Proximity to Fort supports networking
Provide operational support for stakeholders	<p>WEAK</p> <ul style="list-style-type: none"> Failed to reliably lower cost and time req'd to do business with DoD 	<p>STRONG</p> <ul style="list-style-type: none"> Lab space available for prototyping and research 	<p>STRONG</p> <ul style="list-style-type: none"> Variety of services offered to support small businesses 	<p>STRONG</p> <ul style="list-style-type: none"> Variety of services offered to support small businesses
Attain buy in and/or support from local and/or national gov't stakeholders	<p>STRONG</p> <ul style="list-style-type: none"> Great support from DoD, VC, industry, state and local gov't 	<p>STRONG</p> <ul style="list-style-type: none"> State and federal partnerships in place 	<p>STRONG</p> <ul style="list-style-type: none"> State and federal partnerships in place 	<p>STRONG</p> <ul style="list-style-type: none"> Long relationship with county and growing state sponsorship
WA Implications	Notable for early buy-in across stakeholder types (e.g., VC, gov't, industry)	Model strong success driven by targeted focus on specific sector	Notable for the role that MA state officials play in the COE	Sector focus drives operations (e.g., events, partnerships, location)

4

TECHNOLOGY TRANSFER STRATEGY

Options for WA & Key Considerations



GAPS & COE MODELS

WA stakeholders perceive several gaps that stand in the way of growing and improving the resilience of the state's defense sector through technology transfer

WA State Stakeholder Wish List

Coordination

"We look nationwide for talent, partners, etc. – optimally we would...find the skillsets we need locally – there isn't really a good forum for that"

- **Stakeholders face challenges in identifying suitable go-to-market partners**
 - One explained that even when he identifies a partner, he sometimes has issues locating the appropriate individual within that business
- **Despite general consensus that WA has the resources to be a strong defense sector technopole, many noted a need for resources to be more synchronized**

Marketing

"for the most part, [WA big tech firms] are isolated from the military ...and invest in what they know...tech and healthcare"

- **Research institutions lack robust marketing staffs and processes to build awareness about locally developed IP**
 - Opportunities for tech transfer, pro bono or low cost marketing support were areas of interest
- **Stakeholders showed interest in a centrally-managed WA IP repository**
 - This might allow defense firms, tech companies, VCs, etc. to more efficiently identify promising technologies or partners

Pursuit Support

"It is not easy to keep your pulse on all the new technologies"

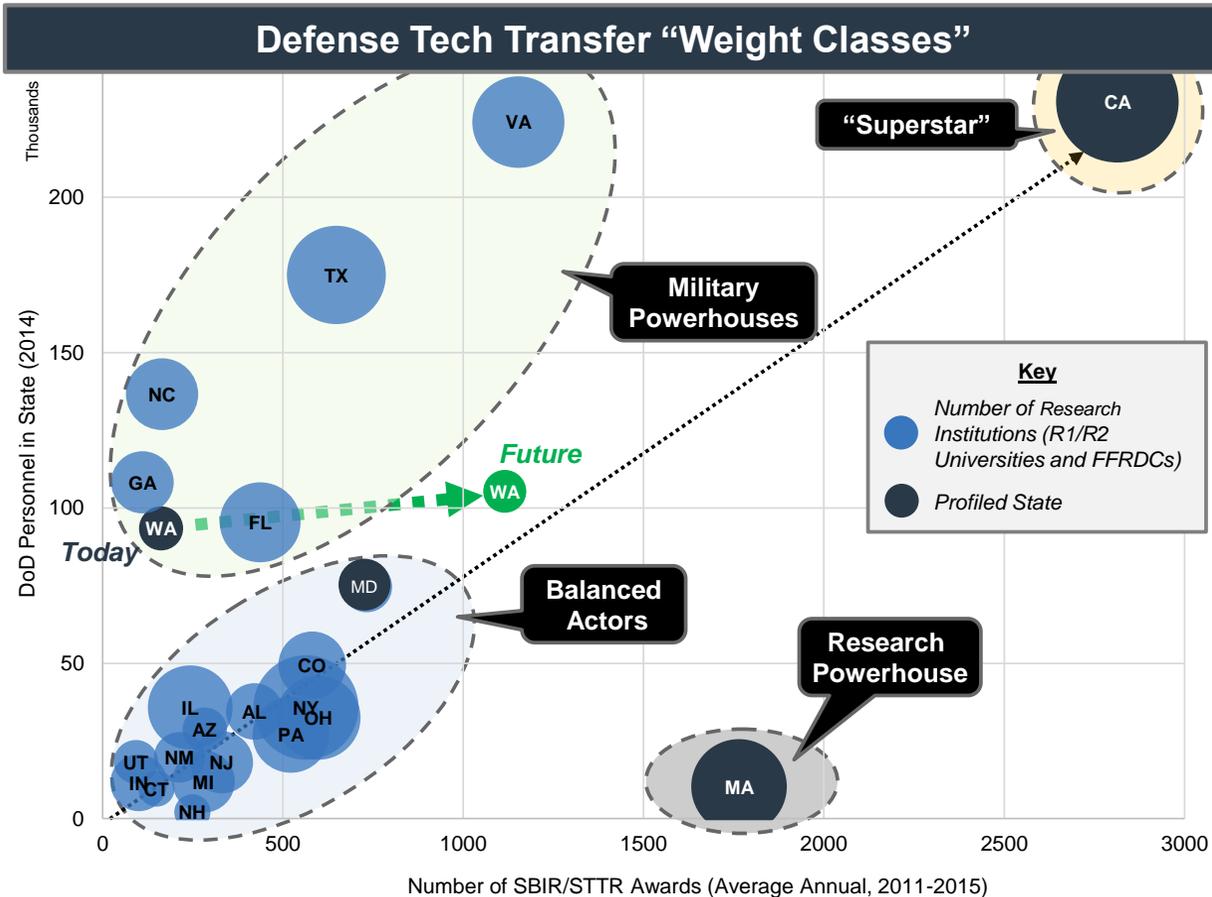
- **Businesses with small percentages of overall revenue from defense contracts expressed concerns about an inability to stay abreast of federal requirements**
 - Complex contracting regulations, the paperwork associated with contracting and long payback periods sometimes resulted in these businesses choosing to focus elsewhere

Capacity Building

"If we could get the state-of-the-art stuff funded, we would definitely attract the right people"

- **Finding qualified staff is difficult**
 - "Baby Boomer" retirements and exodus from Boeing could exacerbate the issue
- **One stakeholder noted that aerospace sector firms are not perceived by candidates to be as "cutting edge" as firms like Amazon or Google**
 - Unless aerospace and other firms move into more sophisticated, innovative product lines, they may struggle to attract top employees

Despite these gaps, WA has the potential to reposition within its “weight class” by formulating new support mechanisms and networks for innovators



WA Prospects for the Future

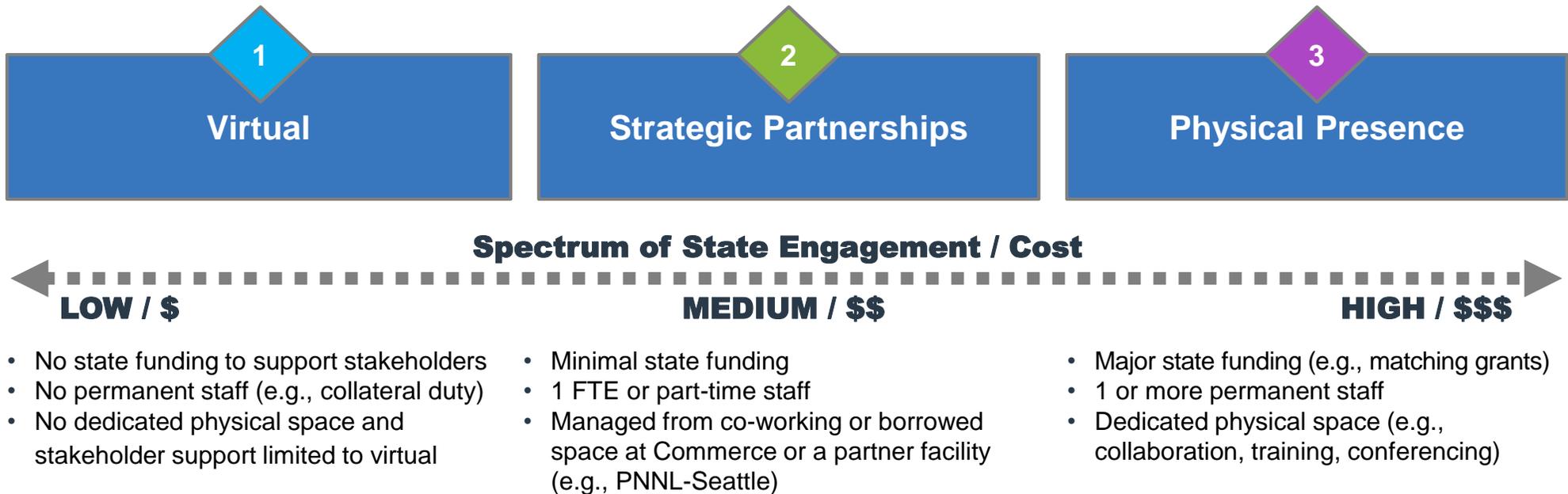
- WA is “punching below its weight” among Military Powerhouses and Balanced Actors in SBIR/STTR awards
- WA ranks 8th among states for DoD contract spend, but much of this appears to support its large installations, rather than R&D with tech transfer potential
- MD, with a similar profile to WA – is home to cutting edge cybersecurity and aerospace entities, such as NSA, DISA, and NAVAIR, and generates nearly 3x the SBIR/STTR awards as WA
- By better coordinating existing resources (industry, VCs, R&D institutions) that lead the nation in areas like IT, space, and AI, WA may be able to evolve into a more resilient Balanced Actor

Maryland, with a similar profile to Washington, leads the Balanced Actor category in SBIR/STTR awards and offers an aspirational example that Washington may be able to emulate

Creating a COE to coordinate existing resources may allow WA to begin closing stakeholder identified gaps and accelerate tech transfer and commercialization

Range of COE Options Available to WA

- PA identified a spectrum of options across which Washington State could implement a COE – the COE's at each end of the spectrum vary greatly in terms of their requirements for state funding, staffing, or physical/virtual assets
- PA proposes three COE options for consideration by Washington State, each designed based on lessons learned from a review of COEs across the country, and matched against specific needs and gaps identified by military and defense sector stakeholders in Washington





Virtual

Largely web-based “virtual COE” to support stakeholders at low cost to WA

WA State Stakeholder Wish List

Coordination

“We look nationwide for talent, partners, etc. – optimally we would...find the skillsets we need locally – there isn’t really a good forum for that”

Marketing

“For the most part, [big WA tech firms] are isolated from the military...and invest in what they know...tech and healthcare”

Pursuit Support

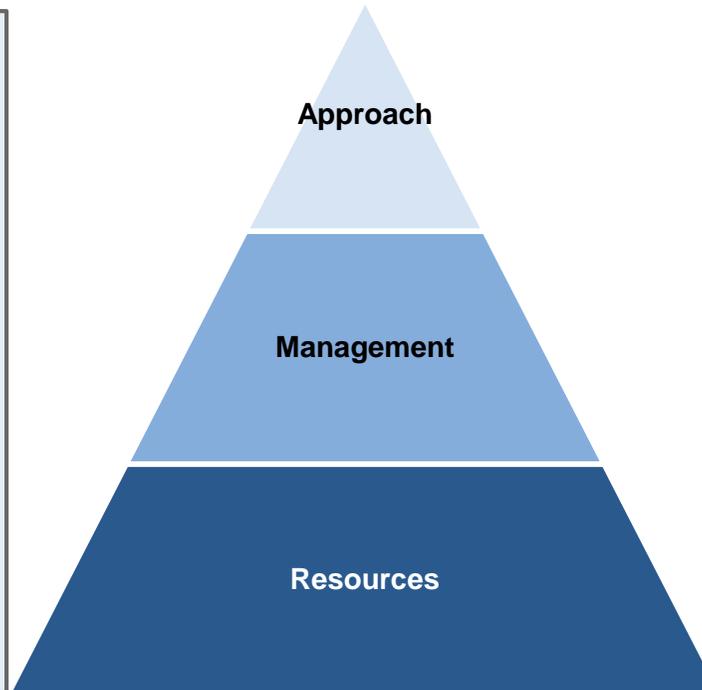
“It is not easy to keep your pulse on all the new technologies”

Capacity Building

“If we could get the state-of-the-art stuff funded, we would definitely attract the right people”

Approach

- “Help you help yourself” model – repository of how-to’s for federal contracting and access to network of pre-screened defense stakeholders
 - Model envisioned as technology agnostic
- Web platform (e.g., *DefenseInnovation.wa.gov*) akin to DoD Defense Innovation Marketplace and open to interested stakeholders in WA or elsewhere (password protected access)
- Platform to offer:
 - WA IP clearinghouse; Member database, teaming partner list, how-to’s for funding avenues (e.g., SBIR/ STTR, accelerators), job board, info on events related to defense, technology, or government contracting, POCs for USG orgs (e.g., PTAC), and/or links to relevant news content and DoD budget information



Management

- Primary responsibility of designated POC to cultivate strategic partner relationships and, to the extent possible, raise funds
- Small pool of funding, raised from industry partner network and managed by COE to provide funding grants (e.g., for professional services support) to small businesses seeking to grow or win US government contracts

Resources

- Web platform *only*
- No full-time staff
- No dedicated physical space or assets available to local stakeholders
- No direct state funding for members

WA State Stakeholder Wish List

Coordination
"We look nationwide for talent, partners, etc. – optimally we would...find the skillsets we need locally – there isn't really a good forum for that"

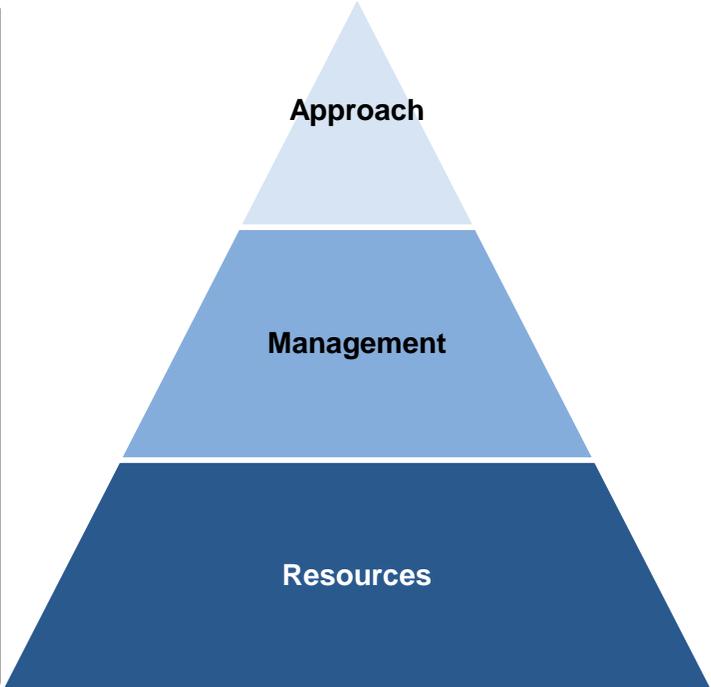
Marketing
"For the most part, [big WA tech firms] are isolated from the military...and invest in what they know...tech and healthcare"

Pursuit Support
"It is not easy to keep your pulse on all the new technologies"

Capacity Building
"If we could get the state-of-the-art stuff funded, we would definitely attract the right people"

Approach

- Model tailored to help advance WA firms' key differentiators (could be broad, e.g., advanced manufacturing or narrow, e.g., AI) by providing enablers, but doing so at low cost to the State
- Web platform, as in COE 1, augmented by resources from interested partners in WA
- Resources available to members based on successful applications
- Potential partner activities coordinated by COE:
 - Low cost or pro bono marketing, legal, or accounting support, reserved slots in accelerators, etc. for defense businesses, network of coaches for DoD contract know-how, on-demand computing or data storage, access to low-cost co-working space or labs, speaker programs by university experts, career days with member organizations



Management

- Initial development through WA State web design or outsourced resources
- Ongoing maintenance a part-time collateral duty for Commerce staffer or intern
- Content updates potentially augmented by social media cross-posting from local stakeholder organizations or via partnerships with WMA, NDIA, etc.

Resources

- 1 COE staff member paid through grant, or Commerce and/or partner funding
- Partner provided workspace for COE staff
- Conference spaces provided by partners for speaker events, career days, etc.
- Lab space available to small businesses through partner facilities
- Low / limited cost computing and/or data storage for members on behalf of partner(s)



Physical Presence

COE with sufficient capacity to provide independent support to stakeholder organizations

WA State Stakeholder Wish List

Coordination

"We look nationwide for talent, partners, etc. – optimally we would...find the skillsets we need locally – there isn't really a good forum for that"

Marketing

"For the most part, [big WA tech firms] are isolated from the military...and invest in what they know...tech and healthcare"

Pursuit Support

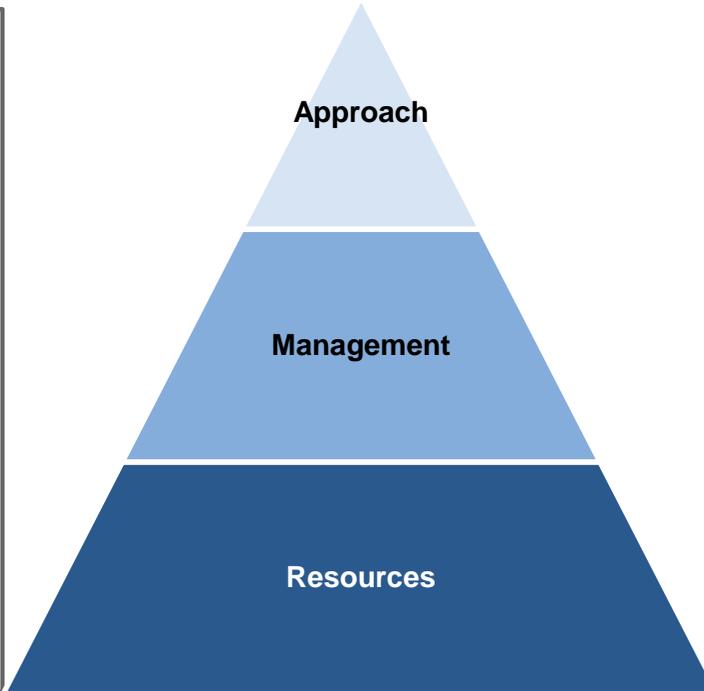
"It is not easy to keep your pulse on all the new technologies"

Capacity Building

"If we could get the state-of-the-art stuff funded, we would definitely attract the right people"

Approach

- Model tailored to drive economic growth in key areas (e.g., built around an OTA consortium focused on AI) by providing a broad array of services to participating stakeholders
- Web platform and partner support, as in COEs 1/2, augmented by robust staffing and funding
- Resources coordinated from central location in close proximity to key industry players
- In addition to partner-provided activities, COE potentially to offer, in its own facilities:
 - Accelerator programs tailored for businesses seeking USG contracts
 - Hackathons and/or career fairs
 - Speaker series with USG "buyers"
 - Prototyping space
 - Training programs on avenues for funding and contracting
 - Partner matching



Management

- Responsibility of FTE's to cultivate strategic partner relationships, but also:
 - Market WA-created IP; Market WA as good home for business; Coordinate events and member support (e.g., hackathons, 1:1's with VCs); Manage access to "maker space" or computing power

Resources

- Multiple (2-5) FTEs, with a scalable model based on demonstrated success
- Pool of funding, raised from industry partner network, and potentially matched by the State
- Dedicated workspace potentially with:
 - Office space for 2-5 permanent staff
 - Reconfigurable conference space
 - Low-cost co-working space for startups
 - "Maker space" with tools for prototyping/training (in specific tech areas)



There are myriad detailed implementation options for each COE model, but PA has estimated ranges that characterize approximate recurring costs for each

			
Cost Category	Virtual	Strategic Partnerships	Physical Presence
Staff	\$45.5K/year (Est.) (0.5 FTE @ \$70K + 30% benefits)	\$91K/year (Est.) (1 FTE @ \$70K + 30% benefits)	\$161-371K/year (Est.) (2-5 FTE @ average 70K+ 30% benefit)
Physical Space	N/A (To use preexisting WA space, e.g., at Commerce facilities)	Limited (Donated by partners at no or very low cost)	\$150/300K/year (Est.) (5K-10K sq. ft. x \$30/sq. ft = \$12.5-25K/month)
Equipment	N/A (To use preexisting WA equipment, e.g., laptops, printers)	Limited (Combination of WA equipment and partner provided equipment in co-working or lab space)	Potentially Significant (Variable, but wide range dependent on detailed approach – e.g., RFT-MII to have large, well equipped prototyping space)
Web Design / Maintenance	\$1800-2700/year (Est.) (Hosting and updates)	\$1800-2700/year (Est.) (Hosting and updates)	\$1800-2700/year (Est.) (Hosting and updates)
Other Professional Services	Limited (Potentially some up front costs for web design)	Limited (Potentially some up front costs for web design, remainder donated by partners at no or very low cost)	Moderate (Potentially some up front cost for web design, remainder donated by partners, or paid for at cost, e.g., training services)

These estimates reflect high-level PA assumptions and are meant to be illustrative only – estimates should be further refined based on WA Commerce inputs and decisions



SUCCESS METRICS

After establishing a COE, WA should consider a number of metrics to determine its impact on the effectiveness of the state’s tech transfer and commercialization goals

“Hard” Metrics

Metric	Measure
Industrial base innovation in the military and defense sector	<ul style="list-style-type: none"> • Uptick in SBIR/STTR awards by DoD or DHS to WA-based firms • Uptick in VC funding to WA based firms • Uptick in new patents
Commercialization of military and defense sector technology	<ul style="list-style-type: none"> • Transition of concepts developed through SBIR/STTR process through Phases 1-3
Size of WA economy	<ul style="list-style-type: none"> • Uptick in WA GDP
Size of WA military and defense sector	<ul style="list-style-type: none"> • Uptick in registration of new businesses in the defense sector • Relocation of businesses from elsewhere to WA

“Soft” Metrics

Metric	Measure
Industrial connectivity to WA state research entities	<ul style="list-style-type: none"> • Uptick in meetings between R&D entities and WA firms or VCs
VC connectivity to military and defense sector	<ul style="list-style-type: none"> • Increased participation of VC sector in COE activities (e.g., IP clearinghouse, forums, accelerators)
Understanding of DoD priorities and contracting processes	<ul style="list-style-type: none"> • Increased engagement between DoD entities in WA and local business and/or R&D centers • Uptick in engagement with PTAC • Increase in RFI or RFP responses to DoD from WA-based firms



No matter which strategy Washington State chooses to undertake, there will be a need to fill existing gaps to ensure success

“Hard” Metrics

Metric	Gap	Options
<i>Industrial base innovation in the military and defense sector</i>	<ul style="list-style-type: none"> Lack of comparative industrial base presence to drive innovation <ul style="list-style-type: none"> Many WA defense firms operate in niche areas Lack of significant prime defense contractor and OEM presence 	<ul style="list-style-type: none"> Attract new presence through engagement with the COE and its entities Engage with current industrial base to expand and enhance its breadth of capability Engage commercial firms to get involved in defense
<i>Commercialization of military and defense sector technology</i>	<ul style="list-style-type: none"> Lack of communication and dialogue between defense and commercial industrial base in WA Commercial firms have capabilities applicable to defense, but appear uninterested in the market 	<ul style="list-style-type: none"> Leverage COE to engage commercial firms as soon as possible and create a path for them to engage in the defense sector
<i>Size of WA economy</i>	<ul style="list-style-type: none"> While WA’s economy is robust, outreach suggests limited ongoing engagement between large successful commercial firms, and smaller defense industry players 	<ul style="list-style-type: none"> Identify ways for commercial firms to benefit from the COE <ul style="list-style-type: none"> Direct defense R&D Assist with better market understanding Matchmaking with defense firms
<i>Size of WA military and defense sector</i>	<ul style="list-style-type: none"> While WA has a large military presence, its defense industrial base is relatively small Few military facilities are focused on R&D and/or procurement 	<ul style="list-style-type: none"> Strengthen bonds between technology focus military stakeholders (e.g., NUWC-Keyport) and local innovators, laying the groundwork for future SBIR/STTR awards

Additional metrics may not be able to be served in-State and may require engaging with entities around the country to bring in the right capability/financing

“Soft” Metrics

Metric	Gap	Options
<p><i>Industrial connectivity to WA state research entities</i></p>	<ul style="list-style-type: none"> • In-state research facilities are less robust than many states with a larger industrial and military presence • There is a comparative lack of presence of firms/business units of larger firms focused on cutting edge R&D 	<ul style="list-style-type: none"> • Development of a COE with access to funding, whether through direct R&D or through creating a pathway to investment through VC/PE
<p><i>VC connectivity to military and defense sector</i></p>	<ul style="list-style-type: none"> • There is very little in state VC/PE that is focused on or interested in defense investments (this is particularly true outside Seattle) • VC/PE often has a limited understanding of the defense market, or ignore it as it is perceived as weaker for potential ROI 	<ul style="list-style-type: none"> • There will be a need to engage with WA based financial sponsors who have an understanding and comfort with defense investing
<p><i>Understanding of DoD priorities and contracting processes</i></p>	<ul style="list-style-type: none"> • While the larger firms understand this process well, there was an identified gap in the smaller, more niche firms in understanding how to engage 	<ul style="list-style-type: none"> • Creating a dialogue between large and small firms, and commercial and defense firms will help create channels to market and better understanding





KEY CONSIDERATIONS & RECOMMENDATIONS

Each model PA evaluated demonstrates best practices and shortcomings that WA should keep in mind as it explores the establishment of its own COE

<u>Success Factors</u>	COE #1: Virtual	COE #2: Strategic Partnerships	COE #3: Physical Presence
Focus on key differentiator(s)	<p>WEAK</p> <ul style="list-style-type: none"> Model envisioned as technology agnostic 	<p>STRONG</p> <ul style="list-style-type: none"> Model requires a focus to properly allocate resources (e.g., space, equipment) 	<p>STRONG</p> <ul style="list-style-type: none"> Model requires a focus to properly allocate resources (e.g., space, equipment)
Facilitate technology funding	<p>WEAK</p> <ul style="list-style-type: none"> Provide more of a “how-to” guide than access to funding for tech development 	<p>MODERATE</p> <ul style="list-style-type: none"> Provide matchmaking services for various funding sources (e.g., SBIR/STTR, VC) 	<p>STRONG</p> <ul style="list-style-type: none"> In addition to matchmaking, potentially provide direct funding via COE grants
Facilitate and/or promote networking between stakeholder groups	<p>WEAK</p> <ul style="list-style-type: none"> Provides database of the right stakeholders but stops short of face to face interactions 	<p>MODERATE</p> <ul style="list-style-type: none"> Sporadic networking events Access to managed member database 	<p>STRONG</p> <ul style="list-style-type: none"> Dedicated FTE to lead member networking, event planning, matchmaking, etc.
Provide operational support for stakeholders	<p>MODERATE</p> <ul style="list-style-type: none"> Some ability to provide business services 	<p>MODERATE</p> <ul style="list-style-type: none"> Part-time or single FTE role to coordinate access to partner provided services 	<p>STRONG</p> <ul style="list-style-type: none"> Dedicated FTEs focus on specific member service areas (e.g., IP marketing)
Attain buy in and/or support from local and/or national gov’t stakeholders	<p>WEAK</p> <ul style="list-style-type: none"> Limited buy in and investment required to establish this model 	<p>STRONG</p> <ul style="list-style-type: none"> Ability to execute dependent on strong buy-in from partners in WA and potentially across US 	<p>STRONG</p> <ul style="list-style-type: none"> Size and LOE to establish will require buy-in and interest from national level stakeholders
WA Implications	Least resource-intensive model has limited ability to achieve the networking standard of other COEs	Achieves goal of enhancing statewide collaboration across communities at moderate cost	Of options presented, model is most resource intensive and most dependent on sector specific strategy

As WA assesses its COE options, it should consider several critical questions and recommendations that are agnostic of the specific model selected

Critical Questions

1) What should the COE focus on?

- A hallmark of successful technology innovators tends to be their focus, either on advancing technology in a single (or short list) of area(s), or on driving cross-sector collaboration
- Many perceive unmanned systems, big data, AI, and commercial space launch as differentiators for WA, and an advanced manufacturing COE might be feasible (but nine focused MII's already exist across the US)
- Any COE must balance between being too generic, and not avoiding stakeholders

2) Where should the COE be located?

- Research by the Brookings Institution's Metropolitan Policy Program suggests that innovation occurs where:
 - *“Leading-edge anchor institutions and companies cluster and connect with start-ups, business incubators and accelerators. They are also physically compact, transit-accessible, and technically-wired and offer mixed-use housing, office, and retail.”**
- Given its geographic expanse, WA could pursue an anchor COE in Seattle (already a burgeoning “Innovation District”) and create satellite facilities at partner locations elsewhere

Overarching Recommendations

- **Engage non-traditional defense stakeholders (e.g., Amazon, Vulcan, Inc., Blue Origin)**
 - WA’s defense cluster lacks the concentration of defense primes and OEMs, defense-related FFRDCs, or technical military populations that many “Balanced Actors” possess
 - Engaging WA’s world-leading innovators outside the traditional defense sector and driving collaboration between them, the traditional defense industry, and WA’s research centers could be a critical spark
- **Augment federal and state dollars by creating a fund to which partners can contribute on a tax deductible basis**
 - SCRA (a self-sustaining COE in South Carolina – see Appendix A) established a fund through which it receives \$6M annually in state tax deductible donations that it disburses to promising technology businesses
- **Pursue a variation of COE 2, as it represents the best balance of face-to-face engagement and initial investment**
 - Stakeholders would lose the natural networking that occurs with face-to-face interactions in COE 1, but a virtual component has merit for any model given WA’s geographic expanse
 - COE 3, while potentially transformational, would come with a requirement of significant up front investment by the state

Realizing that the feasibility of implementation will depend on budgetary concerns and WA's specific strategic goals, PA recommends a variation of COE 2



COE 2 offers a relatively low-cost, scalable solution with minimal required up-front investment and a discrete time commitment, and can evolve in parallel with the needs of the state and local stakeholders

5

APPENDICES

Appendix

A

ADDITIONAL COE PROFILES



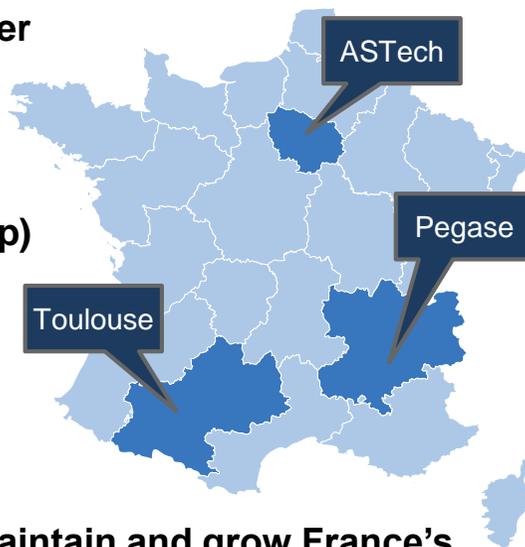
FRANCE'S AEROSPACE CLUSTERS & COE MODELS

REGIONAL PROFILE: France's Aerospace Clusters

France hosts a network of aerospace clusters focused on networking between industry and the research community

Regional Attributes

- ✓ Major presence of A&D primes and major Tier II players (e.g. SAFRAN Group, Thales Avionics, Airbus, Dassault-Aviation, etc.)
- ✓ Strong indigenous supplier network (e.g., Latécoère, Liebherr Aerospace, Nexeya Group)
- ✓ Major engineering, research and training bodies, including Institut Supérieur de l'Aéronautique et de l'Espace (ISAE), Aerocampus Aquitaine, National Center for Scientific Research (CNRS), etc.)
- ✓ Engaged national government seeking to maintain and grow France's economic position in an increasingly competitive global economy



Core Competencies

- Aerostructure materials and manufacturing (e.g., rotary wing, wide bodies)
- Intelligence & Surveillance, led by Pegase region's expertise in UAVs
- Propulsion, led by Aerospace Valley and ASTech clusters
- Cockpit Technologies (e.g., navigation, positioning, telecommunications)

Key Takeaways

Recognizing the potential of several regions, the French government established aerospace-focused clusters that network industry, research and training stakeholders:

- 1) Aerospace Valley**
 - SW France
 - Aeronautics, space, embedded systems
- 2) Pegase**
 - SE France
 - Rotary wing, UAV, lighter-than-air
- 3) ASTech**
 - Paris region
 - Engines and electronics

CASE STUDY: Aerospace Valley, Southwestern France

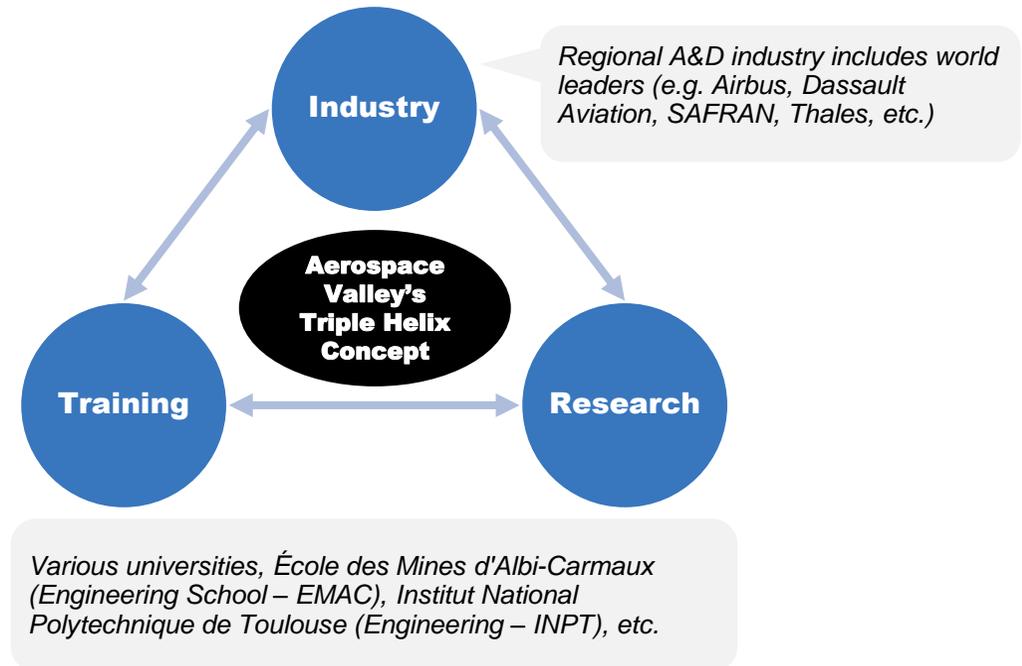
Origination of Aerospace Valley

Established by the French government, Aerospace Valley includes over 1/3rd of the country's aerospace workforce

- **French national government established Aerospace Valley in 2005 as a means of remaining globally competitive and promoting collaboration in the A&D sector**
 - Government provides networking access to other national clusters and international partners
- **Set up in a “Triple Helix” structure to network industry, training and research stakeholders**
 - ~60 major prime contractors and hundreds of smaller companies are part of the group
 - ~8500 researchers are in the Aerospace Valley territory
 - 2 out of the 3 major French engineering schools, as well as 6 universities and 12 Grandes Ecoles in the region

Aerospace Valley Business Model

- **Background:** Established in 2005 as a non-profit association
 - Annual operating costs of €1.6M and permanent staff of under 30 people
 - The cluster supported the creation of ~13k jobs from 2005-2009
- **Services offered:**
 - Financial: access to low-rate loans, investor networks, SMEs
 - R&D: Access to technology and valuation SMEs
 - Networking: Access to major French and international industry shows and conferences



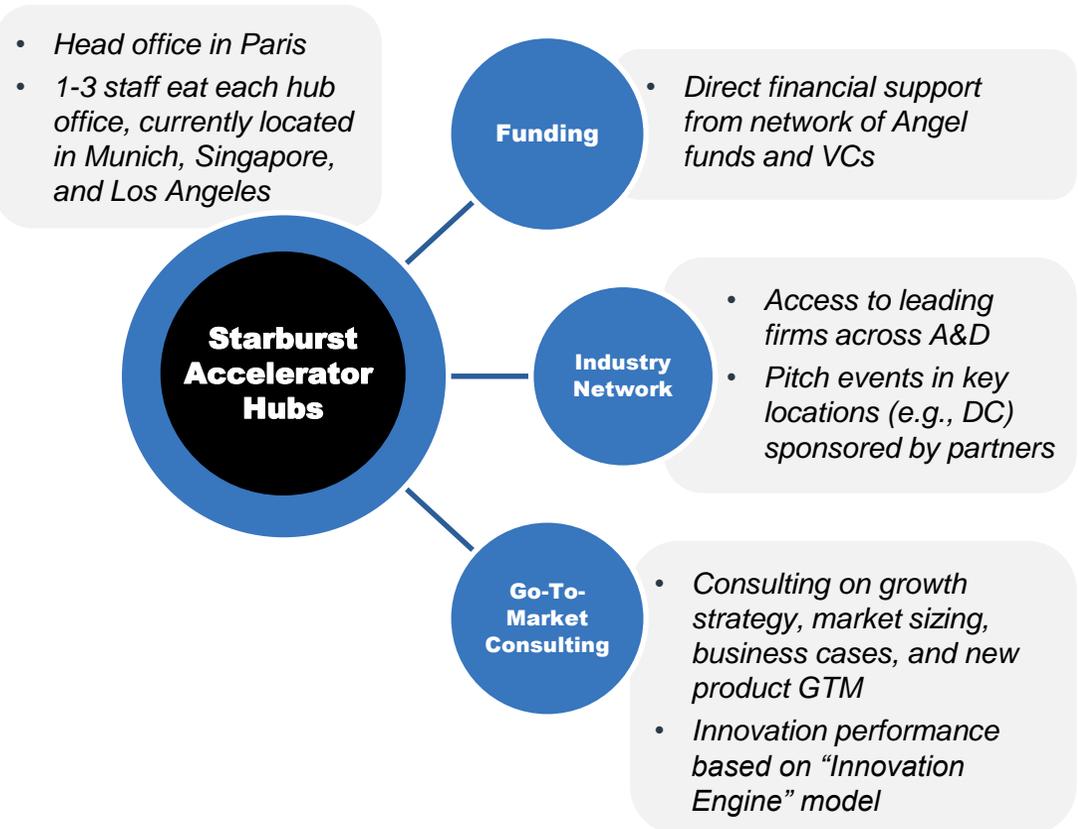
CASE STUDY: Starburst Accelerator

Origination of Starburst

The world's first aerospace industry specific accelerator – created in Paris to transfer innovative technology from labs to market

- **Brings together stakeholders from the private sector, research community, and investment community**
 - Industry partners include Boeing, Airbus, BAE, Booz Allen Hamilton, Raytheon, Safran, Thales, Northrop
 - Other partners include Harvard Business School, ASTech, Space Angels Network
- **Has a had a significant impact on aerospace industry clusters, and is in the midst of further expansion**
 - Offices located in Paris, Munich, Singapore, and Los Angeles, and future office planned for Montreal
 - Has accelerated 103 startups, created 807 jobs, generated nearly \$1m / startup, and is working with close to 100 startups currently
- **Multiple benefits to startups and stakeholder network**
 - Our program offers seed funding from angel investors and VC dedicated to aerospace, aviation and defense, as well as go-to-market consulting services
 - Access to a large group of corporate stakeholders to help startups win their first \$1M contract

Starburst Business Model





OTHER COE MODELS

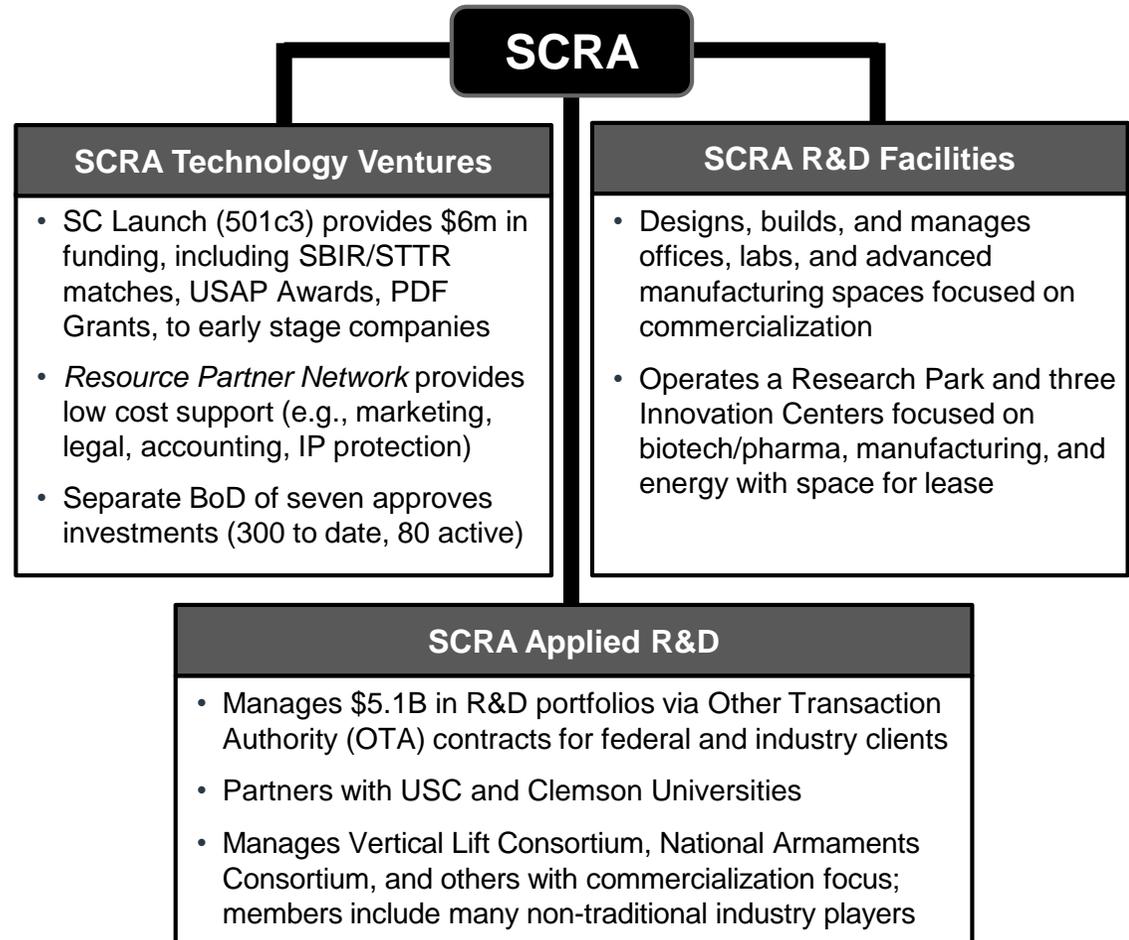
CASE STUDY: SCRA Applied Technologies (South Carolina)

Origination of SCRA

Founded in 1983 with \$500k grant and 14K acres from the State of South Carolina to compete with North Carolina RTP and commercialize local IP

- **Acts as a coordinating node in the defense sector**
 - Manages DoD contract vehicles as interlocutor between innovative businesses and USG customers
 - Focus on prototyping, maritime technology, EM spectrum, advanced materials, and energy
 - Leads several consortiums, including National Armaments Consortium (NAC) with 86 members
- **Significant, measureable impact on South Carolina**
 - Self sustaining with continuous growth – \$399m in revenue and \$1.4b in economic output in 2015
 - Generated 1,390x original funding in economic output
 - Enticed 17 international firms to South Carolina
- **Has created associated SCRA Technology Venture**
 - Shares services with SCRA, but not budget; relies on net revenues and Industry Partnership Fund (IPF)
 - SCRA funded IPF to \$12M in 2006, and receives \$6M annually from industry (State tax credit at 100%)
 - Captured \$362.7m in additional private investments and created 1K+ jobs with average wages of \$69k

SCRA Business Model



CASE STUDY: National Security Technology Accelerator (NSTXL)

Origination of NSXTL

Founded to accelerate “discovery, development, and deployment of innovative... solutions for operational missions and installations”

- **Light footprint, Austin, TX organization focused on building bridges, identifying technology, and funding it**
 - Two part-time staff manage national network of NGOs, companies, tech incubators, and research partners
 - Executes annual Defense Innovation Technology Challenge and issue/area specific technology challenges
 - Awarded an Other Transaction Authority (OTA) contract to directly fund promising companies / technologies
- **OTA contract vehicle allows rapid funding up to \$100M**
 - Focused on operational and installation energy
 - Can be used for prototyping and offers flexibility for engagement of non-traditional contractors (e.g., no cost accounting, commercial standards, IP negotiation)
 - Three year authority with scope to include innovative tech, processes, methods, facilities, and capabilities to identify, test, and provide access

NSXTL Business Model

For DoD

- Need development support
 - Access to tech network
 - Tech prospecting/matching
 - Tech selection support
-
- Contract vehicle for prototyping (OTA)
 - Initiative award process support
 - Facilitation of initiative agreement
-
- Support to management of terms and imitative agreement
 - Monitor progress of tech development

For Members

- Understand DoD req;’s
 - opportunities to efficiently engage DoD
 - White Paper Process to present relevant tech to DoD
-
- Funding mechanism for tech development
 - Facilitation of DoD proposal process
 - Support to initiative planning
-
- Support to tech testing and development
 - Management of funding and award process through initiative lifecycle

Explore

Plan

Deliver

APPENDIX

B

STAKEHOLDER INPUT FROM “LISTENING SESSIONS”

The PA team gathered extensive input from Washington stakeholders about their “core competencies” and need for tech transfer and commercialization support

Locations



1. Tacoma
2. Bremerton
3. Everett
4. Seattle
5. Kent/Auburn
6. Spokane
7. Vancouver
8. Richland

Stakeholder Categories

Research

- Academic research labs
- Government R&D centers

Workforce Training

- Community and Technical Colleges

Government

- Military (leaders and contract staff)
- City and Regional Economic Development organizations

Private Sector

- Marine Manufacturing
- Technology firms
- Tier 1-3 suppliers
- Startups

Advocacy Groups

- Industry associations
- Workforce organizations

Objectives

Capture insights from diverse stakeholders to better understand:

- The reliance of Washington defense industry on DoD and DHS funding
- Resource needs to meet DoD and DHS technology requirements, and maintain healthy business portfolios appropriate to fiscal constraints, budgetary uncertainty and competition
- Insights on enhancing linkages among key stakeholder groups
- Any other barriers to successful tech transfer and commercialization (e.g., structural, financial and human capital)
- Long-term visions for success in technology transfer and incubation

Key takeaways from listening sessions and supplementary interviews

- WA has the resources to drive economic growth through technology transfer and commercialization, but stakeholders believe cross-sector coordination needs to improve to meet that objective
 - Non-traditional defense businesses, commercial banks, and venture capital firms are unfamiliar with processes by which to coordinate with state and federal research institutions, or seek federal contracts
 - WA's research institutions operate independently without an overarching system of professional interaction – they are eager to collaborate and find new sources of outside funding and would welcome a system by which to better synchronize their activities
 - WA's research institutions lack robust marketing staffs and processes for spreading awareness about locally developed IP and opportunities for technology transfer to third-party sponsors, licensees, commercial bankers, venture capitalists, or the federal government
- Stakeholders consulted would welcome a Commerce sponsored center focused on:
 - 1) Information sharing and synchronization of activities among research institutions
 - 2) Serving as an ongoing, real-time 2-way information exchange for state labs, industry, funders (e.g., VCs), and the federal government about tech innovation and transfer
 - 3) Hosting and sponsoring national symposia at which prospective sponsors, investors and companies could observe tech demonstrations and interact with providers to learn more about research and development (R&D) and tech transfer opportunities in the Washington technopole
 - 4) Operational support to companies looking to do business with the federal government

Key takeaways from listening sessions and supplementary interviews (continued)

- A state-sponsored center focused on tech transfer could also help educate public decision makers on the scope, scale, and economic importance of the state's R&D centers, national defense and homeland security operations, and advanced manufacturing capabilities.
- Existing manufacturing or technology innovation centers around the United States tend to have the following attributes, though their processes differ based on regional particularities:
 - A focus on specific technology areas (e.g., 3-D printing, advanced fabrics) and broad national consortiums of thought leaders in those areas
 - The ability to provide funding (e.g., via VC partners, industry matches, SBIR/STTR funding support, or Other Transaction Authority Contracts with the US government)
 - The ability to provide operational support to start-ups or small businesses either directly or through partnerships (e.g., marketing, legal, accounting)
 - The ability to act as a central repository of intellectual property (IP) on behalf of universities, small businesses, etc., and to market that IP to companies or VCs
- Stakeholders from WA's community and technical colleges, workforce development, and economic development are concerned that the state's K-12 system is not generating sufficient graduates with the STEM skills, aptitudes, and attributes needed for today's high-tech economy
 - Employers reported difficulty and unusually long delays in recruiting qualified workers for job vacancies and expressed concern that the problem will be exacerbated by the impending retirement of "Baby Boomers" en masse and an expected exodus of Boeing workers due to corporate retirement plan changes

1. Tacoma

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - Joint Base Lewis McChord (JBLM) regional Mission Installation and Contracting Command (MICC)
 - Tacoma – Pierce County Economic Development Board

Key Takeaways

Top Insights

1. The Army and Air Force have centralized all weapons system acquisitions and other large dollar contracting actions.
 - Local installation officials have no interaction with R&D institutions and are largely limited to acquiring fungible goods and services from small to mid-market vendors.
2. Installation officials rely upon Washington State Procurement Technical Assistance Centers (PTACs) to find responsible qualified contractors.
3. Economic Development Offices (EDOs) learn about tech transfers and other demand pull trends through their ongoing relationships with community and technical colleges, workforce development boards and major local and regional employers.
4. There is such heavy demand for computer science graduates that University of Washington –Tacoma students are often hired before they graduate. Although they often stay in the local area, the demand for workers with computer skills still greatly exceeds supply.

Other Noteworthy Takeaways: A state supported center focused on driving tech transfer could help EDOs anticipate technology trends

2. Bremerton

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - Naval Undersea Warfare Center – Keyport
 - Economic and Workforce Development Offices
 - Private Sector Technology Companies and Start Ups
 - Washington Military Alliance
 - Community and Technical Colleges

Key Takeaways

Top Insights

1. NUWC-Keyport is interested in engaging more systematically with PNNL, the University of Washington, UW-APL, Washington State University and WSU-ASL.
2. Creating a state sponsored center focused on driving tech transfer could strengthen inter-lab relationships and encourage public-private sector collaboration
3. WA's small to mid-market companies would benefit from access to a research or collaboration "cloud".
4. WA Community and Technical Colleges (CTC) have benefited greatly from establishment of CTC Centers of Excellence and from closer collaboration with workforce development offices
5. Community and Technical Colleges are hampered, however, by delays in state approval of curriculum changes needed to keep pace with dynamic workforce requirements.

Other Noteworthy Takeaways: NUWC-Keyport, an applied sciences lab, would welcome early stage engagement with entrepreneurs and start-up companies.

3. Everett

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - City and Regional Economic Development Offices
 - Washington Military Alliance
 - Community and Technical Colleges

Key Takeaways

Top Insights

1. Defense expenditures in Snohomish County are about \$1B annually. The State should collect information about such expenditures and use it to depict the scope and scale of WA's defense economic sector.
2. Former waterfront sawmill sites in Snohomish County present a once-in-a-generation opportunity for conversion to marine manufacturing uses.
3. Whatcom Community College (WCC) was the first National Security Agency (NSA) Center of Academic Excellence in Two-Year Education (CAE2Y) in the nation. It is also a National Science Foundation Advanced Technological Education (ATE) institution and creator / administrator of the CyberWatch West cybersecurity curriculum used in colleges nationwide.
4. WCC has been approached about creating a Marine Cybersecurity curriculum for ships, cargo, terminals and other shore side facilities.

Other Noteworthy Takeaways: WA could assist in training cybersecurity professionals by increased funding, streamlining administrative processes, reducing administrative bureaucracy, expanding access to higher education, establishing a computer science competency requirement for high schools and supporting cyber patriot programs in high schools.

4. Seattle

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - Pacific Northwest National Laboratory (PNNL) - Seattle
 - University of Washington Applied Physics Laboratory
 - Seattle-King County Economic and Workforce Development Offices
 - Washington Military Alliance.

Key Takeaways

Top Insights

1. WA is 1 of only 6 states with a national laboratory. PNNL generates an average of 1 invention per day and files an average of 1 patent per week. The Lab's *National Security Directorate* is the largest in the Dep't of Energy and PNNL's largest directorate by business volume. More than 170 business have been created by PNNL tech transfers. That being said, however, the Lab has a modest tech transfer staff and outreach program.
2. PNNL is planning to host a technology exposition in Seattle in November 2016 with UW and WSU as participants.
3. The UW-APL is a Navy-funded marine research center that focuses on ocean environments, acoustics and electromagnetic sensing and applications, environmental and information systems and electronic and photonic systems that could have broad commercial applications.

Other Noteworthy Takeaways: PNNL and UW-APL would welcome creation of a State Center for Best Practices for Public-Private Sector Tech Transfers. Such a Center could help synchronize and exchange continuous, real-time tech transfer information among and from WA's federal and state labs and sponsor national symposia at which potential sponsors, investors and commercial entities can learn more about R&D and tech transfer opportunities in the WA technopole.

5. Kent and Auburn

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - City of Kent and City of Auburn Economic Development Offices
 - Community and Technical Colleges
 - Member company representatives from the Center for Advanced Manufacturing Puget Sound (CAMPS).

Key Takeaways

Top Insights

1. The cities of Kent and Auburn have a rich history of hosting high-tech corporations (e.g., Boeing space center), start-ups and entrepreneurs drawn to the area by its highly skilled workforce. The region is also home to a robust traditional and advanced manufacturing community.
2. WA Community and Technical Colleges focus much of their attention on meeting workforce requirements of the manufacturing sector.
3. CAMPS is supported by more than a hundred small to mid-market manufacturing and service company CEOs who meet regularly to share best practices and supervise research in industrial business processes.
4. CAMPS companies are struggling to recruit skilled workers. Their recent initiative to build relationships and internship programs with regional high schools is proving successful and is a practice that should be replicated throughout the state.
5. CAMPS believes WA State should play a coordination / facilitation role in helping companies engage with federal and state R&D organizations.

Other Noteworthy Takeaways: Transitioning military members are a reliable and stable workforce source due to their attitude, aptitude and work ethic.

6. Spokane

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - Fairchild AFB contracting officials
 - Washington State University Applied Sciences Laboratory (WSU-ASL)
 - City and County Economic Development Offices and elected officials
 - Washington Military Alliance
 - Community and Technical Colleges

Key Takeaways

Top Insights

1. Like JBLM officials, Fairchild AFB contracting is limited to purchasing installation-level goods and services from small businesses.
2. WSU-ASL averages 10 professional publications, 5 conference presentations and 1 to 2 patent filings annually. It has one shared staff appointment with the PNNL Environmental and Engineering Directorate.
3. WSU-ASL is principally funded by DoD and DHS grants and, to a lesser degree, by contract research for private sector companies.
4. WSU-ASL would be happy to have the State play a “facilitation” role in encouraging information sharing between R&D institutions and bringing researchers into contact with tech transfer sponsors and funding sources.
5. Community and Technical College officials are concerned about a lack of state financial support and by K-12 graduates’ lack of STEM skills and personal attributes needed in today’s private sector economy, in general, and high tech manufacturing industries, in particular.

Other Noteworthy Takeaways: Spokane-area representatives stressed that State officials should play a “supporting” as opposed to a “supported” or “directive” role in hosting information sharing platforms and forums for tech transfer.

7. Vancouver

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - City and Regional Economic Development Offices
 - State/Regional Defense Sector Trade Association (Pacific Northwest Defense Coalition)

Key Takeaways

Top Insights

1. Vancouver does not have an incubation center or accelerator facility, but EDO officials are establishing a privately funded “work space” center.
2. The Pacific Northwest Defense Coalition (PNDC) is a trade organization of small to mid-market defense sector companies, although nearly all its members have both commercial and defense-oriented business portfolios.
3. Most PNDC members are unaware of technology transfer opportunities for which their companies might be an appropriate partner.
4. EDO and PNDC officials support creation of a state sponsored center to facilitate the exchange of information about tech transfer opportunities and stressed that such a center should be created in the “right” agency and with the “right” official to lead it. They also believed that the center should function as a “virtual” clearinghouse rather than an office-centric facility.

Other Noteworthy Takeaways: It is important for policy makers to recognize that the national security sector is far larger than the companies commonly associated with doing business with DoD. Companies in this sector, like in many other Washington State sectors, are struggling to find qualified workers.

8. Richland

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - Pacific Northwest National Laboratory – Richland
 - Washington State University (WSU)
 - Columbia Basin College

Key Takeaways

Top Insights

1. The levels of fundamental and applied science research undertaken at national and university labs (typically Technology Readiness Levels 1-4) require that lab technology be transferred to sponsors outside the lab that have the requisite funding and commercial incentives to mature the technology to “product-ready” TRL 8-9 levels. This requires active engagement with established companies, start-ups, entrepreneurs and members of the commercial banking and venture capital communities.
2. Other states have provided public funding and resources to support such tech transfers.
3. In addition to PNNL and WSU-APL productivity figures previously reported, other research at WSU generates nearly 50 IP licensing agreements and generates creation of 5 start-up companies annually.
4. Columbia Basin College officials are concerned about the lack of computer science courses in Tri-Cities-area high schools

Other Noteworthy Takeaways: PNNL, WSU and Columbia Basin College representatives believe a state clearinghouse for tech transfer information would stimulate growth in the WA technopole and stimulate better HS education choices

8. Additional Listening Sessions – Seattle, Lakewood and Tacoma

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - Vigor Industries, Inc.
 - City of Lakewood Military Partnership
 - University of Washington – Tacoma
 - Pacific Northwest National Laboratory – Seattle

Key Takeaways

Top Insights

1. Marine manufacturing companies rely so heavily on Community and Technical Colleges that Vigor Industries, for example, has made direct investments and provided facilities, tools and financial support to local colleges to assure the training of highly skilled maritime workers.
2. The latest technology challenge for marine manufacturing companies is incorporation of composite materials into marine equipment and surface / subsurface platforms. Companies like Vigor Industries also endorse establishing “work space” arrangements like the UW-APL “Collaboratory”.
3. On June 20, 2016 President Obama designated PNNL to lead a newly established *Pacific Northwest Regional Manufacturing Center* to help revolutionize smart manufacturing technology applications and processes needed by energy intensive, clean energy and energy dependent industries.

Other Noteworthy Takeaways: Participants in additional listening sessions all agree that a state clearinghouse for public-private tech transfer information would help grow the WA technopole and incentivize the kinds of K-20 education choices needed for WA and its workers to be competitive in the global economy

9. One-On-One Interviews

Listening Session Details

- Key stakeholder groups, organizations, or individuals listed, engaged, or in attendance:
 - SCRA (South Carolina Research Authority)
 - Revolutionary Fabrics and Textiles – Manufacturing Innovation Institute (RFT-MII)
 - Massachusetts Innovation Bridge (MIB)
 - Seattle Angel Conference
 - Alta Vista Solutions
 - Esterline
 - PTAC

Key Takeaways

Top Insights

1. Successful technology or manufacturing innovation centers across the country tend to focus on specific technology areas (e.g., 3-D printing, advanced fabrics), assemble national consortiums of thought leaders, fund innovators directly, and offer operational support
2. Industry representatives face several key challenges: 1) competing with Seattle-based innovators (e.g., Amazon, Microsoft) for top talent that does not perceive defense to be as interesting as tech; 2) managing the government contracting process, particularly the bureaucratic elements, the long payback period, or limited contracted R&D funding; 3) identifying the right partner companies and/or the right people to speak with
3. Despite the presence of many leading aerospace and defense firms in the state, Washington lacks an innovator or accelerator focused on the sector (or more generally on helping companies seeking government funding)

Other Noteworthy Takeaways: As in the Listening Sessions, interview participants were generally supportive of establishing a technology or manufacturing innovation center of excellence in the State of Washington with some or all of the attributes described above.

PA consulted a variety of organizations and individuals as part of its outreach

Organization	Sector
University of Washington Applied Physics Laboratory	Academic Research Lab
Washington State University <u>and</u> the WSU Applied Sciences Laboratory	Academic Research Lab
Association of Washington Business (AWB)	Business Association
Chesapeake Innovation Center (CIC)	Innovation Center of Excellence
Ignite Northwest	Innovation Center of Excellence
Revolutionary Fabrics and Textiles – Manufacturing Innovation Institute	Innovation Center of Excellence
SCRA (South Carolina Research Authority)	Innovation Center of Excellence
Massachusetts Innovation Bridge	Innovation Center of Excellence
City of Liberty Lake	City Economic Development
City of Auburn - Economic Development Office	City Economic Development
L Miller Consulting	Consulting Firm
City of Lakewood Military Partnership	Defense Advocacy Group
Washington Military Alliance (WMA)	Defense Advocacy Group
ATS NW, Inc.	Defense Industry
Esterline	Defense Industry
Pacific Machine, Inc.	Defense Industry
RedDot	Defense Industry
Tri-Tec Manufacturing	Defense Industry
Super Critical Technologies	Defense Industry
Vigor Industries, Inc.	Defense Industry
Alta Vista Solutions	Defense Industry
Fairchild Air Force Base	DoD Installation
Joint Base Lewis McChord (JBLM)	DoD Installation
Naval Undersea Warfare Center-Keyport	DoD Installation / National Lab (US Navy)
Greater Spokane, Inc.	Economic Development (City / Regional)

Organization	Sector
Economic Development Board for Tacoma – Pierce County	Economic Development (City / Regional)
Spokane County	Economic Development (City / Regional)
City of Kent Economic Development Association	Economic Development (City)
City of Vancouver Economic Development Office	Economic Development (City)
City of Airway Heights	Economic Development (City)
Columbia River Economic Development Council	Economic Development (Regional)
Economic Alliance of Snohomish County	Economic Development (Regional)
Kitsap Economic Development Association	Economic Development (Regional)
Center for Advanced Manufacturing Puget Sound (CAMPS)	Industry Association
Pacific Northwest Defense Coalition (PNDC)	Industry Association
Pacific Northwest National Laboratory (PNNL)	National Lab (US DoE R&D Center)
ATS, Inc.	Technology Firm
Critical Informatics	Technology Firm
Seattle Angel Conference	Venture Capital
University of Washington-Tacoma	Workforce Training
Avista Center for Entrepreneurship	Workforce Training
City of Lakewood Workforce Central	Workforce Training
Columbia Basin College	Workforce Training
Green River Community College	Workforce Training
Spokane Community College	Workforce Training
Spokane Workforce Development Council	Workforce Training
Whatcom Community College	Workforce Training
Olympic College	Workforce Training
Seattle-King County Workforce Development Council	Workforce Training

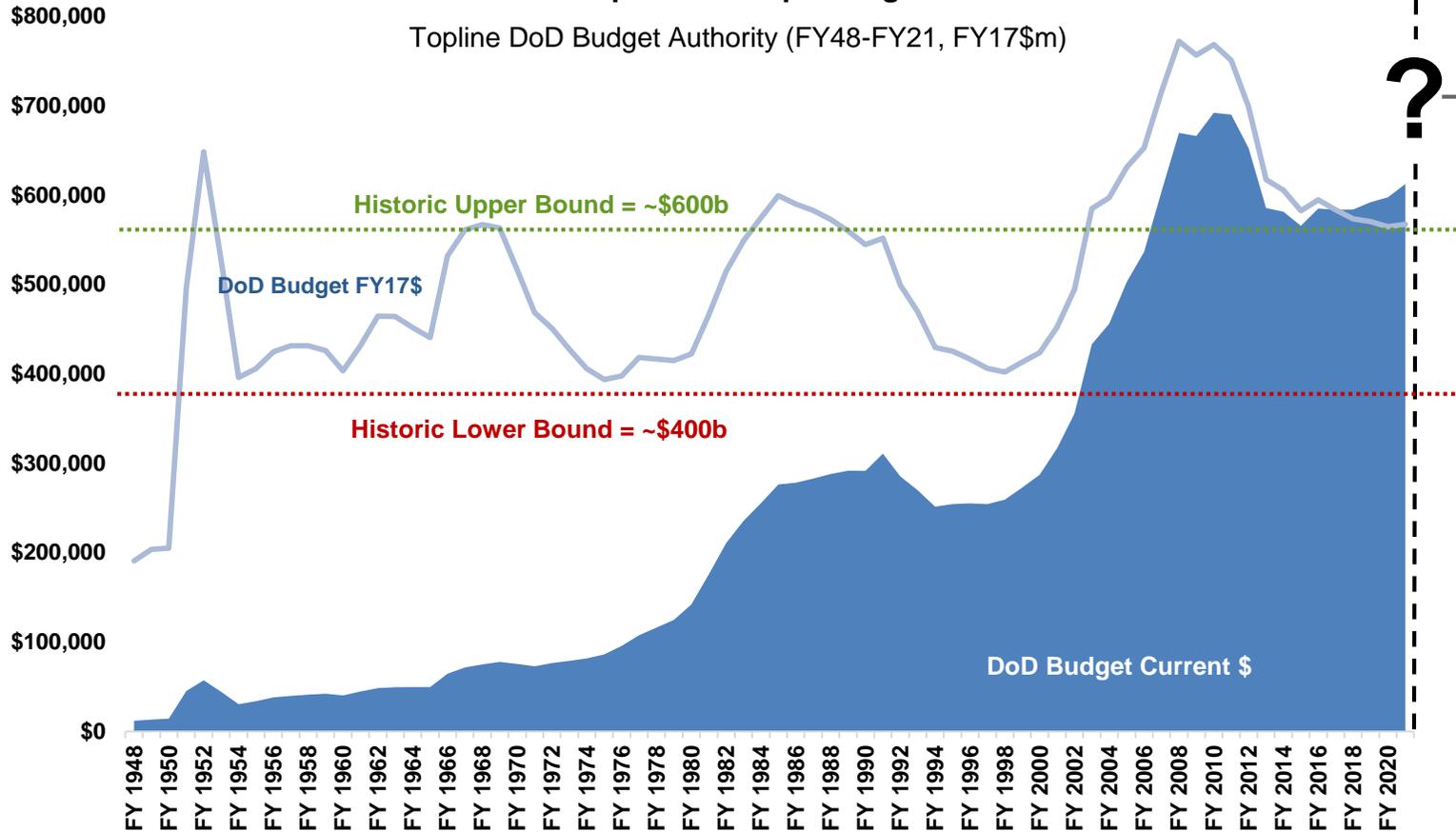
Appendix

C

STRATEGIC CONTEXT
(EXPANDED)

Since the end of WWII US DoD spending has followed a predictable 20-year cycle, but there is a question as to whether we are seeing a change to that cycle

Topline DoD Spending



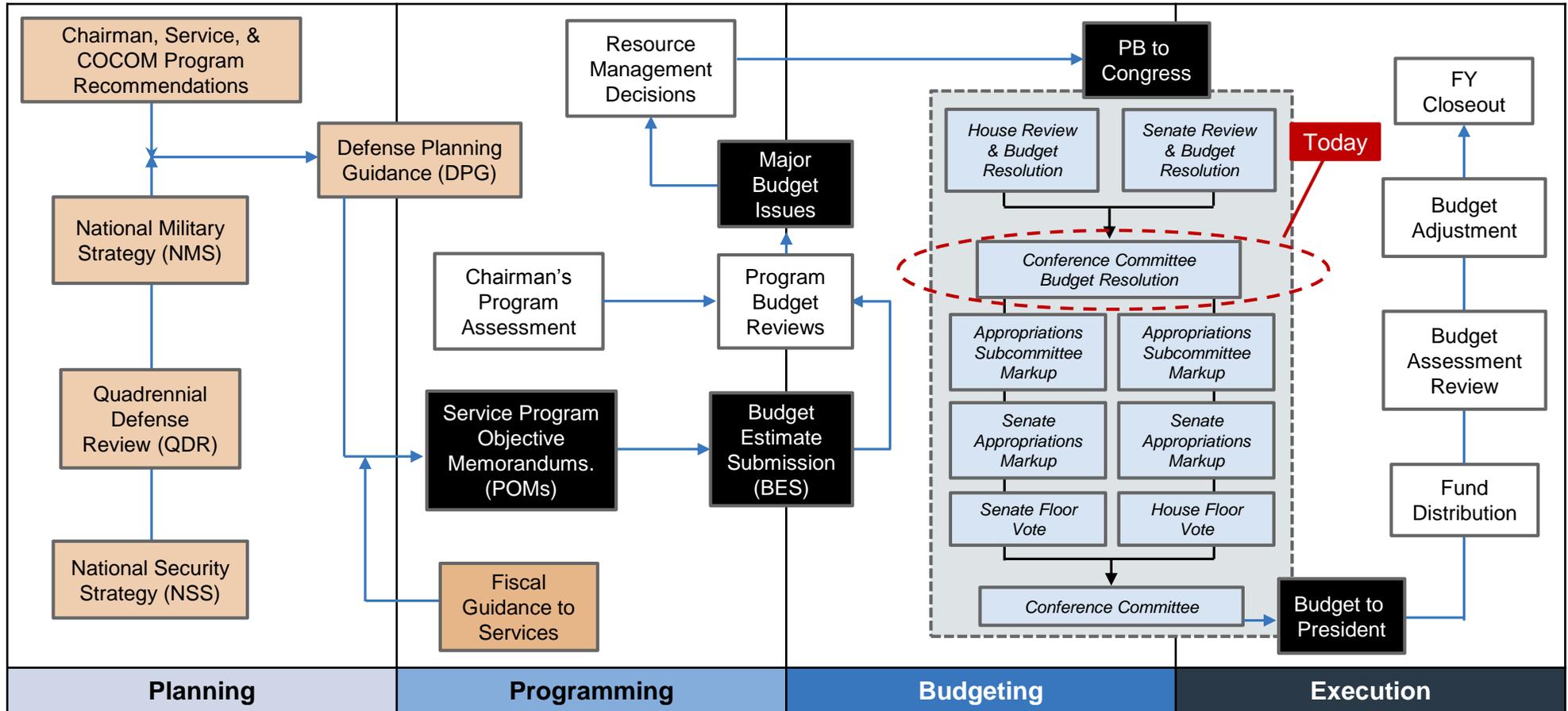
Are we in a paradigm shift?

- Budget floor appears higher than \$400b
- Rise of non-state threats requiring non-traditional capability
- Battlespace evolving (e.g. cyber, space, etc.)
- DoD focus on innovation and commercial capabilities (e.g. DIU(X), 3rd Offset Strategy)
- Defense as a % of GDP shrinking over the last several years and moving forward
- Use of OCO funding above baseline

A key issue is whether DoD will force industry to move to more commercial mindsets by changing acquisition requirements and making it easier to engage non-defense firms

Source: DoD, PA Analysis

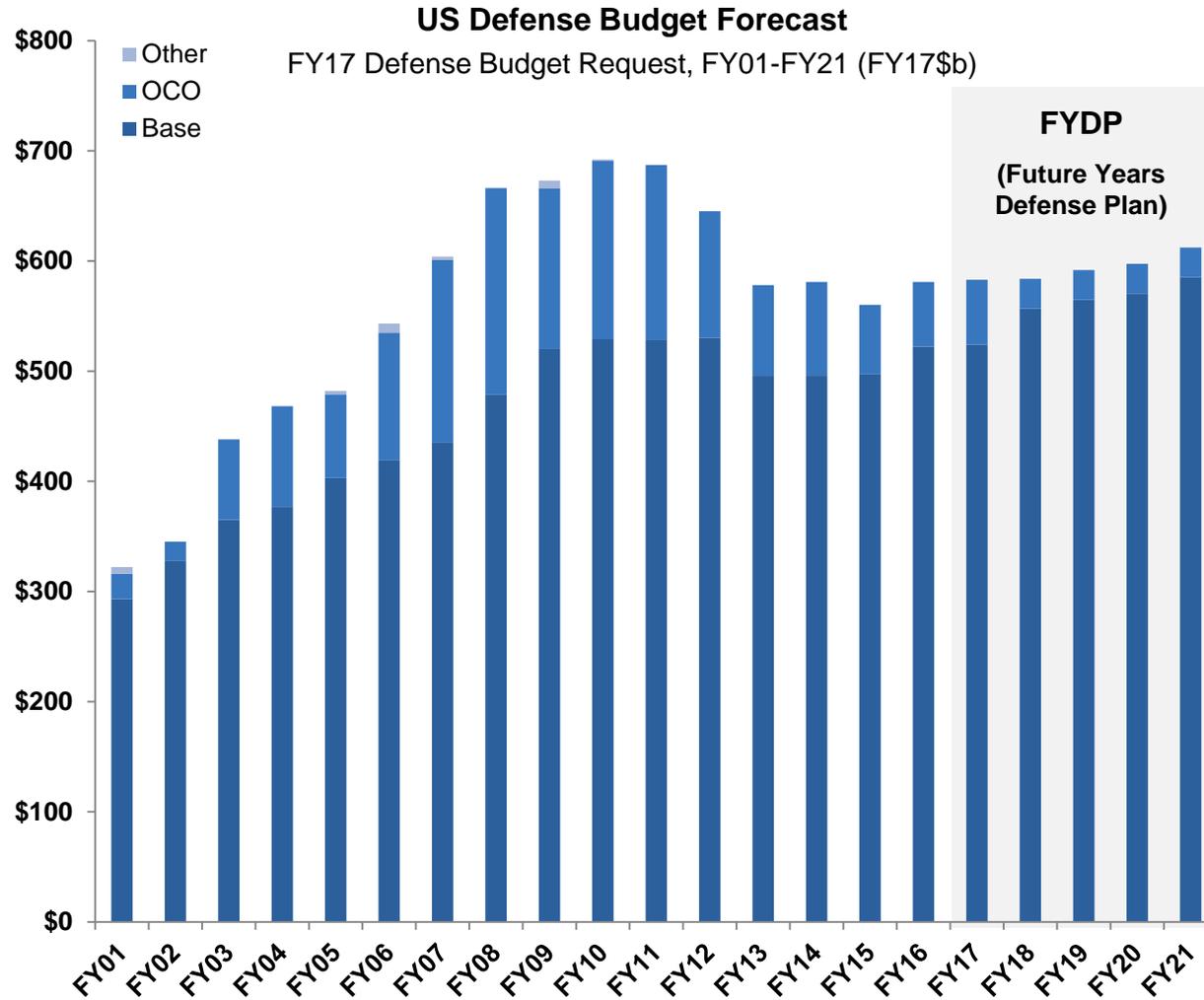
The FY17 budget is now with Congress and while issues remain, analysts do not expect major changes – the 2016 election however, could result in a major shift



- **Analysts largely confident that Congress will not significantly increase the budget as doing so would obviate the October deal**
 - Increases to spending likely to focus on pay raises for military personnel or additional funding for overseas operations

- **2016 Presidential election, and the possibility of a Democratic majority in the Senate, could dramatically alter the paradigm in 2016**
 - Democratic win in one or either could solidify key Carter/Work initiatives – a Republican win would result in an all new landscape

The Administration is requesting \$582.7b for defense spending in FY17 (Base + OCO), which is \$2.4b (~.4%) more than the FY16 enacted level of \$580.3b



Budget Overview

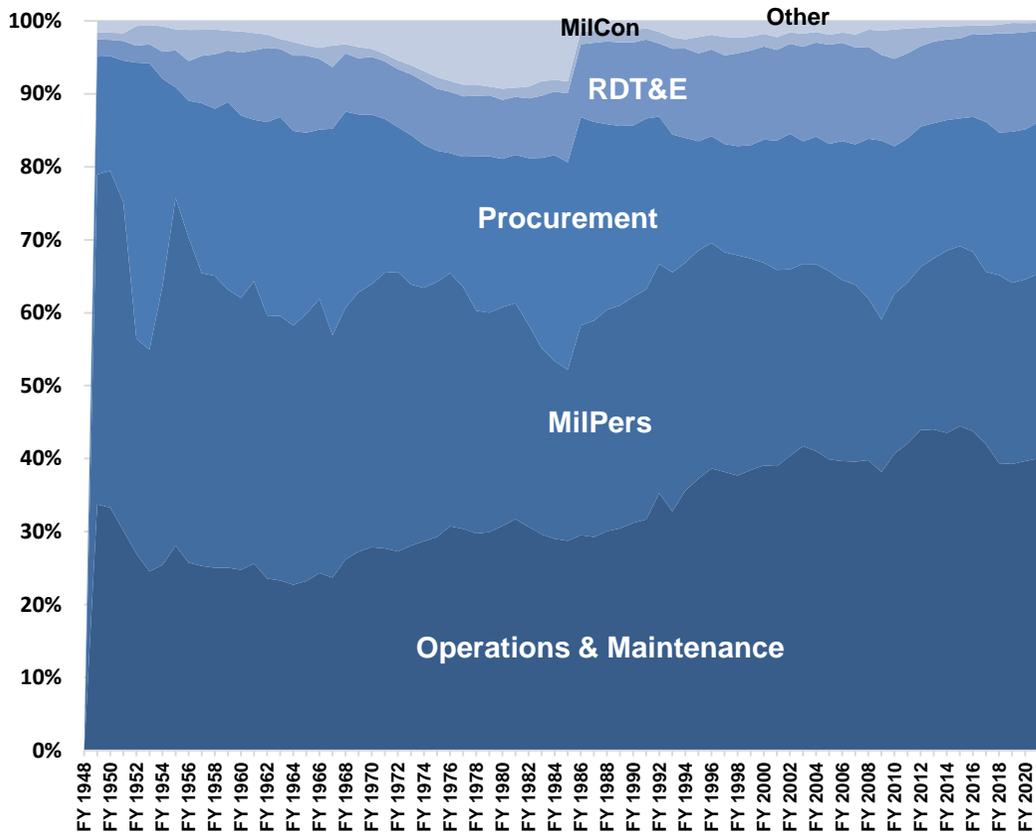
- **The Bipartisan Budget Act of 2015 provided some stability in FY16/FY17 budgets**
 - FY18 will likely see a much greater debate depending on the Administration and the state of the economy
- **There are three areas DoD is focusing on to “reduce risk”**
 1. Prioritize conventional deterrence against near-peer threats
 2. Focus more on the shape than the size of the force
 3. Emphasize innovation
- **DoD has suggested that the new NDAA under the BBA provides ~98% of funding requested**
 - While not ideal for DoD, planning can be managed by slipping a few major programs
- **\$27B forecast OCO request a DoD placeholder and will likely grow in future budgets**
 - OCO has become an increasingly convenient tool

Source: DoD Comptroller, PA Analysis

Growth in O&M and MilPers will continue to put pressure on Investment accounts, especially as more advanced systems become more expensive to maintain

Topline DoD Spending

Share of DoD Budget Authority by Account (FY48-FY21)



Spending Overview

• Operations & Maintenance

- CAGR FY17-FY21: 0.7%
- Cost to maintain weapons systems growing
- Transition from DoD personnel to the use of contractors moving funds from MilPers to O&M

• Military Personnel

- CAGR FY17-FY21: 0.1%
- Cost of the All Volunteer Force is cheaper in peacetime, but more expensive during periods of high OPTEMPO
- Salaries and benefits continue to rise

• Procurement

- CAGR FY17-FY21: 2.3%
- Advanced technology on new platforms leading to more capable systems in far fewer numbers

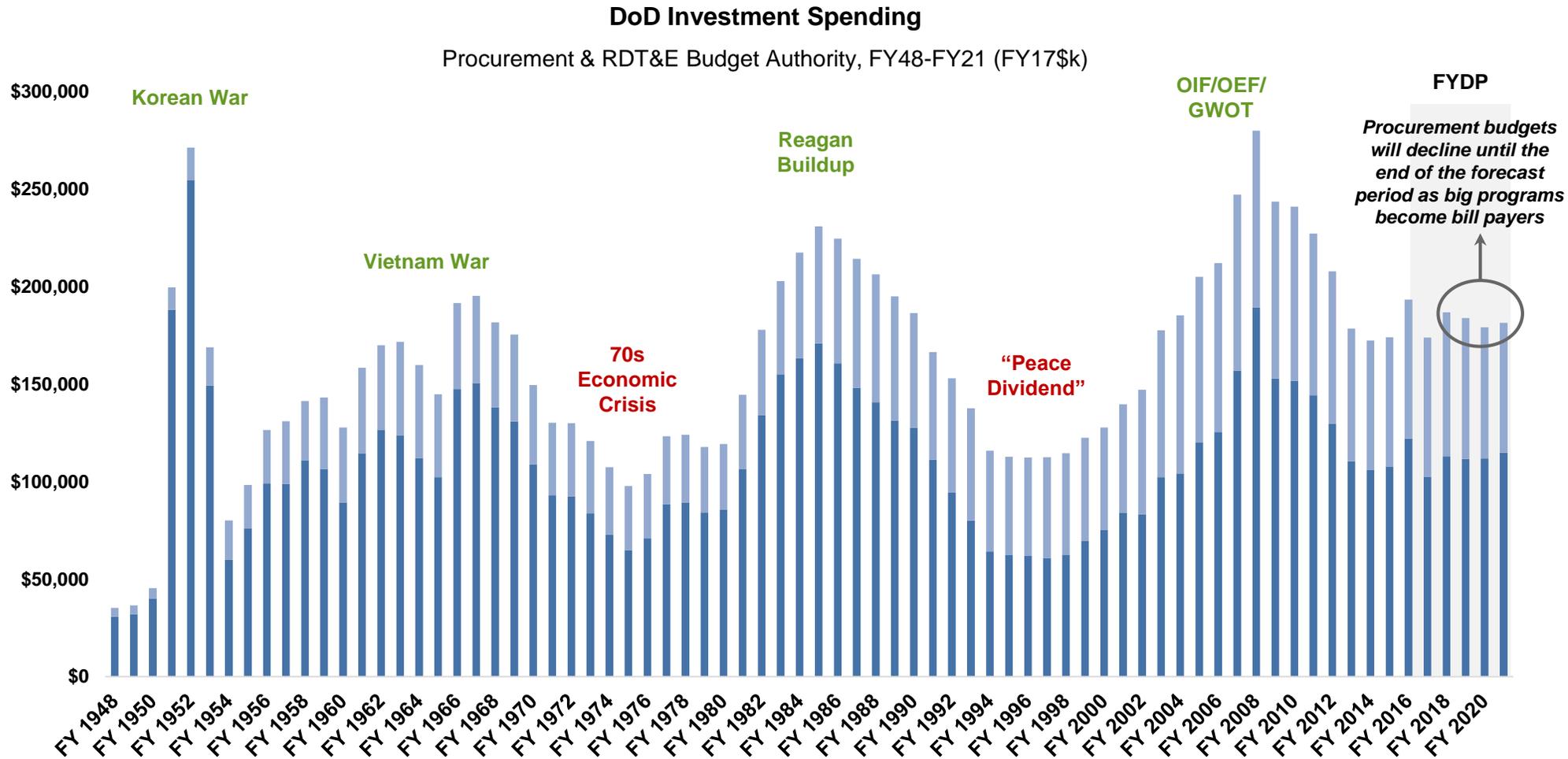
• RDT&E

- CAGR FY17-FY21: -2.6%
- RDT&E spending growth still negative, but less so by ~1% over FY16 budget submission
- \$18b for 3rd Offset Strategy investment over FYDP

Despite a greater focus on innovation, practical budget pressures may limit what DoD can afford, especially if the US maintains a high overseas OPTEMPO

Source: DoD Comptroller, PA Analysis

US Investment budgets have largely been cyclical, but current projections suggest a flat to slight decline in funding over the FYDP



Despite some topline growth, Investment budgets will face challenges due to competing budget demands and ever increasing platform costs

Source: DoD, PA Analysis

Modernization appears to be a top priority within the Investment account in the FY17 budget, while large programs become “bill payers”

FY16 to FY 17 Budget Cuts

DoD planning to reduce the number of units acquired as part of its largest programs to relieve budget pressure

- **Programs to be cut from Procurement over the FYDP:**
 - 9 AH-64 Apache helicopters (Army)
 - 24 UH-60 Blackhawk helicopters (Army)
 - 5 F-35A Joint Strike Fighters
 - 2 V-22 aircraft (Navy)
 - 3 C-130J aircraft (Air Force)
 - 4 LCAC Service Life Extension Programs (USN)
 - 77 Joint Light Tactical Vehicles (USMC)
- **Aircraft procurement accounts reduced \$4.4b**
- **Shipbuilding reduced \$1.75b**
- **Other procurement accounts reduced \$2.6b**
- **Reduce plans for new MilCon projects by \$1.1b**

Secured in FY17 Budget

While a select few areas have been targeted for modernization, R&D budgets are not set for massive growth

- **Programs secure with a focus on modernization:**
 - DDG modernization and SSN upgrades
 - Surface ship advanced munitions and sensor technologies
 - Investment in space capabilities
 - Hypersonic R&D
 - Cyber tools for Combatant Commanders
 - Army aviation modernization plan
 - Marine Corps vehicle modernization plan
- **Planned force structure levels**
- **Service readiness recovery plans**
- **Nuclear force at New START levels**
- **Force of the Future initiatives**
- **Key reform proposals (e.g., TRICARE)**

DoD appears willing to trade off a reduced number of big-ticket procurements in an effort to stimulate modernization in select technology areas

Given ongoing fiscal pressure, and a rapidly evolving external threat environment, the US defense and security establishment is under pressure to do more with less

Modernization Challenges

The FY17 DoD budget cuts procurement units to support high-priority investments

- **Upcoming budgets are expected to be above Budget Control Act caps, but not sufficient to implement DoD's full needs**
 - Procurement budgets hit hardest to protect O&M, RDT&E, and MILPERS
 - F-35 JSF, Army modernization, etc. “bill payers” for near-term investment
 - “Bow wave” must be addressed, likely after 2021, due to pressure from programs like SSBN-X, with further cuts or supplemental funding possible
- **DoD has estimated that the FY17 budget will be \$15b below planned needs**
 - DoD stated that investment plans for FY17 needed to be cut to fit the budget to align with the October deal

New Threats

Amidst continuing violent extremist threat, DOD focusing on potential “great power” adversaries

- **Despite continuing focus on countering violent extremists, a variety of other potential peer or near-peer threats are emerging**
 - China investing in long-range systems to dominate Western Pacific and extend reach
 - Russia testing new capabilities in Ukraine and threatening Eastern Europe
- **Across domains and regions, proliferation of guided swarm weapons becoming a major concern and shifting cost imposition to US**
 - Must counter swarms of guided rockets, artillery, mortars, missiles, or small UAS
 - 1-to-1 defense too expensive or logistically burdensome and platforms face “magazine depth” issues
- **US “pivot” to the Asia-Pacific will drive new technological needs in air and undersea**

Technology & Innovation

DoD need to invest in new tech could result in new approaches, or drive disruption

- **DoD facing an erosion of its technology dominance in several key areas**
 - Adversaries increasingly using commercially incubated “off-the-shelf” technology to counter US advantages
 - DoD beginning to implement new approaches to develop capabilities or constructs to shift cost imposition back to adversaries
- **New policies, or a new administration could create opportunities for existing industry players and new market entrants**
 - If barriers to entry crumble, new innovative firms could cause disruptions (e.g., as SpaceX has done with space launch) as they seek out government funding

DoD is now embarking on several initiatives to more effectively leverage the capabilities of industry “technopoles,” like those that exist in Washington, to protect US military advantage

The 3rd Offset Strategy, advanced by DoD leaders, to enable the US to conventionally deter great powers, underlies the DoD's innovation agenda

3rd Offset Strategy

- **Senior DoD leaders are promoting the “3rd Third Offset Strategy” to ensure the US can deter *peer adversaries* via conventional means**
 - The 3rd Offset Strategy seeks to offset adversaries not by matching them 1-to-1 in ships, aircraft, etc., but by gaining disruptive advantage through breakthrough technological capabilities, or strategy-based organizational or operational constructs
 - First two offset strategies emphasized tactical nuclear weapons to achieve advantage in Europe in the 50s and precision munitions to counter Soviet nuclear advantage in the 70s
- **3rd Offset Strategy will investment in key technology areas to enable human-machine collaboration and combat teaming**
 - Technology focus areas include learning machines (e.g., big data), human machine collaboration (e.g., JSF helmet), assisted human operations (e.g., exoskeletons), combat teaming (e.g., P-8/BAMS combo), and semi-autonomous weapons
 - DoD to reinvigorate wargaming, experimentation, futuristic studies to explore new concepts
- **DoD will employ several key to identify, fund, and incubate the technologies or constructs needed to achieve the strategy**

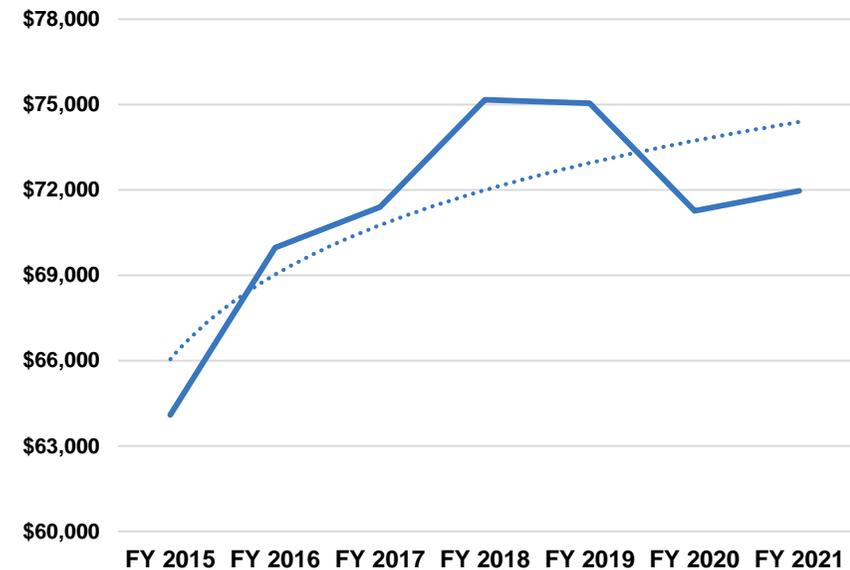
Lacking sufficient CRAD to meet DoD objectives, industry will need to lead the way with its own IRAD – to help, DoD is creating new connections to help industry target that spending

Budget Implications

- **~\$18B marked for the “3rd Offset technology” over the FYDP, though planned RDT&E levels not in line with innovation vision – DoD will need industry help**

RDT&E Spending Forecast FY14-21

(FY17\$m)



*CapAlpha Advisors

To support 3rd Offset Strategy, DoD launched the Defense Innovation Initiative and other efforts to connect with and leverage both new and legacy industry players

Defense Innovation Unit Experimental (DIUx)

Envisioned to help cultivate lasting relationships with new innovators, with a pilot project in Silicon Valley

- Innovation hub staffed by DoD and tasked to identify ideas and talent outside traditional defense industry and connect them with DoD requirements generators and funders

DIUx 2.0 announced in May 2016, with planned office at MIT campus in Cambridge, MA – others likely to follow

Long Range Research & Development Plan (LRRDP)

Established in 2014 to:

- “identify high-payoff enabling technologies that...offer opportunities to shape...future competition for technological superiority, and will focus on technology that can be moved into development programs within...five years”

Teams on *Space, Undersea, Air Dominance and Strike, Air and Missile Defense, and Technology-Driven*

Strategic Capabilities Office (SCO)

Created in 2012 to:

- “help...re-imagine DoD and intelligence community and commercial systems by giving them new roles and game-changing capabilities to confound...enemies”

Focus on rapid fielding expanded to include long-lead systems

Funding up from \$125 to \$530M from 2014 to 2016

In-Q-Tel

Not-for-profit venture capital firm established in 1999 by CIA to:

- Help bridge gap between emerging commercial innovation and Intel Community by providing seed funding to advance new tech

DoD will make small investments with In-Q-Tel to leverage “proven relationships and apply its approach to DoD”

Defense Innovation Marketplace

Communications resource created by DoD to provide industry:

- Enhanced insight into DoD and other agency R&D priorities

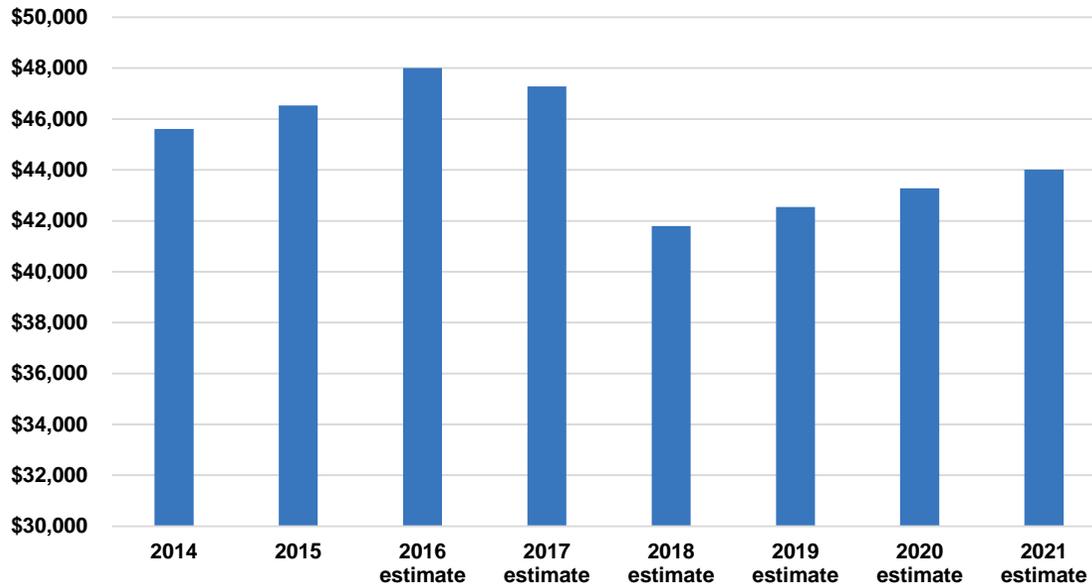
Repository of DoD strategic documents, contract solicitations, and relevant news and events

Intended to help industry align R&D with DoD need, and make smart IRAD investments

These efforts represent progress, but much more remains to be done at the federal level...

Though the Department of Homeland Security's budget is much smaller than DoD's, it presents pockets of opportunity for firms in the defense and tech space

Department of Homeland Security Discretionary Budget Authority (\$M)



- DHS's FY17 Budget includes ~\$47b in net discretionary funding distributed amongst 14 DHS organizations, including Customs and Border Protection (CBP), the Coast Guard and the Federal Emergency Management Agency (FEMA)
- From FY16-FY21, DHS's total budget is expected to decline by about 2%
- Major future programs include a small Unmanned Aircraft System (sUAS) advanced sensing effort, the USCG future heavy Polar class icebreaker(s), UAV detection systems, human factors-based threat detection, and cyber security

Major FY17 Funding Priorities

- **Prevent Terrorism and Enhance Security**
 - Transportation Security Administration (TSA) Screening Operations (\$5.1b)
- **Secure and Manage Our Borders**
 - Border Patrol and CBP Benefits/Salaries (\$7b)
 - Immigration and Customs Enforcement criminal investigations and personnel costs (\$2.1b)
 - Coast Guard counter-drug and alien migration interdiction operations \$2b
 - Coast Guard's ports, waterways, and coastal security efforts (\$1.6b)
- **Enforce and Administer Our Immigration Laws**
 - Maintain Immigration and Customer Enforcement detention beds (\$2.2b)
- **Safeguard and Secure Cyberspace**
 - National Cybersecurity Protection System (NCPS) (\$0.47b)
- **Strengthen National Preparedness and Resilience**
 - Disaster Relief Fund (\$7.3b)
 - State and Local Emergency Funding (\$2b)

Appendix

D

PROJECT TEAM

Commerce engaged PA Consulting Group and Gordon Thomas Honeywell Government Affairs to execute this study over the next four months

PA Consulting Group

- 70+ year old, employee-owned management consulting firm of 2,500+ staff with revenues of \$675m
- Operations in the US / Americas, Europe / Nordics, Asia-Pacific, and the Gulf – US offices in New York, Washington, DC, Boston, Denver, and Los Angeles
- Expertise across industries, including: aerospace, defense, security, energy, financial services, life sciences and healthcare, manufacturing, government, telecommunications, transport and logistics
- Service expertise in strategy, innovation, operations, and technology development and advising
- Has operated a Technology Center in Cambridge, UK for 40 years that employs 250 scientists and engineers focused on incubating and commercializing new technology and creating linkages between the defense industry, academia, government, and entrepreneurs.
- Prime contractor to Washington Department of Commerce

Gordon Thomas Honeywell Government Affairs

- Washington State-based firm offering comprehensive professional consultancy services, including government affairs, government research, strategy consulting, and association management
- Offices in Seattle, Tacoma, and Washington, DC
- Provides supports to diverse clients at the federal, state, local, and international levels
- Offers policy expertise on subjects ranging from national defense and the defense industrial base to homeland security, technology, biotechnology, and cybersecurity
- Subcontractor to PA Consulting Group

The PA Consulting Group Team



John Kenkel, Managing Consultant at PA

Mr. Kenkel leads strategic engagements and M&A assignments across the global aerospace, defense, security and government services sectors. Prior to PA he was a Managing Partner and co-Founder of Renaissance Strategic Advisors, a strategy and M&A support firm serving the global aerospace and defense industry. He has previously been a founding member of Jane's Strategic Advisory Services and worked at DFI International. Mr. Kenkel holds BAs in Diplomacy & Foreign Affairs and Political Science from Miami University.

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James Marceau, Partner at PA

Mr. Marceau has 25 years of experience in business, leadership, operations, and management consulting. He specializes in strategy, supply chain management, cost optimization, and transformation, and has worked with business and government executives at the highest levels. James was most recently President and CEO of Celerant Government Services (CGSI) and was previously a partner at Oliver Wyman and Capgemini. Mr. Marceau holds an MBA from the University of Miami and a BA from the University of Colorado.

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Andrew Jesmain, Consultant at PA

Mr. Jesmain advises executives in industry and government, using scenario-based analysis to inform strategy and multibillion dollar investments. He was previously a manager at Booz Allen Hamilton and has worked in the Office of the Secretary of Defense and at the Defense-Industrial Initiative Group at the Center for Strategic & International Studies. Mr. Jesmain holds an MA in International Relations from Syracuse University and a BA (Honours) from Queen's University.

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Annassa Brindley, Consultant at PA

Ms. Brindley leads due diligence and strategy efforts for aerospace and defense clients. Prior to PA she was a project manager at the Avascent Group, a leading boutique consulting firm where her clients included Lockheed Martin, aerospace and defense component suppliers, and private equity firms. Ms. Brindley previously worked in the US Department of State's Bureau of Political Military Affairs. She holds an MS and a BA from the University of Pennsylvania.

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The GTH Team



Maj. Gen. (Ret.) Tim Lowenberg, Of Counsel at GTH Law and VP at GTH-GA

Gen. Lowenberg advises and supports a variety of public and private sector clients on defense, homeland security, cybersecurity and DoD renewable energy matters. Prior to GTH, he was the nation's longest tenured Homeland Security Advisor and culminated a 44 year military career as Washington Adjutant General. Gen. Lowenberg holds a Bachelors in Political Science from the University of Iowa and a Doctor of Jurisprudence from the University of Iowa College of Law.

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Angela Durbin, Consultant at GTH-GA

Angela Durbin joined GTH as a Governmental Affairs Consultant for the Multi-State Governmental Affairs Group, and the Washington State Governmental Affairs Group. She comes to the firm with a strong understanding of both public affairs and the political process. Prior to joining the firm, Angela worked as a session aide for Washington State Senator Mike Padden. Angela holds a Bachelors in Communication from Thomas Edison State College.

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Noah Reandeau, VP for Strategy at GTH-GA

Mr. Reandeau designs and manages implementation of disruptive marketing strategies for leading corporations. He provides clients innovative services to expand markets, reduce sales cycles, and maximize ROI. Mr. Reandeau also consults for select government affairs clients. Prior to joining Gordon Thomas Honeywell, he worked for the Criminal Investigative Division of the Federal Bureau of Investigation. He holds a Bachelors in Political Science from St. Martin's University.

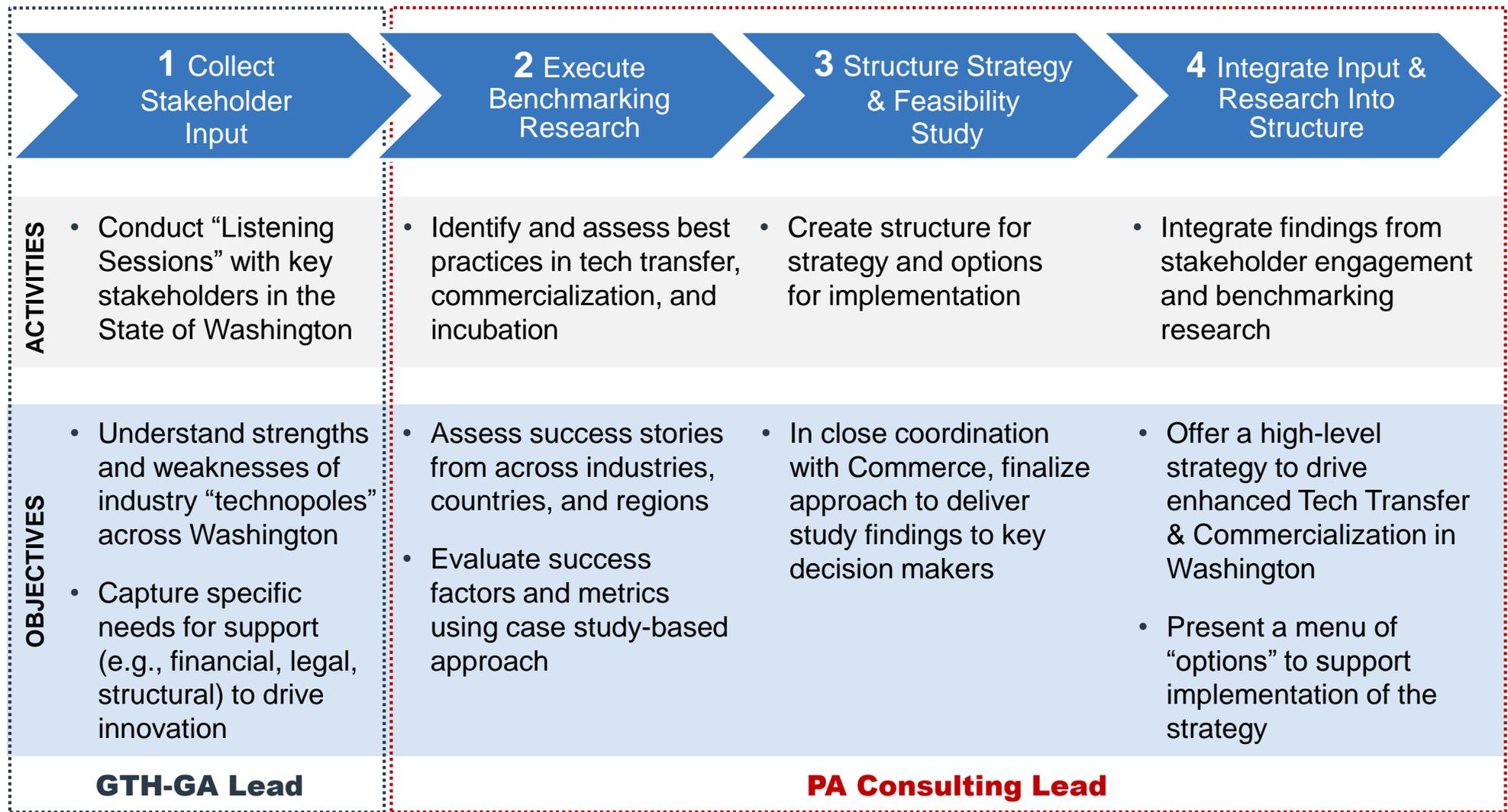
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Appendix

E

PROJECT METHODOLOGY

PA employed a four-phase approach to execute this project



PHASE 1: Gathered input from Washington stakeholders about their internal core competencies and needs for tech transfer and commercialization support

Locations



- ❖ Tacoma
- ❖ Kent
- ❖ Bremerton
- ❖ Spokane
- ❖ Everett
- ❖ Vancouver
- ❖ Seattle
- ❖ Richland

Stakeholders

Research

- Academic research labs
- Government R&D centers

Workforce Training

- Colleges and vocational-technical schools

Government

- Military (leaders and contract staff)
- Regional and city economic development organizations

Private Sector

- Traditional industry (e.g., Boeing)
- Technology firms (e.g., Microsoft)
- Tier 1-3 suppliers
- Startups

Advocacy Groups

- Industry associations
- Workforce organizations

Objectives

Capture insights from diverse stakeholders to better understand:

- The reliance of Washington defense industry on DoD and DHS funding
- Resource needs to meet DoD and DHS technology requirements, and maintain healthy business portfolios given fiscal constraints, budgetary uncertainty, and competition
- Insights on how to enhance linkages between various stakeholder groups
- Any other barriers to successful tech transfer and commercialization (e.g., legal, structural, human capital)
- Long-term visions for success in technology incubation

PHASE 1: Executed eight “Voice of the Community” listening sessions and numerous 1-on-1 interviews to capture perspectives spanning geographies and industries

Tacoma (May 16)

- Joint Base Lewis-McChord (JBLM)
- The Yakima Training Center (Army and Air)
- Off-base City and regional Economic Development Offices

Bremerton (May 17)

- Naval Base Kitsap (command and contracting officials)
- Keyport Undersea Warfare Center (Director and contracting officials)
- Off-base City and regional Economic Development Offices

Everett (May 19)

- Homeport Everett (command and contracting officials)
- City and regional Economic Development Offices

Seattle (May 23)

- Pacific NW National Lab. (PNNL) – Seattle
- University of Washington Applied Physics Lab. (UW/APL)
- City and regional Economic Development Offices

Kent (May 24)

- The Center for Advanced Manufacturing (Puget Sound)
- City and regional Economic Development Offices

Spokane (May 26)

- Fairchild AFB (command and contracting officials)
- Washington State University Applied Sciences Laboratory (WSU/ASL), and off-base City and regional Economic Development Offices

Vancouver (Jun. 3)

- City and regional Economic Development Offices

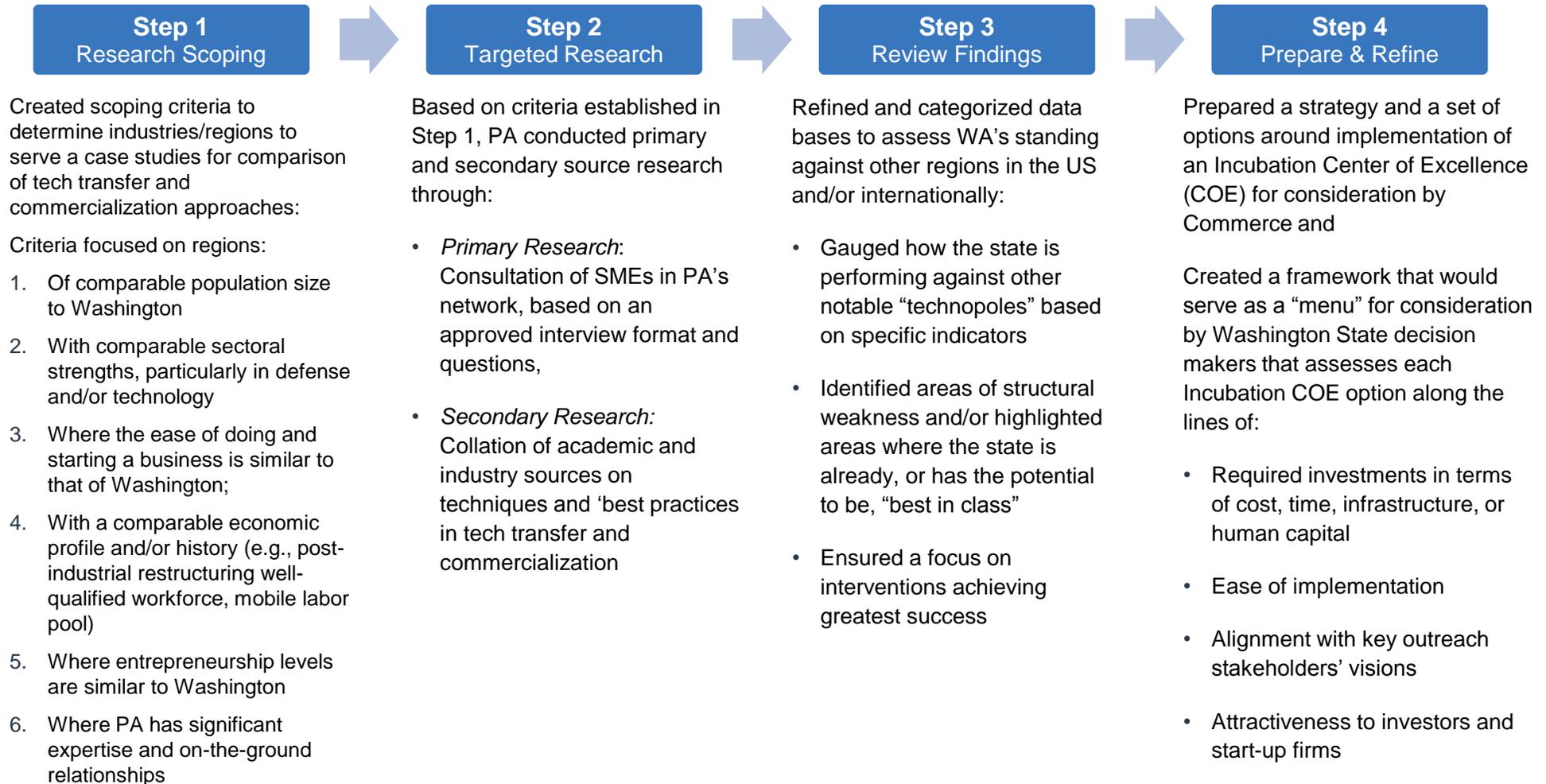
Richland (Jun. 10)

- PNNL – Richland (Lab. R&D and Tech. Transfer officials)
- WSU-ASL
- City and regional Economic Development Offices

Each session also included opportunities to engage local and regional members or representatives from:

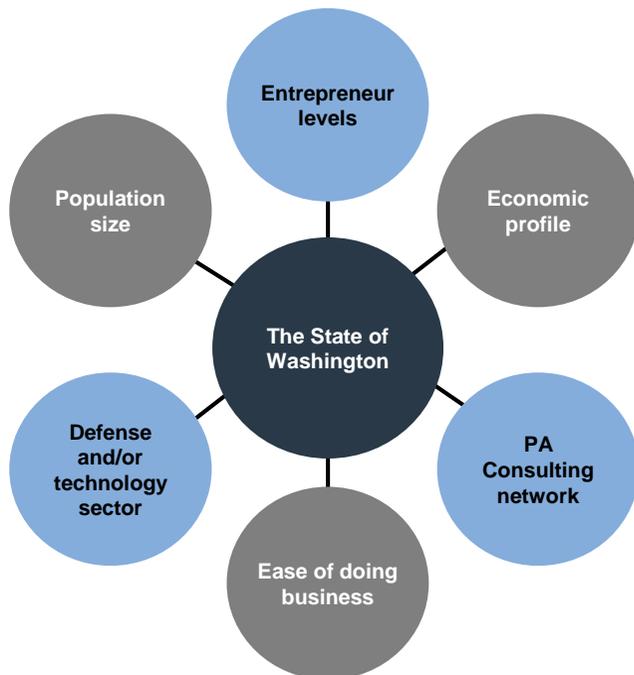
- The *Pacific Northwest Defense Coalition* (PNDC)
- The *National Defense Industrial Association* (NDIA)
- The *Washington Military Alliance* (WMA)
- The *Washington Roundtable* (WR)
- The *Washington Workforce Development Association*
- Local and regional Community and Technical Colleges
- Local and regional Business Incubation Centers

PHASE 2: Conducted benchmarking research to identify and assess case studies in tech transfer / commercialization across industries and regions



PHASE 2: Benchmarked against regions within the US and globally based on criteria agreed upon with Commerce

Figure 1: Criteria for selecting comparative regions



PA's global network ensured high levels of engagement and a comprehensive understanding of each region selected. Regions selected informed development of benchmarking indicators for tech transfer and entrepreneurship, which included, among other things:

- Birth and death rates of businesses;
- Spending on entrepreneurial support;

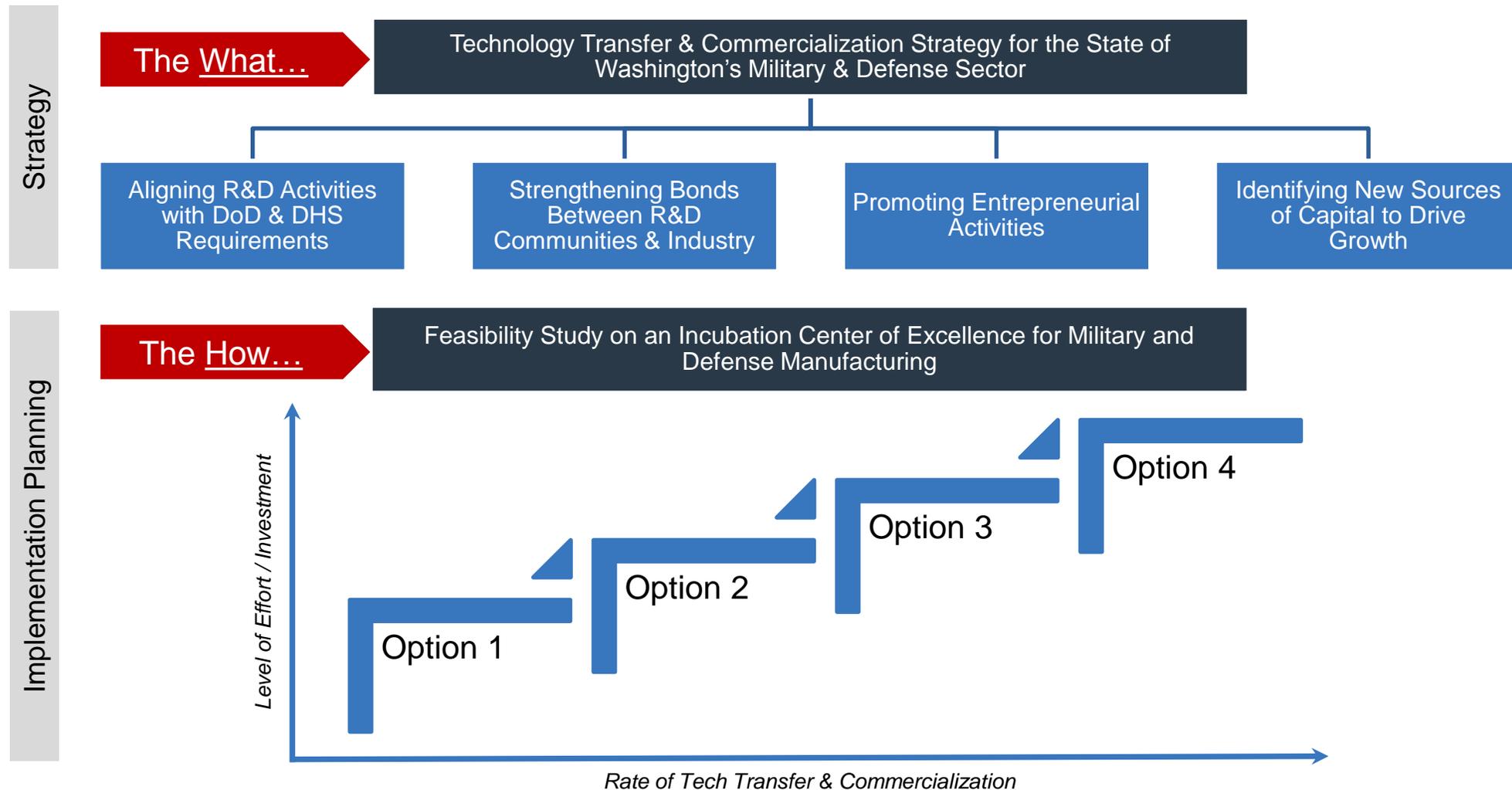
- Regional in- and out- and migration of talent;
- R&D facilities;
- Universities and education;
- FDI flows; and
- Levels of qualifications.

We emphasized outcomes achieved by support as well as support offered, to ensure we were assessing results and outputs rather than simply inputs.

Representative examples considered in this review included:

- Silicon Valley – DoD Defense Innovation Unit experimental (DIUx)
- Route 128 Tech Corridor – Massachusetts Innovation Bridge
- London – London & Partners, Level 39, Mass Challenge, Accelerator Academy, Wayra, etc.
- Vancouver – Vancouver Economic Commission, HQ Vancouver, Ministry of International Trade of British Columbia;
- Toronto – Canadian High Commission London. Canadian Technology Accelerator;
- Tel Aviv – UK Israel Tech Hub;
- Dublin – Enterprise Ireland, Propel

PHASE 3: Outlined a framework for the strategy and the array of options Washington State could select to implement a Incubation Center of Excellence



PHASE 3: Identified and reviewed a set of potential methodologies to best support a COE around defense sector innovation, tech transfer, and commercialization

Incubation Methods	Categories	Description
Incubation Centers/Facilities	Technology Business Incubators (TBI)	TBI refers to the type of incubation where the focus group consists of innovative, mostly technology-oriented, or knowledge-intensive service sector enterprises and interactions with the academic sphere giving a substantive element of the incubation process. TBI aims at the development of new innovative industries by stimulating the establishment and early growth of start-up firms
	Business Incubators	The incubator combines a variety of small enterprises support elements in one integrated affordable package. It has a special niche, i.e. nurturing early stage, growth-oriented ventures, through focused assistance within a supportive environment
	Technology Innovation Centers (TICs_)	The TICs conduct research and development (R&D) and technology innovations required by the industrial field, which aims to jointly invest resources into university campuses or research institutions and achieve commercialization with support from business enterprises or public institutions. As a concept the TIC is similar to that of the Technology Parks
	Virtual Business Incubator	These incubators do not have any physical location, providing services and support through internet
Government Support	Public funded schemes / grants	All publicly funded schemes are designed to encourage new and growing businesses, to bring wealth and ultimately create jobs. They include direct grant, repayable grant, soft loan, equity finance, free or subsidized consultancy etc.
Expert Advisory Services		In Europe, regional centers like Employment and Economic Development Centers (T&E Centers) offer advisory, development and financing services to small businesses. Many private companies provide advisory services and conduct workshops for start up companies
University Support		Universities support start up companies through science parks. A Science Park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets; it facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and provides other value-added services together with high quality space and facilities
Facilitators / Sponsors		Organizations or individuals who support an incubation program financially - may serve as an incubator's parent or host organization or may simply make financial contributions to the incubator

PHASE 4: Integrated “Listening Session” input and research into the agreed upon framework and delivered the strategy and feasibility study to Commerce

State of Washington *Incubation Center of Excellence for Military & Defense Manufacturing*

