



Defense Industry Maine Strategic Plan for the Maine Defense Sector Final Report



June, 2019

Prepared by Stone & Associates for the Maine Department of Economic & Community Development and the Maine International Trade Center under a grant from the DoD Office of Economic Adjustment



Defense Industry Maine (DIME) – Strategic Plan for the Maine Defense Sector

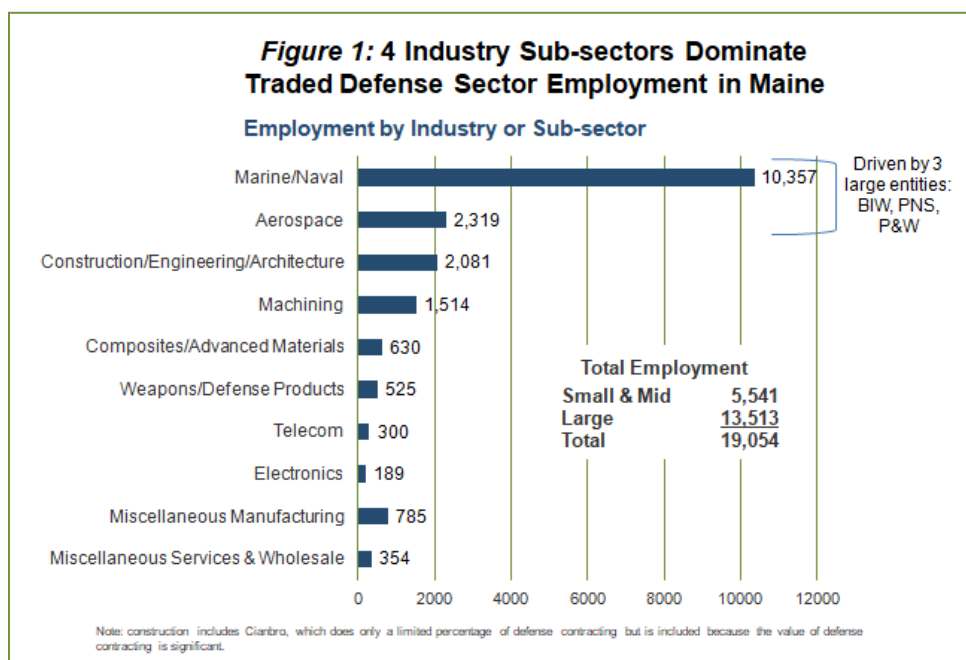
Executive Summary

Background. The US needs a defense supply chain that is diversified, growing and innovative to ensure defense readiness and to support a robust economy. However, the defense sector is facing a series of challenges, including uncertainty and variation in defense spending, over-reliance (for some companies) on defense as a source of revenue, a decline in US-based manufacturing, “fragile” supply chains for certain products (where only one viable supplier exists), and workforce shortages. In response to these challenges, the Office of Economic Adjustment in the Department of Defense has awarded Defense Industry Adjustment (DIA) grants to states to support resilience in their defense sectors. OEA awarded a DIA grant to the Maine Department of Economic and Community Development (DECD), in part, to develop a strategic plan to assist Maine companies in the defense supply chain that are impacted by these challenges.¹

Objective. The objective of this effort was to develop a strategic plan to assist companies in the Maine defense supply chain to grow, diversify and enhance their resilience. The focus was to conduct research to identify defense company growth and diversification opportunities, as well as challenges and barriers to growth, and then recommend specific programs and investments that can assist Maine companies to reduce risk, accelerate growth and generate high quality/high wage jobs in Maine. The work tasks included research to identify companies that serve defense markets, 57 in-depth interviews with Maine companies, economic development organizations and recipients of OEA grants in other states (to identify lessons learned), as well as secondary research on key industries/sub-sectors of the Maine defense sector.

The Traded Maine Defense Sector. The research identified 152 traded companies in the Maine defense sector, which was defined to include companies with sales into the defense supply chain – primes, subcontractors and suppliers - that sell their products outside of Maine and the immediate region – generally nationally and internationally. These 152 traded defense companies employ over 19,000 people (See Figure 1 below). The bulk of the employment – 63% – is driven by 3 large entities – General Dynamics Bath Iron Works, the Portsmouth Naval Shipyard and Pratt & Whitney’s North Berwick operation. These big 3 have driven tremendous employment growth, collectively hiring over 6,000 people in the past 4 years (including backfill for attrition and retirement). Partly driven by these large entities, 4 industry sub-sectors represent 85% of traded defense sector employment in Maine: marine/naval, aerospace, construction/engineering and precision machining. When focusing on only the small and mid-size companies, the major sub-sectors – in terms of number of companies and employment – include machining, advanced materials (composites, technical textiles and rope), construction/engineering, marine products, defense products/weapons, and telecommunications (particularly RF and microwave antenna and transmission products).

¹ This strategic planning effort was led by Stone & Associates and the Maine International Trade Center, in collaboration with Maine MEP, the Maine Composites Alliance, the Manufacturers Association of Maine and the Maine Procurement Technical Assistance Center.



Diversification and Growth Opportunities. Most of the firms interviewed serve a variety of markets, and want to diversify, develop new markets and acquire new customers. Some remain focused on markets where they have been successful – often defense and aerospace – or have valid strategic reasons for remaining focused on these markets. Over the long term, however, over-reliance on one market entails risk. Each company has a unique situation, strategy and set of market opportunities. They need a set of programs and assistance that can help each of them overcome barriers to pursue growth opportunities.

There are some patterns to the markets defense companies are targeting for growth. Many are targeting further growth in the defense/naval market, as well growth in aerospace and a series of energy markets (oil & gas, utilities/power generation and renewable energy). It should also be noted that currently there is strong demand and appear to be growth opportunities for companies in many sub-sectors within defense, including advanced materials, naval ship and submarine building, aerospace, machining and energy. In addition, some specific clusters identified in this effort have “flown under the radar” in the past. There may be an opportunity to foster collaboration and knowledge sharing in these Maine clusters, particularly in RF/microwave telecommunications, soldier systems, and “smart” advanced materials.

Challenges and Barriers. Interviews with companies identified common challenges and barriers to pursuing growth opportunities. Three key sets of challenges emerged:

1. **Workforce.** The major barrier to growth is a shortage of qualified workers. Many companies struggle to identify qualified candidates. Small and mid-size companies are particularly vulnerable, as they lose workers and candidates to large companies, other employers and to the states of Massachusetts and Connecticut which can pay a wage premium.

Companies are constrained from fully pursuing growth opportunities because they cannot find staff for operations.

2. **Testing, Certification and Vendor Qualification.** The additional costs and time required to obtain necessary testing, certification or qualification inhibits entry into new markets. In defense markets, part of the barrier is resistance by DoD and prime contractors to spend engineering time and budget to qualify new vendors.
3. **Sales/Business Development and Marketing.** Companies face a series of challenges in sales, business development, marketing, and product development. These challenges slow growth and expansion in new markets:
 - Small companies often have lean staffing in sales, business development, marketing and product development functions, which provide the critical bandwidth to develop new markets and acquire new customers.
 - Companies would sometimes benefit from assistance in accessing new customers in “insular” niche markets (where it can be difficult for new customers to establish themselves).
 - Suppliers are sometimes unsure about how to navigate business development for DoD and prime contractor customers.
 - Many companies have an idea of where to grow and diversify, but some need help to conduct market research to evaluate potential markets and develop a strategy for entry.
 - Companies need a variety of improvements in their marketing capabilities, sometimes reflecting a lack of marketing staff or budget to develop marketing materials and content. In other cases, the issue is needing greater knowledge about effective digital marketing to bring customers to them.
 - Many companies see growth potential in international markets and outside assistance will help them be more successful.

Recommendations. The recommendations for programs and investments to overcome these challenges and barriers are designed to fill gaps in existing resources and avoid duplication.

This plan makes 5 sets of recommendations (also see Figure 2 below):

1. **Expand investment in workforce programs** to increase the size of the qualified workforce, particularly in manufacturing. The Maine Community College System/Maine Quality Centers are of particular importance, however all of the key workforce programs identified in this report should be considered. Research identified the need for well over 2,000 high paying jobs to be filled in the Maine defense sector in the next year and thousands more will need to be filled in the next several years.
2. **Offer a grant program** to individual companies to make it easier for them to invest in diversification and growth. This program would be a defense cluster matching grant fund to offset the costs of hiring one additional sales/business development or marketing staff person, or to offset the costs of various outside services that support new business development and entry into new markets, including testing/certification/qualification services, business development services (e.g. consulting, matchmaking, lead generation), market research, and compliance with DFARs cybersecurity requirements.
3. **Provide assistance in navigating DoD/contractor procurement** by co-organizing a workshop/webinar with the Maine PTAC on how to navigate defense procurement.

4. Offer new programs and tools to help companies **improve marketing and business development, including:**
 - Organizing the participation of Maine companies in a series of tradeshow, conferences and events targeting the aerospace and defense markets – focused on B2B matchmaking, networking and market intelligence
 - Offer training/workshops to help companies improve their marketing skills, particularly in such as areas as digital marketing, search engine optimization, content marketing and international marketing – the goal is to help companies to bring customers to them
 - Work with Maine MEP to evaluate the potential benefits versus investment required to offer Technology Driven Market Intelligence (TDMI) to Maine defense companies
 - Explore ways to enhance the functionality of the DIME website so that Maine defense companies can identify bid and collaboration opportunities
 - Consider organizing a small number of targeted business matchmaking introductions for larger Maine defense companies to fill specific gaps in their supply base
5. **Enhance cross-marketing and collaboration among economic development partners on existing programs** that have value for defense companies, including PTAC services (Regional DoD Council matchmaking events, “Industry Day” events where primes identify smaller suppliers, workshops, and counseling); MITC services (ITAR workshops, matchmaking and tradeshow support, international trade and business development workshops); and Maine MEP/MAME (cybersecurity assistance)

Figure 2: 5 Sets of Programs Recommendations

- 1** Expand workforce programs
- 2** Offer grant program for companies to support diversification and growth
- 3** Provide assistance in navigating DoD/contractor procurement
- 4** Offer new programs and tools to help companies improve marketing and business development
- 5** Enhance cross-marketing and collaboration among economic development partners on existing programs that have value for defense companies

Sustainability. A critical challenge for OEA grant funded initiatives in other states has been the sustainability of programs after the grant funding has ended. To ensure successful implementation and sustainability in Maine, it is recommended that the Defense Industry Maine (DIME) initiative have a 0.5 to 1.0 full-time staff person assigned to lead and spearhead these recommendations. This staff person could reside in DECD or an existing economic development organization, to leverage existing company relationships and established credibility.

Conclusion. Implementation of these recommendations offers an excellent opportunity to grow the high wage/high value traded sector of Maine’s economy and to support the US defense

industrial base. Thousands of high paying jobs are at stake. Further, many of these recommendations apply to companies outside of the defense sector, so it would make sense to consider offering these programs to a wider range of Maine companies. The recently initiated statewide economic development plan for Maine will be a perfect opportunity to consider expanding the scope of these recommendations to more broadly support Maine economic advancement.

Defense Industry Maine **Strategic Plan for the Maine Defense Sector** **Final Report**

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Structure of this Report

- ❑ **This report is divided into 4 major components:**
 - *Executive Summary* - at the front of the document (in Word format) which summarizes the report's key findings and recommendations
 - *Summary and Recommendations* - a summary in presentation format of key findings and recommendations; this section is composed of pages repeated from the Full report
 - *Full Report* - documents the findings and basis of the recommendations in full detail (while this document is in PowerPoint format, it is intended as a written report with detailed findings)
 - *Appendix* - provides more detailed supporting analysis

Glossary of abbreviations

Terms

- ❑ CAGR – Compound Annual Growth Rate
- ❑ EAR – Export Administration Regulations
- ❑ DFARs – Defense Federal Acquisition Regulations Supplement
- ❑ ITAR – International Traffic in Arms Regulations
- ❑ SEO – Search Engine Optimization
- ❑ SME – Small and Mid-size Enterprise

Organizations

- ❑ ASME – American Society of Mechanical Engineers
- ❑ BIW – General Dynamics Bath Iron Works
- ❑ CBO – Congressional Budget Office
- ❑ DECD – Department of Economic and Community Development
- ❑ DIME – Defense Industry Maine
- ❑ DoD – Department of Defense
- ❑ FAME – Finance Authority of Maine
- ❑ NHADEC – New Hampshire Aerospace and Defense Export Consortium

Organizations *(continued)*

- ❑ Maine MEP – Maine Manufacturing Extension Partnership
- ❑ Maine PTAC – Maine Procurement Technical Assistance Center
- ❑ MAME – Manufacturers Association of Maine
- ❑ MCA – Maine Composites Alliance
- ❑ MCCS – Maine Community College System
- ❑ MITC – Maine International Trade Center
- ❑ MTI – Maine Technology Institute
- ❑ MQC – Maine Quality Centers
- ❑ OEA – Office of Economic Adjustment
- ❑ PNS – Portsmouth Naval Shipyard
- ❑ P&W – Pratt & Whitney
- ❑ SBA – Small Business Administration
- ❑ SBIR – Small Business Innovation Research
- ❑ SMCC – Southern Maine Community College
- ❑ TDMI – Technology Driven Market Intelligence
- ❑ YCCC – York County Community College

Summary and Recommendations

The Maine defense sector faces challenges and risks, and also has growth opportunities

Challenges¹

- Uncertainty in defense spending
- Decline of US manufacturing
- Risk factors that may disrupt supply of a specific product or service, such as the existence of only one viable supplier, or dependence on foreign sources
- Workforce: “gaps in U.S.- based human capital”

Risks

- Maine defense companies that are too dependent on defense or any one market
- Maine as a whole has a relatively high level of defense dependence, ranked #9 among US states in defense spending as a percent of GDP (4.1%)²

Opportunities

- Maine has strong sectors/clusters that serve defense and are poised for growth
- Including naval shipbuilding, aerospace, composites and advanced materials, precision machining, other marine products

1. *Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States, Report to President Donald J. Trump by the Interagency Task Force in Fulfillment of Executive Order 13806*, September 2018

2. *Defense Spending by State, Fiscal Year 2017*, DoD OEA. It appears that contracts were assigned to Maine by place of performance versus recipient location.

Objective: to develop a strategic plan to grow, diversify and enhance the resilience of the Maine defense sector

Objectives:

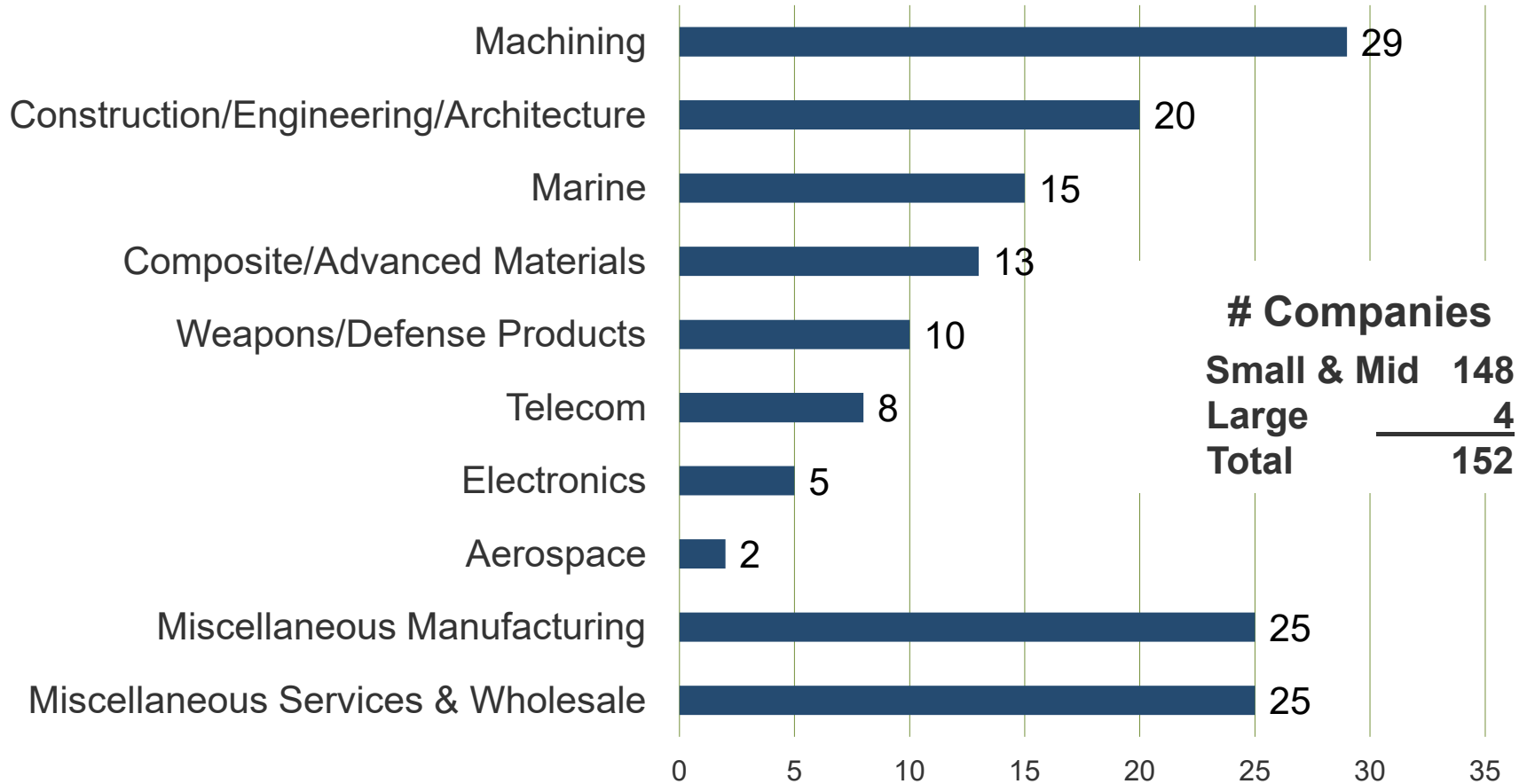
- ❑ **Diversify, grow and reduce risk for the Maine defense sector**
 - In response to uncertainty and variation in defense spending, and the decline of the US industrial base
 - Research focused on defense company growth and diversification opportunities and strategies
 - Could include diversification outside of defense, or gaining additional customers within defense
- ❑ **Identify specific programs, investments and business development activities that reduce risk, accelerate growth and generate high quality/high wage jobs in Maine**

The work tasks included identifying defense companies, and conducting interviews / secondary research

Work Tasks	Tasks Completed
1. Lessons Learned from Other OEA Projects	<ul style="list-style-type: none">• 9 interviews• Extensive secondary document review
2. Community Outreach Partners	<ul style="list-style-type: none">• Extensive coordination with all 4 partners on outreach to companies
3. Current Base of Defense Companies and Key Sub-sectors/Clusters	<ul style="list-style-type: none">• Developed dataset of 152 companies that sell into defense market
4. Needs Assessment and Sector/Cluster SWOT Analysis <ul style="list-style-type: none">• Company Interviews• Other Economic Development Interviews• Secondary Research	<ul style="list-style-type: none">• 39 company interviews• 9 interviews with economic development organizations• Secondary research on 6 sub-sectors/ clusters, as well as workforce and economic development organizations
5. Diversification and Growth Assessments <ul style="list-style-type: none">• Sub-sector Analysis• Common Needs	<ul style="list-style-type: none">• Assessment of company needs in defense sector• Sub-sector analysis
6. Final Report and Recommended Plan	<ul style="list-style-type: none">• This document represents the final report

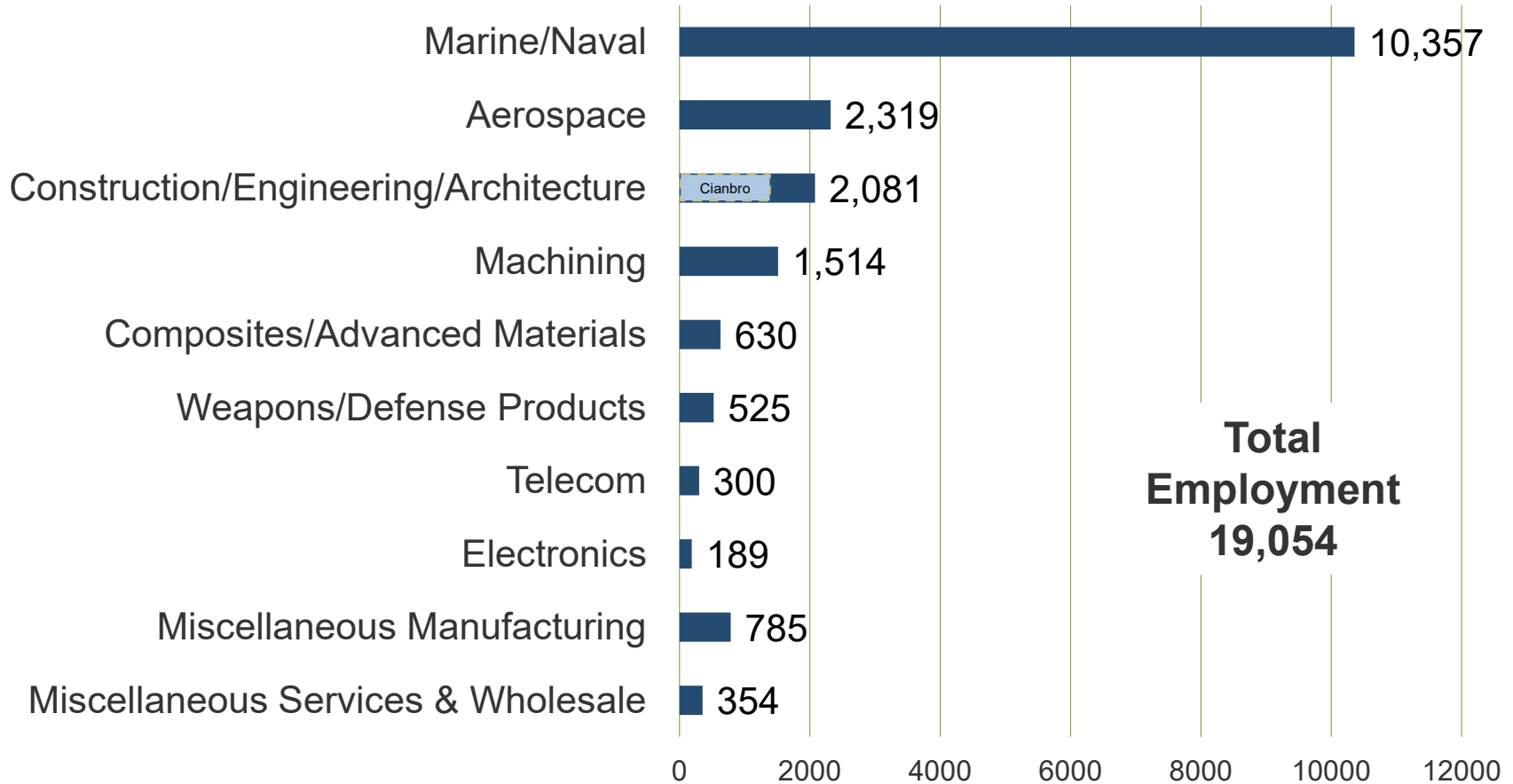
7 industry sub-sectors represent two thirds of the traded defense companies in Maine

of Companies by Industry or Sub-sector



4 industry sub-sectors dominate traded defense sector employment in Maine

Employment by Industry or Sub-sector



A few large Maine defense companies drive most of the sector's employment and employment growth

Current Employment		Demand Outlook	Net Employment Growth	Hiring Trend
General Dynamics Bath Iron Works ¹	6,000	<ul style="list-style-type: none"> Strong demand, including recent contracts for DDG51 class destroyers Navy expansion from 285 to 355 ship fleet Competing for Navy FFG(X) program 	+1,242 (2015-18)	<ul style="list-style-type: none"> Collectively planning to hire ~ 2,000 this year Hired over 6,000 in past 4 years These numbers include backfill for attrition, retirement
Pratt & Whitney North Berwick ²	2,119	<ul style="list-style-type: none"> Rapid growth due to P&W's strong position in jet engine market, particularly "PurePower® Geared Turbofan™ engines and the F135 engine for the Joint Strike Fighter" Completed \$200M investment in past 7 years 		
Portsmouth Naval Shipyard ³	3,894 ME 6,972 total	<ul style="list-style-type: none"> 8-24-18 article: "PNS has enough submarine maintenance and overhaul work to keep 3 dry docks busy through 2021, with more on deck after that" 8-24-18 article: "A booming shipyard that is working straight out..." 		

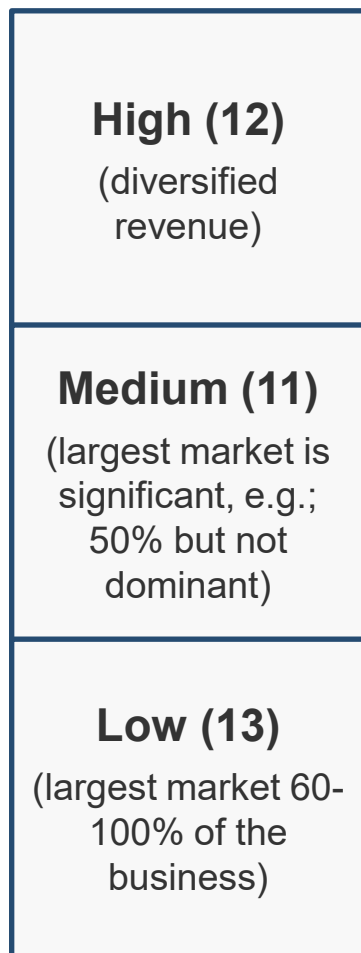
1. Sources: Interview with BIW on 1-30-19 and follow-up emails during 1st half of 2019; Portland Press Herald articles on 9-27-18, 10-23-18, 12-21-18, 2-4-19, and 3-1-19

2. Sources: Interview with Pratt & Whitney on 4-22-19 and follow-up emails on 5-31-19. Total employment number is as of May, 2019; <http://www.utc.com/News/PW/Pages/Pratt-Whitney-North-Berwick-Recognized-as-an-IndustryWeek-Best-Plants-Recipient.aspx>; <https://www.industryweek.com/industryweek-best-plants/2015-iw-best-plants-winner-pratt-whitney-north-berwick-built-competition>; <https://www.forbes.com/sites/lorenthompson/2017/07/17/pratt-and-whitney-surges-u-s-hiring-investment-as-geared-turbofan-ramps-up/#1324553686a6>; <https://www.seacoastonline.com/news/20160515/pratt-and-whitneys-berwick-plant-ready-to-soar>; P&W Profile in MaineBiz, Stuff Made in Maine, Fall 2018

3. Sources: Seacoast Shipyard Assoc C/Y 2018 Economic Impact Report; Interview with PNS on 4-29-19 and follow-up email on 5-20-19

Most firms want to diversify, but some want to remain focused on markets where they have been successful

Level of Diversification for 36 Companies Interviewed (primarily SMEs)



Want to develop new customers and enter or expand in targeted markets.

Some want to diversify, and some don't. Some are busy and reluctant to say no to current customers. Others have good strategic reasons for being focused on one market. However, over the long term that entails risk.

Each company has a unique strategy.

Everyone needs to acquire new customers, sometimes new customers within defense.

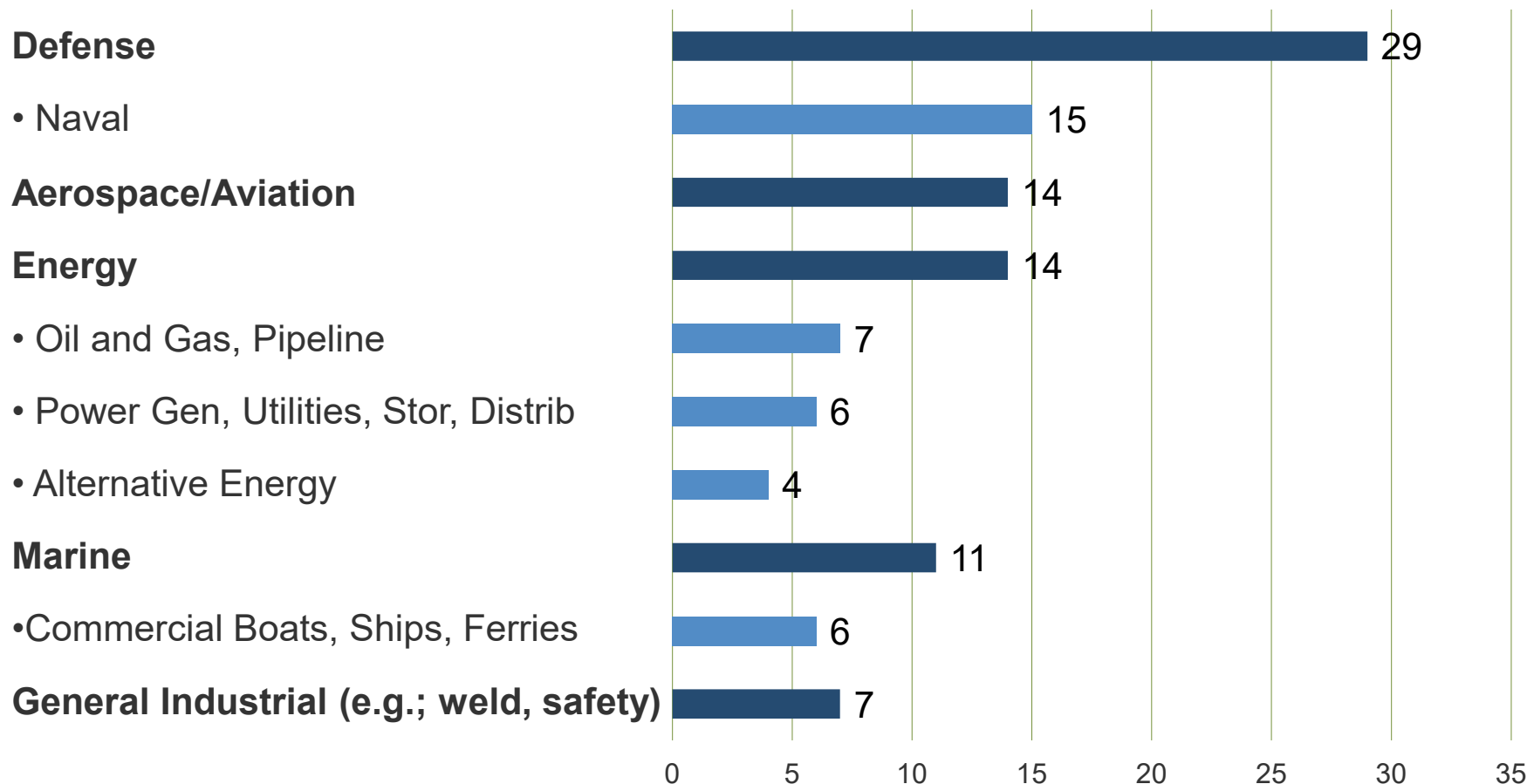
Most companies want to develop new markets.

Some focused companies will want to diversify a few years from now.

The question is "how we can help all of these companies grow?"

Many companies interviewed continue to target defense for growth, as well as aerospace and energy markets

Markets Targeted for Growth
Companies Interviewed (N=36)



Barrier/Challenge #1: the major barrier to growth is a shortage of qualified workers

Workforce Challenge

- ❑ **A major barrier to growth identified by companies interviewed was the lack of qualified workers**
- ❑ **Relevant in many sectors**
 - However, particularly acute in precision machining
- ❑ **Many companies struggled to identify qualified candidates, even while stating that they could train them**
- ❑ **SMEs are hit particularly hard**
 - Lose workers to large defense companies and MA/CT



Constraint on Growth

- ❑ **Companies are constrained from fully pursuing growth opportunities because they cannot staff manufacturing operations**
 - Some companies – particularly in machining – are struggling financially because they don't have enough workers to generate sales volume that would make it easier to cover fixed costs and overhead

Small and mid-size companies are most vulnerable in the labor market

Large Defense Companies

	Current Hiring ¹ (3 cos combined)	Recent Hiring ¹ (3 cos combined)
GD Bath Iron Works	~2,000 this year	Hired >6,000 in past 4 years
Pratt & Whitney North Berwick		
Portsmouth Naval Shipyard		
1. Includes hiring for attrition and retirement; see sources on page 11		

Other Employers

MA/CT (wage premium)	ME Non-Manufacturing Other Large Employers
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SME Defense Companies

Selected SMEs Interviewed	
Immediate Needs Can't Fill	150
Additional Planned or Targeted Employment (~1-2 years)	212
Total	362

Large companies need nearly 2,000 workers this year. SMEs interviewed need 150 workers right now and nearly 400 in the next 1-2 years. Other defense companies we did not interview presumably need hundreds more. However they are unable to find them and lose out to large companies, other employers and other states that pay wage premiums.

Barrier/Challenge #2: testing, certification and vendor qualification inhibit entry into new markets

- ❑ **Testing and certification adds additional costs**
 - 3rd party testing, audits and certifications
 - Training, documentation
 - Pilot or test runs (material, labor)
 - Engineering time
- ❑ **And slows entry into new markets**
 - Additional costs increase total investment to enter new market, and delay entry
- ❑ **DoD and prime contractor resistance to qualifying new vendors is part of the challenge**
 - Time and cost to evaluate new vendors (who pays for it?)
 - Limited incentive to switch (unless having problems with a vendor or can obtain dramatic innovation or cost savings)

Examples and Comments from Interviews

Company (#1): “Have not used our material inside jet engines. Must survive fire test. Costs \$20K for test, which is necessary just to see if they are interested – just to be considered.”

Company (#62): “Hard to get product evaluations and approvals. Requires engineering time to review test results. A shipyard engineering department needs to be able to charge time to something... In the Navy, have to convince someone it is worth the time to assign some engineering activity to it.”

Barrier/Challenge #3: companies face challenges in sales, business development, marketing, product development

These challenges slow growth and expansion in new markets:

1. Small companies often have lean staffing in sales, business development, marketing and product development functions, which provide the critical bandwidth to develop new markets and acquire new customers
2. Companies would sometimes benefit from assistance in accessing new customers and markets – contacts, referrals, gaining access to “insular” new markets
3. Suppliers are sometimes unsure about how to navigate business development for DoD and prime contractor customers
4. Many companies have an idea of where to grow and diversify, but some need help to do market research to evaluate potential markets and develop a strategy for entry
5. Companies need improvements in marketing
 - Materials, tradeshow presence, web presence, search engine optimization
 - Inbound marketing (bring customers to you) in addition to outbound business development/sales
6. Many companies see growth potential in international markets, and outside assistance will help

This report offers 5 sets of program recommendations

- 1 Expand workforce programs**
- 2 Offer grant program for companies to support diversification and growth**
- 3 Provide assistance in navigating DoD/contractor procurement**
- 4 Offer new programs and tools to help companies improve marketing and business development**
- 5 Enhance cross-marketing and collaboration among economic development partners on existing programs that have value for defense companies**



Expand workforce programs

- ❑ Expand investment in workforce programs to increase the size of the qualified workforce, particularly in manufacturing
 - Particular importance of Maine Community College System/Maine Quality Centers
 - However all of the additional key workforce programs identified in this report need to be evaluated for potential expansion – Maine Apprenticeship Program, Maine CareerCenters, CareerTech, Jobs for Maine Graduates, MAME Manufacturing Career Connection programs



Offer grant program for companies to support diversification and growth

- ❑ Develop a defense cluster initiative matching grant fund to provide individual company grants to offset the costs of:
 - Hiring one additional sales, business development, marketing or engineering staff person (supporting a portion of compensation for 1 year).
 - Outside services for testing/certification/vendor qualification and engineering projects that accelerate acquisition of new customers or entry/expansion into new markets.
 - Could offset the cost of services from: Maine MEP for quality systems; testing/certification/analysis services from Composites Engineering Research Lab (CERL) and the UMaine Advanced Structures and Composites Center and Advanced Manufacturing Center; and services such as CE Mark from MITC affiliated consultants
 - Outside business development services related to expanding in new markets or growing the business (could be shared among multiple companies)
 - Could offset the costs MAME Business Growth Services and B2B lead generation, as well as MITC or US Department of Commerce Gold Key and B2B matchmaking services¹
 - Outside support for market research and strategy for evaluating, entering or expanding in new or growing markets, or to otherwise support business growth
 - Could be used to offset the costs of MAME Business Growth Services or MITC affiliated international market research firms
 - Outside services related to cybersecurity compliance with Defense Federal Acquisition Regulation Supplement (DFARs)
 - Provided by Maine MEP and MAME

Provide assistance in navigating DoD / contractor procurement

- ❑ Consider co-organizing a workshop/webinar¹ with PTAC on how to navigate DoD/prime procurement, including speakers such as:
 - PTAC staff
 - Prime contractors
 - Natick Soldier Research Center (where Maine companies are well connected)
 - other DoD offices and commands
 - Experienced defense suppliers

Offer new programs and tools to help companies improve marketing and business development

- ❑ Consider organizing the participation of Maine companies in a series of tradeshow, conferences and events targeting the aerospace and defense markets – focused on B2B matchmaking, networking and market intelligence. For example:
 - Pursue collaboration with NH, VT and other New England states on these events, possibly combining/collaborating on the NHADEC Aerospace & Defense Summit/Networking Event
 - Consider bringing a group of Maine companies to aerospace conferences or tradeshow (such as Aeromart which is focused on matchmaking) or arranging for meetings with major aerospace customers
 - These events could be anywhere in the US and international
 - These events could also be used to introduce Maine defense companies to each other, as they are often unaware of the capabilities of companies “down the street” who could become customers or partners
- ❑ Offer training/workshops (possibly as part of conferences/workshops described above) to help companies improve their marketing skills, particularly in such as areas as digital marketing, search engine optimization, content marketing, and international marketing. The goal is to help companies to bring customers to them.
- ❑ Work with Maine MEP to evaluate the potential benefits versus investment required to offer TDMI to Maine defense companies (These projects can leverage grant funding under recommendation #2.)
- ❑ Explore ways to enhance the functionality of the DIME website so that Maine defense companies can identify bid and collaboration opportunities
- ❑ Consider organizing a small number of targeted personal matchmaking introductions for larger companies to fill specific gaps in their supply base

Enhance cross-marketing and collaboration among economic development partners on existing programs

- ❑ Look for opportunities to enhance cross-marketing and collaboration among economic development partners around existing programs:
 - PTAC: Regional DoD Council matchmaking events, “Industry Day” events (where primes identify smaller suppliers), workshops, counseling
 - MITC: ITAR workshops, matchmaking and tradeshow support, international trade and business development workshops
 - Maine MEP/MAME: cybersecurity assistance

Full Report – Findings and Basis for Recommendations

Introduction and Approach

The Maine defense sector faces challenges and risks, and also has growth opportunities

Challenges¹

- Uncertainty in defense spending
- Decline of US manufacturing
- Risk factors that may disrupt supply of a specific product or service, such as the existence of only one viable supplier, or dependence on foreign sources
- Workforce: “gaps in U.S.- based human capital”

Risks

- Maine defense companies that are too dependent on defense or any one market
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Opportunities

- Maine has strong sectors/clusters that serve defense and are poised for growth
- Including naval shipbuilding, aerospace, composites and advanced materials, precision machining, other marine products

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 - Research focused on defense company growth and diversification opportunities and strategies
 - Could include diversification outside of defense, or gaining additional customers within defense
- ❑ **Identify specific programs, investments and business development activities that reduce risk, accelerate growth and generate high quality/high wage jobs in Maine**

The project sponsors and partners played a critical role in outreach and providing input on the strategic plan

Project Sponsors

- ❑ **DoD Office of Economic Adjustment (OEA)**
- ❑ **Maine Department of Economic and Community Development (DECD)**
- ❑ **Maine International Trade Center (MITC)**

Community Outreach Partners

- ❑ **Maine Manufacturing Extension Partnership (Maine MEP)**
- ❑ **Manufacturers Association of Maine (MAME)**
- ❑ **Maine Composites Alliance (MCA)**
- ❑ **Maine Procurement Technical Assistance Center (PTAC)**

The work tasks included identifying defense companies, and conducting interviews / secondary research

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5. Diversification and Growth Assessments <ul style="list-style-type: none">• Sub-sector Analysis• Common Needs	<ul style="list-style-type: none">• Assessment of company needs in defense sector• Sub-sector analysis
6. Final Report and Recommended Plan	<ul style="list-style-type: none">• This document represents the final report

Our approach combined an understanding of individual companies with sectoral assessment

Identifying Regional Assets in Sector/Cluster	Assessment of Growth and Diversification Opportunities and Challenges		Determining How We Can Help
<ul style="list-style-type: none"> •Companies in sector/cluster (large and small, primes and suppliers) •Research institutions, universities, community colleges •Technical skills or innovative capacity •Worker skills, labor pool •Local demand (such as an OEM, prime) •Economic development organizations and existing programs 	Individual Company Level	<ul style="list-style-type: none"> •Current markets and growth history •Degree of diversification •Capabilities and competitive strengths •Growth and diversification opportunities, market opportunities •Barriers and challenges to growth 	Offer programs that fill in gaps that help companies overcome barriers or challenges to growth and diversification
	Sector or Cluster Level (e.g. precision machining, or the defense sector broadly)	<ul style="list-style-type: none"> •Sector analysis helps define drivers, trends and opportunities for individual companies – such as understanding where the market potential and growth exists, and how firms compete and succeed in that business •Competitive strength of a region should also be assessed at the sector level, based on factors such as: <ul style="list-style-type: none"> •Regional scale (concentration of companies and employment in a specific sub-sector) •Presence of companies in industries with attractive growth prospects •Level of collaboration •Unique strengths, such as technical skills or availability of skilled labor •Existence of major companies or primes that drive local demand 	<div></div> <p>Prioritize, invest in, and facilitate sector/cluster-wide initiatives or collaborations to build regional strengths or overcome barriers or challenges</p>

The project developed a dataset of 152 traded Maine companies that serve defense

Included in Company Dataset

- Primes and subcontractors, suppliers
- Focus on manufacturing and product companies, but also service, such as construction/engineering/architect, wholesalers, IT, consulting
- Traded nationally and internationally (excluded firms that only trade locally)
- Excluded government and other entities that are outside of target sector
- At least 10% of sales in defense markets, priority of $\geq 20\%$
- A few companies with $<10\%$ included because significant dollar volume

Sources of Information

- Contract data from:
governmentcontractswon.com ($> \$100K$ 2012-16) and USAspending.gov
- MITC defense and security list
- Maine MEP Phase 1 companies
- MAME pilot companies
- Maine MEP Phase 1 survey
- Defense associations research
- Community Outreach team interviews
- MITC database
- Secondary research (articles from Portland Press Herald, Bangor Daily News and industry trade press)
- DECD suggestions
- Hundreds of company websites and other company databases

39 company interviews were conducted, focused on major sub-sectors of importance to defense

Sub-sector	# Interviews
Composites	4
Technical Textiles and Rope	4
Marine Products	9
Precision Machining	8
Construction/Engineering/Architecture	2
Military Weapons/Defense Products	2
Telecom	2
Aerospace	2
Other	6
Total	39

- The interviews were focused on major sub-sectors within the defense cluster.
- Overall the distribution of interviews was reasonably representative of the defense sector and these key sub-sectors.
 - Ideally there would have been a handful of additional interviews in construct/eng/architect, military/defense products, but we were not able to secure interviews.

The interviews were in-depth, qualitative strategic interviews

Interview Format

- ❑ 1-4 hours
- ❑ Topics:
 - Company profile
 - Product line
 - Current markets
 - Growth history
 - Degree of diversification
 - Capabilities, strengths
 - Growth and diversification opportunities, market opportunities
 - Barriers and challenges to growth
 - Grants
- ❑ Structured, but flexible, open-ended discussion
- ❑ Interviewee: company leadership, often President/CEO
- ❑ Considerable background conducted prior to each interview to cover company profile efficiently

Advantages of This Approach vs. Formal Survey

- ❑ Enables understanding of a company's strategic situation
- ❑ Identifies company priority barriers and challenges – in their own words
 - Does not assume we know the answers in advance
 - If a company identifies an issue in response to an open-ended question, it is a clear insight into their priorities and plans
- ❑ Allows the interviewer to ask follow-up questions and ask “why?”
 - To understand underlying drivers
- ❑ Offers flexibility to tailor the discussion for different types of companies and situations
- ❑ Fosters conversational “flow”, comfort and openness

Interviews by sector – detail

Composites	Compotech	1	
	Fiber Materials	1	Also tech textiles
	Kenway Composites	1	
	Wizbe Innovations	1	
	<i>Subtotal</i>	4	
Technical Textiles and Rope	Auburn Manufacturing	1	
	Tex Tech Industries	1	
	US Felt	1	
	Yale Cordage	1	
	<i>Subtotal</i>	4	
Marine Products	GD Bath Iron Works	2	
	Deepwater	1	Also composites
	Front Street Shipyard	1	
	Howell Labs	1	
	Maine Marine Composites	1	Also composites
	Maritime Applied Physics Corp. (MAPC)	1	
	Pole Star	1	
	Portsmouth Naval Shipyard	1	
	<i>Subtotal</i>	9	

Interviews by sector – detail

Precision Machining	Arundel Machine Tool	1	
	Howard Tool	1	
	J&M Machining	1	
	Kennebec Technologies	1	
	Maine Machine Products	1	
	Northwest Precision	1	
	Odat Machine	1	
	PTE Precision Machining	1	
	<i>Subtotal</i>	8	
Cons/Engrg/Arch	Colby Company	1	
	Lander Group	1	
	<i>Subtotal</i>	2	
Defense Products / Weapons	American Rheinmetall	1	
	Downeast Innovation	1	
	<i>Subtotal</i>	2	
Telecom	mWave Industries	1	
	Yankee Microwave	1	
	<i>Subtotal</i>	2	

Interviews by sector – detail

Aerospace	C&L Aerospace	1	
	Pratt & Whitney	1	
	<i>Subtotal</i>	2	
Other	American Steel and Aluminum	1	Also marine
	Cascon	1	
	Elmet Technologies	1	
	Elscott Manufacturing	1	
	Katahdin Analytical Services	1	
	Loring Industries	1	
	<i>Subtotal</i>	6	

In addition to companies, we interviewed the following additional organizations

Maine Economic Development

- Maine Technology Institute
- Maine Quality Centers (two interviews)
- Maine PTAC
- Maine Composites Alliance
- UMaine Advanced Structures and Composites Center
- UMaine Advanced Manufacturing Center
- SBA Maine District Office
- MAME (re: lessons learned from Phase I)

Other OEA Programs

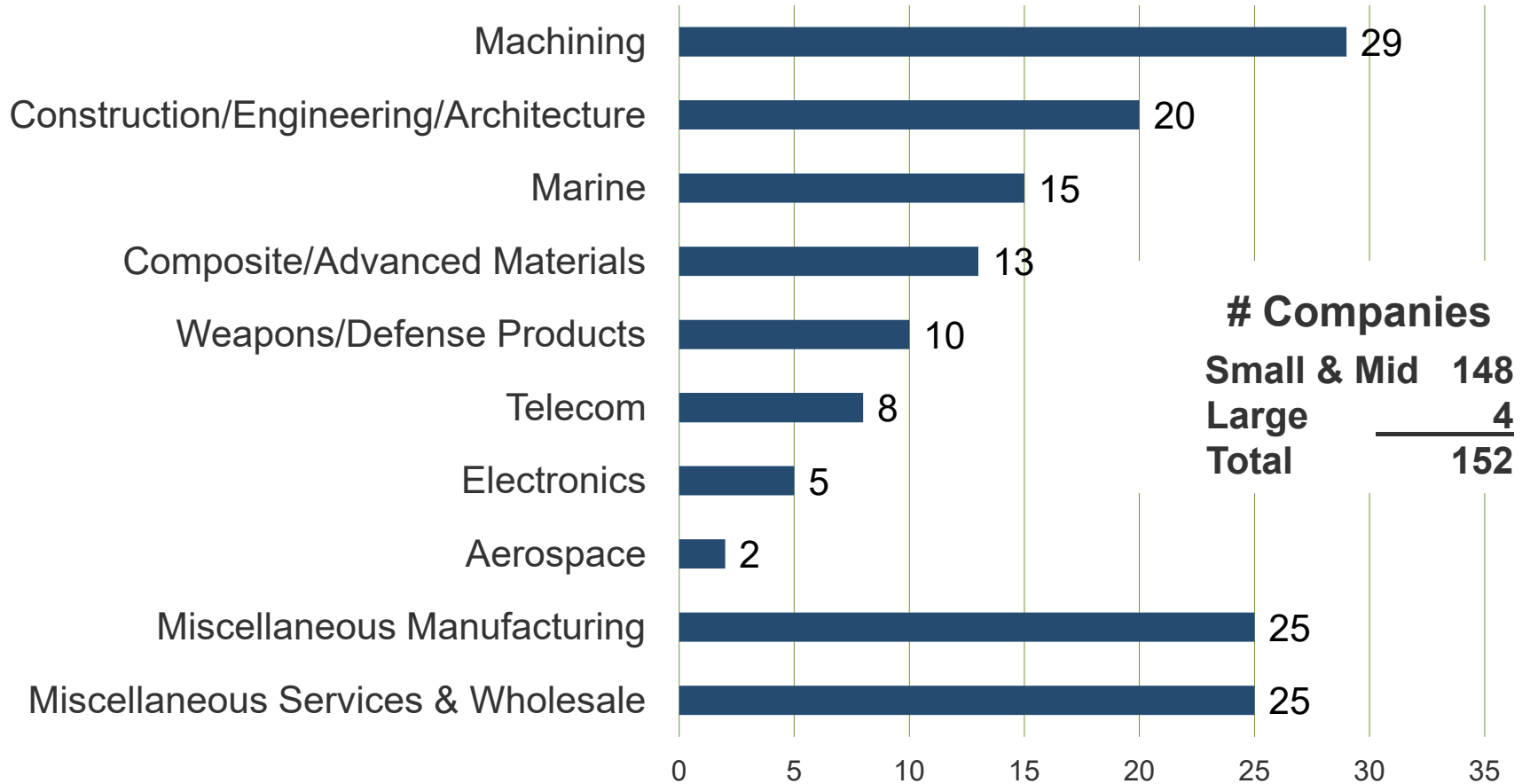
- New Hampshire (two interviews)
- Virginia
- Wisconsin (two interviews)
- Washington
- Center for Regional Economic Competitiveness (CREC) and Entrenworks (National Contractors to OEA)
- Maryland (two interviews)

Full Report – Findings and Basis for Recommendations

Overview and Assessment of Maine Defense Sector

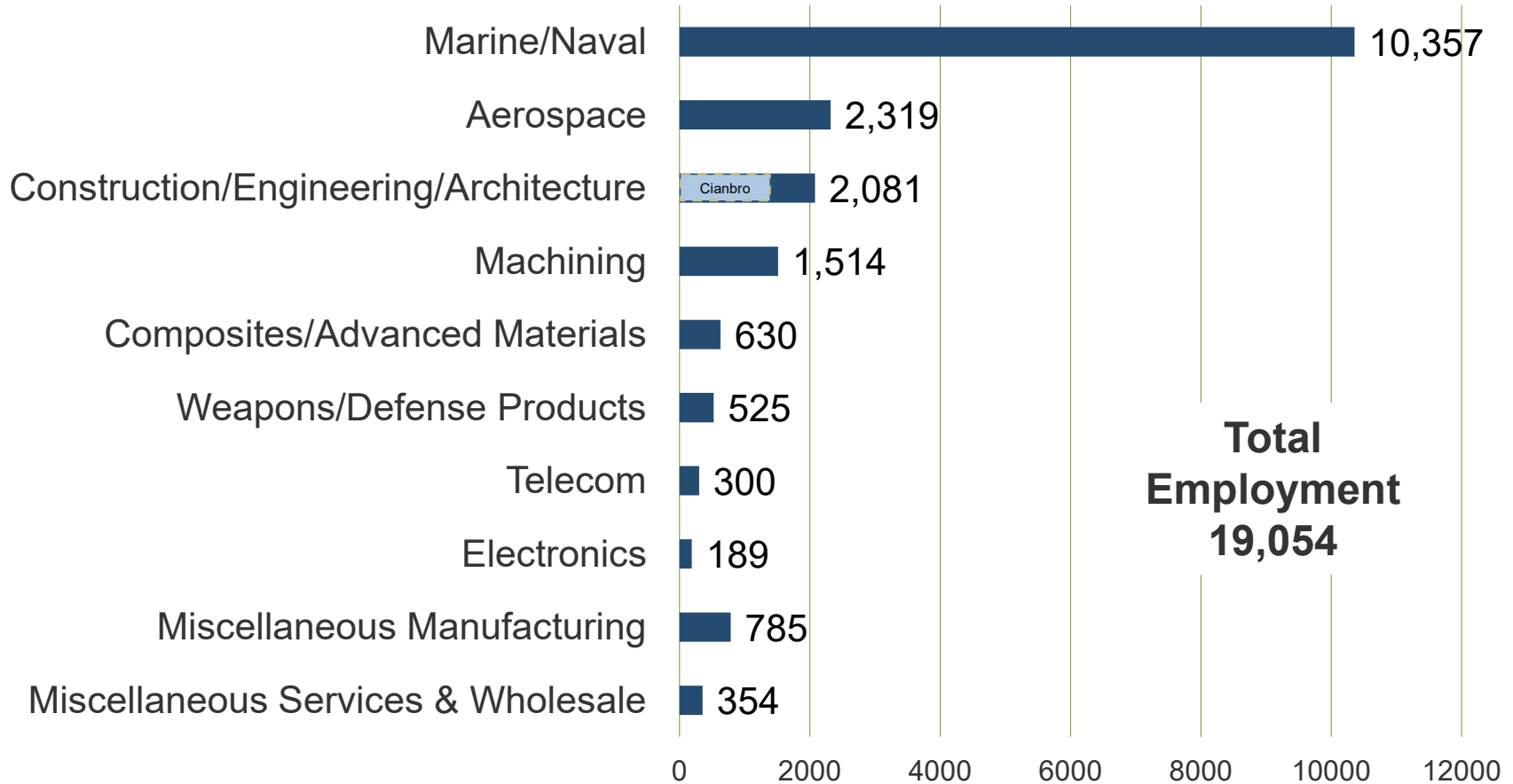
7 industry sub-sectors represent two thirds of the traded defense companies in Maine

of Companies by Industry or Sub-sector



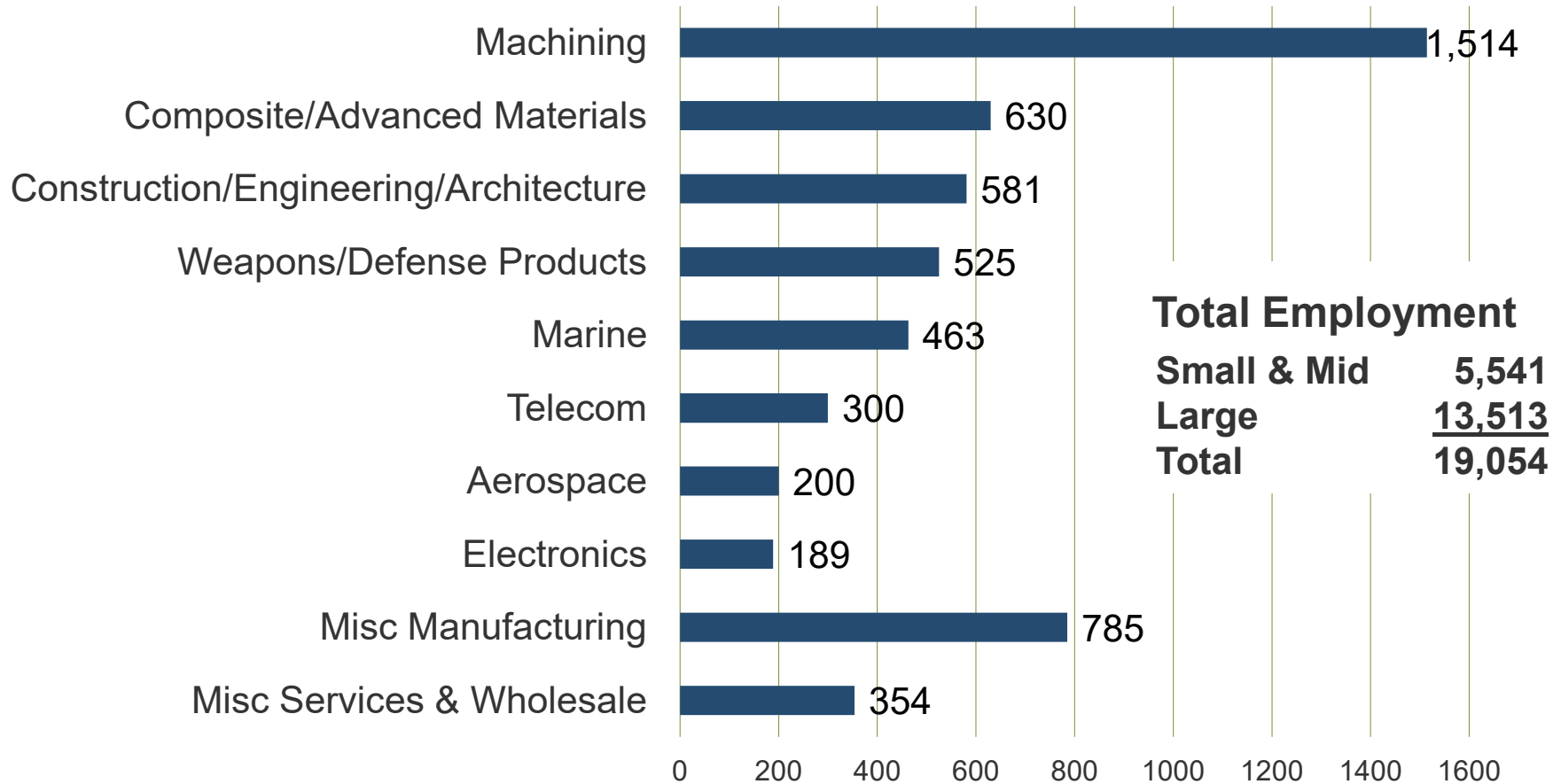
4 industry sub-sectors dominate traded defense sector employment in Maine

Employment by Industry or Sub-sector



When large companies are removed, 7 sub-sectors represent most of employment in small and mid-size firms

Employment by Industry or Sub-sector (SMEs only)



A few large Maine defense companies drive most of the sector's employment and employment growth

Current Employment		Demand Outlook	Net Employment Growth	Hiring Trend
General Dynamics Bath Iron Works ¹	6,000	<ul style="list-style-type: none"> Strong demand, including recent contracts for DDG51 class destroyers Navy expansion from 285 to 355 ship fleet Competing for Navy FFG(X) program 	+1,242 (2015-18)	<ul style="list-style-type: none"> Collectively planning to hire ~ 2,000 this year Hired over 6,000 in past 4 years These numbers include backfill for attrition, retirement
Pratt & Whitney North Berwick ²	2,119	<ul style="list-style-type: none"> Rapid growth due to P&W's strong position in jet engine market, particularly "PurePower® Geared Turbofan™ engines and the F135 engine for the Joint Strike Fighter" Completed \$200M investment in past 7 years 		
Portsmouth Naval Shipyard ³	3,894 ME 6,972 total	<ul style="list-style-type: none"> 8-24-18 article: "PNS has enough submarine maintenance and overhaul work to keep 3 dry docks busy through 2021, with more on deck after that" 8-24-18 article: "A booming shipyard that is working straight out..." 		

1. Sources: Interview with BIW on 1-30-19 and follow-up emails during 1st half of 2019; Portland Press Herald articles on 9-27-18, 10-23-18, 12-21-18, 2-4-19, and 3-1-19

2. Sources: Interview with Pratt & Whitney on 4-22-19 and follow-up emails on 5-31-19. Total employment number is as of May, 2019; <http://www.utc.com/News/PW/Pages/Pratt-Whitney-North-Berwick-Recognized-as-an-IndustryWeek-Best-Plants-Recipient.aspx>; <https://www.industryweek.com/industryweek-best-plants/2015-iw-best-plants-winner-pratt-whitney-north-berwick-built-competition>; <https://www.forbes.com/sites/lorenthompson/2017/07/17/pratt-and-whitney-surges-u-s-hiring-investment-as-geared-turbofan-ramps-up/#1324553686a6>; <https://www.seacoastonline.com/news/20160515/pratt-and-whitneys-berwick-plant-ready-to-soar>; P&W Profile in MaineBiz, Stuff Made in Maine, Fall 2018

3. Sources: Seacoast Shipyard Assoc CY 2018 Economic Impact Report; Interview with PNS on 4-29-19 and follow-up email on 5-20-19

Overall the outlook for the 3 major Maine defense facilities is strong, with some areas of risk/uncertainty

GD BIW

- ❑ Strong current demand due to recent contracts for DDG51 class ships (5 ships, planning yard services), offsetting the sunset of the Zumwalt/DDG1000 program
- ❑ Planned naval expansion from 285 to 355 ship fleet would continue to drive requirements for ship construction, but analysts have questioned whether this plan is entirely feasible given budgetary constraints and politics
- ❑ The next generation Frigate FFG(x) program decision is expected 2020
- ❑ BIW has a reputation for high quality, but is not the low cost supplier
- ❑ BIW has also been challenged by the shift back to the DDG51 program after transforming the operation for the Zumwalt/DDG1000 program

Overall the outlook for the 3 major Maine defense facilities is strong, with some areas of risk/uncertainty

P&W North Berwick

- ❑ North Berwick facility has grown rapidly in recent years
- ❑ 4 businesses at the facility: component manufacturing, modular assembly, aftermarket for repair of components, design engineering
- ❑ Growth partly driven by P&W's strong position in jet engine market due to investments in "PurePower® Geared Turbofan™ engines and the F135 engine for the Joint Strike Fighter"
 - Geared Turbofan technology resulted from 10-year \$20B investment, and reportedly puts P&W ahead of major competitors; the technology offers a 16% gain in fuel efficiency, 50% reduction in carbon emissions, and 75% decrease in noise
- ❑ North Berwick became more aggressive about pursuing additional work, such as bringing in modular assembly and pursuing part design and new product development
- ❑ Completed \$200M investment at North Berwick plant in past 7 years; Industry Week "Best Plants Award winner" in 2015

Sources: P&W North Berwick brochure; <http://www.utc.com/News/PW/Pages/Pratt-Whitney-North-Berwick-Recognized-as-an-IndustryWeek-Best-Plants-Recipient.aspx>; <https://www.industryweek.com/industryweek-best-plants/2015-iw-best-plants-winner-pratt-whitney-north-berwick-built-competition>; <https://www.forbes.com/sites/lorenthompson/2017/07/17/pratt-and-whitney-surges-u-s-hiring-investment-as-geared-turbofan-ramps-up/#1324553686a6>; <https://www.seacoastonline.com/news/20160515/pratt-and-whitneys-berwick-plant-ready-to-soar>; P&W Profile in MaineBiz, Stuff Made in Maine, Fall 2018

Overall the outlook for the 3 major Maine defense facilities is strong, with some areas of risk/uncertainty

Portsmouth Naval Shipyard

- Federally owned; mission is overall repair and modernization of submarines
- May 12, 2019 article: “The navy yard is “very, very busy”...there’s enough work projected to keep the shipyard workforce busy through 2032 and beyond”
- Significant employment growth in recent years – now leveling off
- Expansion of naval fleet to 355 ships – including submarines – should drive continued demand, again tempered by budgetary realities
- Currently upgrading 1 of 3 drydocks so it can work on the newer Virginia class submarines, in addition to the older Los Angeles class (the other 2 dry docks have already been upgraded)
 - There is some risk of transferring funds from PNS projects to fund the border wall, including the dry dock upgrade
- The Navy plans to invest \$21B to modernize its shipyards (whether that investment materializes will be subject to budget/political negotiations)
 - There may be some long-term concern about the cost position of federal shipyards versus private shipyards in building submarines, based on a CBO study that indicated private shipyards are 38% lower in cost

Most firms want to diversify, but some want to remain focused on markets where they have been successful

Level of Diversification for 36 Companies Interviewed (primarily SMEs)



Want to develop new customers and enter or expand in targeted markets.

Some want to diversify, and some don't. Some are busy and reluctant to say no to current customers. Others have good strategic reasons for being focused on one market. However, over the long term that entails risk.

Each company has a unique strategy.

Everyone needs to acquire new customers, sometimes new customers within defense.

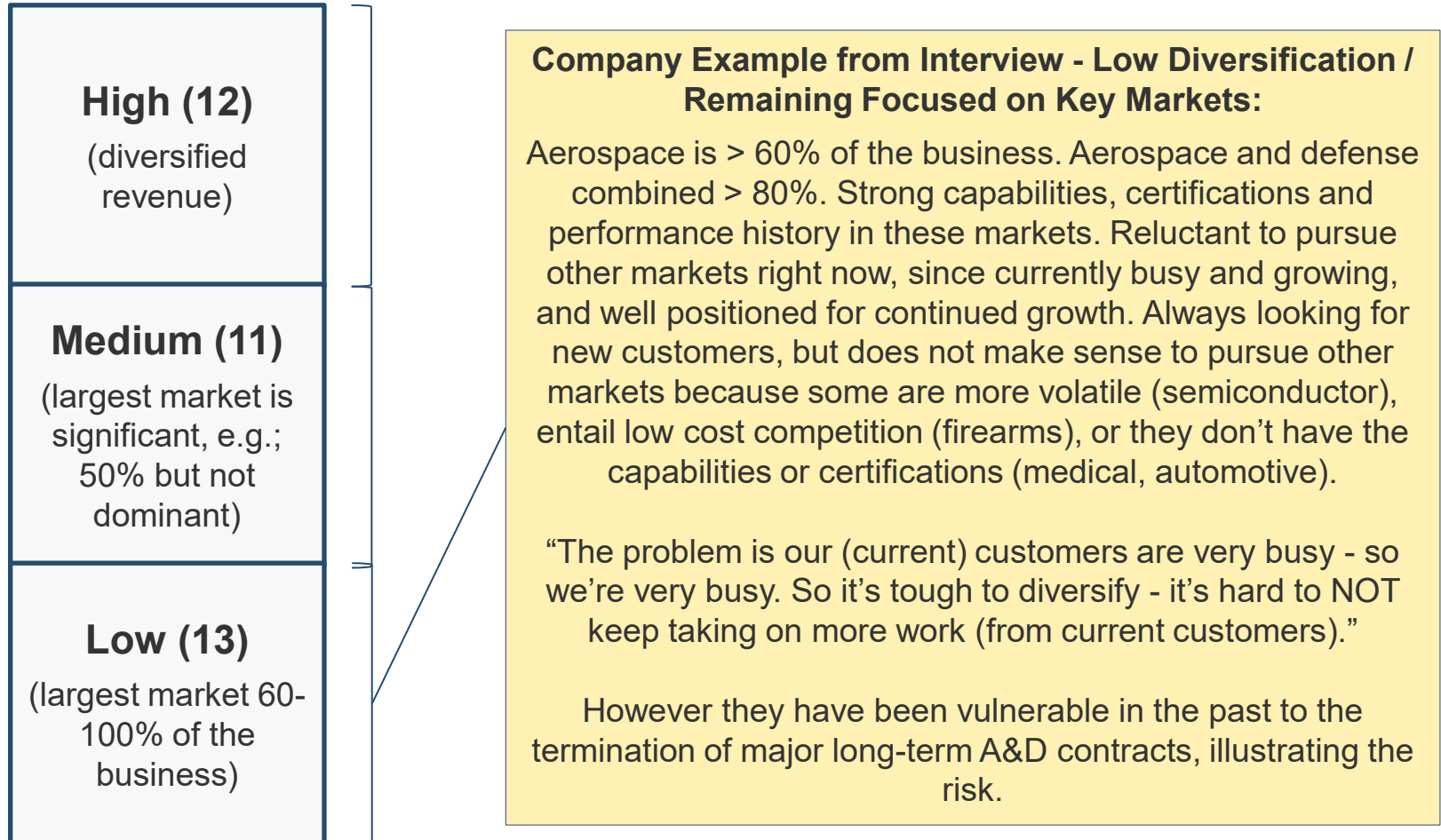
Most companies want to develop new markets.

Some focused companies will want to diversify a few years from now.

The question is "how we can help all of these companies grow?"

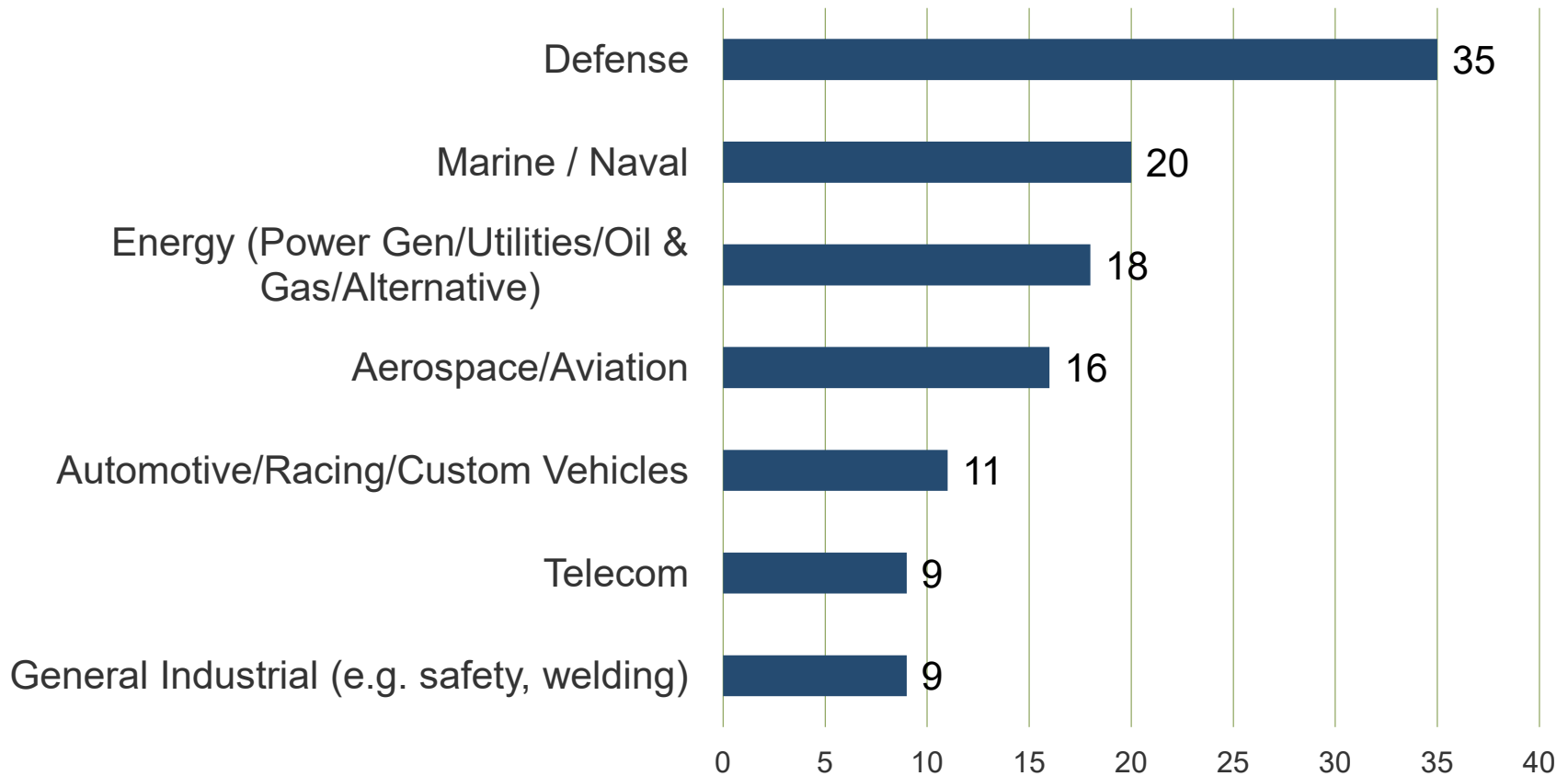
Most firms want to diversify, but some want to remain focused on markets where they have been successful

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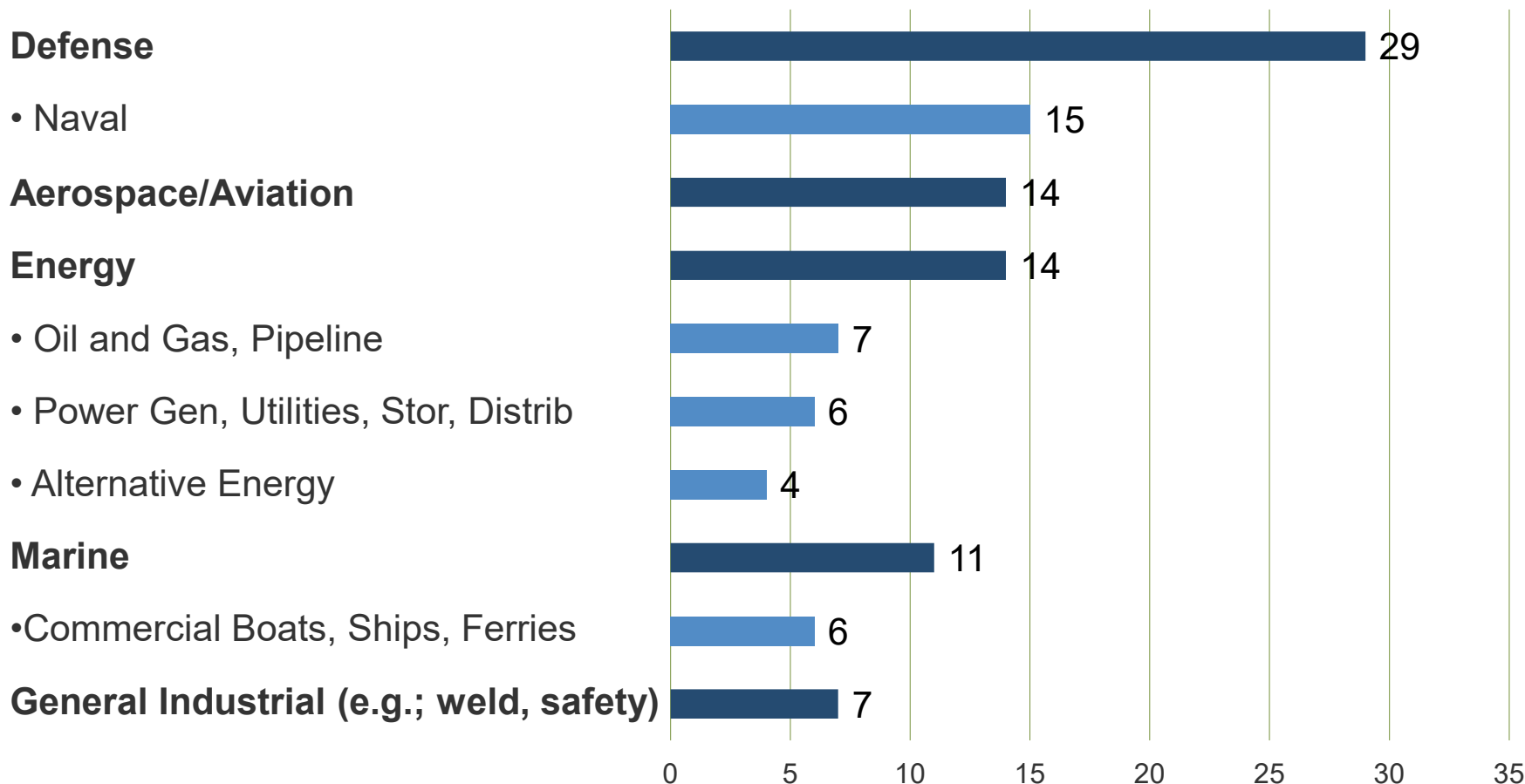
Many of the companies interviewed currently serve marine, energy, aerospace & automotive markets – as well as defense

Current Markets Served
Companies Interviewed (N=36)

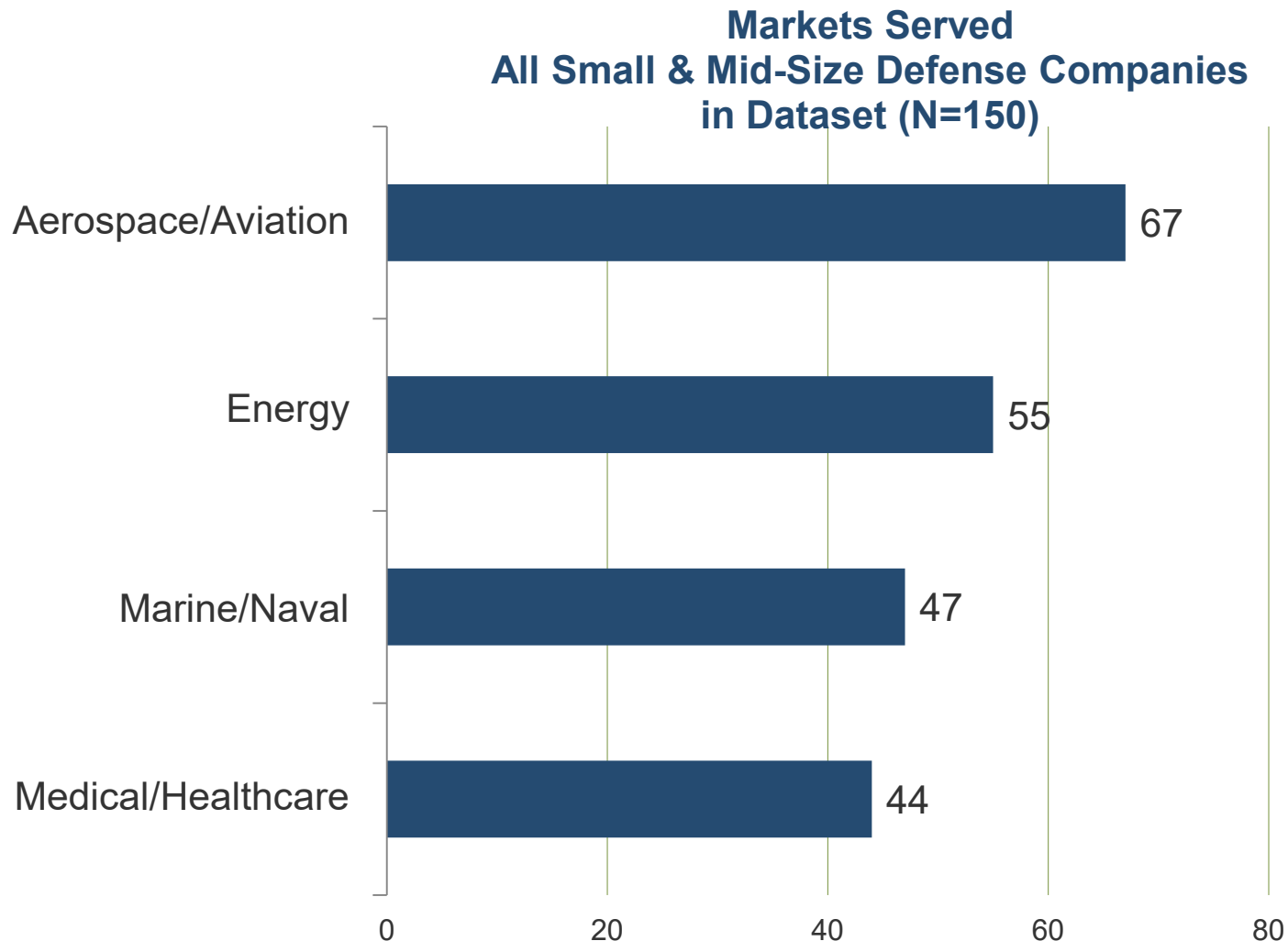


Many companies interviewed continue to target defense for growth, as well as aerospace and energy markets

Markets Targeted for Growth
Companies Interviewed (N=36)



When analyzing all small and mid-size firms in the defense sector, large numbers serve aerospace and energy markets



Summary of conclusions that emerge from the sub-sector analysis *(see Appendix for detail)*

Sub-sectors Analyzed:

- ❑ Advanced materials
 - Composites
 - Technical textiles
- ❑ Marine products
- ❑ Precision machining
- ❑ Defense products / weapons
- ❑ Telecom
- ❑ Construction / Engineering / Architecture

The sub-sector analysis in the Appendix provides additional perspective on:

- ❑ Recent growth and decline of Maine companies in these sub-sectors
- ❑ Major segments of the global market and growth outlook
- ❑ Current markets and target growth markets for Maine companies in each sector
- ❑ Areas of Maine strength in each sub-sector

Observations from Sub-sector Analysis:

- ❑ Significant growth opportunity exists across sub-sectors
- ❑ Reinforced the importance of aerospace and defense/naval as key target growth markets for Maine defense sub-sectors
 - Including advanced materials, marine, machining, telecom and obviously defense products
 - Actual defense and naval spending (resulting from political and budget negotiations) will have a significant impact on the Maine defense sector – particularly whether the Navy will expand its fleet aggressively according to their long term plans
- ❑ Maine has clusters in “soldier systems” (based mainly on advanced materials) and in smart materials
- ❑ Some clusters have not been identified previously and may benefit from support:
 - RF/Microwave antenna and telecom cluster may benefit from opportunities to collaborate
 - Need to educate the construction/engineering cluster that economic development organizations can help them diversify and grow
- ❑ The experience of the machining sector in particular highlights the risks of being overly dependent on one market or customer

Full Report – Findings and Basis for Recommendations

Challenges and Barriers to Growth

Barrier/Challenge #1: the major barrier to growth is a shortage of qualified workers

Workforce Challenge

- ❑ **A major barrier to growth identified by companies interviewed was the lack of qualified workers**
- ❑ **Relevant in many sectors**
 - However, particularly acute in precision machining
- ❑ **Many companies struggled to identify qualified candidates, even while stating that they could train them**
- ❑ **SMEs are hit particularly hard**
 - Lose workers to large defense companies and MA/CT



Constraint on Growth

- ❑ **Companies are constrained from fully pursuing growth opportunities because they cannot staff manufacturing operations**
 - Some companies – particularly in machining – are struggling financially because they don't have enough workers to generate sales volume that would make it easier to cover fixed costs and overhead

Small and mid-size companies are most vulnerable in the labor market

Large Defense Companies

	Current Hiring ¹ (3 cos combined)	Recent Hiring ¹ (3 cos combined)
GD Bath Iron Works	~2,000 this year	Hired >6,000 in past 4 years
Pratt & Whitney North Berwick		
Portsmouth Naval Shipyard		
1. Includes hiring for attrition and retirement; see sources on page 11		

Other Employers

MA/CT (wage premium)	ME Non-Manufacturing Other Large Employers
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SME Defense Companies

Selected SMEs Interviewed	
Immediate Needs Can't Fill	150
Additional Planned or Targeted Employment (~1-2 years)	212
Total	362

Large companies need nearly 2,000 workers this year. SMEs interviewed need 150 workers right now and nearly 400 in the next 1-2 years. Other defense companies we did not interview presumably need hundreds more. However they are unable to find them and lose out to large companies, other employers and other states that pay wage premiums.

Large companies are also facing critical workforce challenges, and are investing in workforce development

- ❑ **Large defense companies are better able to find workers than smaller companies, but it is becoming increasingly difficult**
 - As one large company indicated, they still see candidate flow, but “it is getting harder - a lot harder”
 - Larger companies are better able to attract candidates because of considerable investment in marketing and outreach, name recognition, and the ability to offer higher compensation and benefit rates
- ❑ **As discussed later in this report, these large companies are making considerable investment in workforce development programs**
 - Including critical partnerships with the Maine Community College System and other public/non-profit workforce programs
 - They have also developed training/development programs to train people with more limited experience

Worker shortages – company examples and comments from interviews

Examples and Comments from Interviews

- *Company (#3)*: They are challenged in hiring production workers. The issue is not skills – they can train, but need them to show up. They offered interviews to 20 people who applied for production jobs. “0” responded. Need 10-15 employees now.
- *Company (#1)*: Production workforce is a capacity constraint. Need to hire 30-40 production workers. “Struggle to find them and retain them.” Compete with places like P&W.
- *Company (#10)*: Workforce is an issue. One of their production guys said “need to hire 4 people to get 1 person who stays.”
- *Company (#11)*: Workforce is the major issue – have machine capacity, but can’t hire people. “Could double output if could find people.” Down 10-15% from planned staffing.
- *Company (#7)*: People they interview have major issues, not really hireable: “no relevant background, or worked at 8 places in last year, or no manufacturing experience.”
- *Company (#70)*: Trying to hire all the time – struggling to find people. “Need people in almost every department.” Target is to hire additional 40 employees. Need people “who want to work and learn.” They can train, but can't take on too many because need experienced mentors.
- *Company (#64)*: Challenging to find people. Need skilled tradesmen who are skilled in multiple processes. Willing to train.

Worker shortages – company examples and comments from interviews

Examples and Comments from Interviews

- *Company (#20)*: Workforce is "far and away the biggest challenge." Could hire 25 people right now if could find skilled machinists. Also lose some candidates to MA and CT who can pay more.
- *Company (#18)*: Have advertised jobs on Indeed for a month and gotten 2 responses. 2 years ago would have gotten 20-30. Not getting qualified respondents – "can't buy a qualified resume. Would like to have some experience – can't get close to that." ... Portsmouth Naval Shipyard compounds the workforce challenge. PNS is so desperate to hire people they offer compensation and benefits small firms can't compete with. This company needs to increase employment to increase sales and strengthen profitability – struggle to breakeven at current volume level.
- *Company (#40)*: "Hate having to turn work away – don't have enough people – that is #1 issue – wake up at night worried about getting the work done we have already agreed to."
- *Company (#16)*: Facing same workforce challenges as everyone else. "About 1 out of 6 hired stick with it and work out." If they leave "you lose the training and investment time." Also employees get "picked off by PNS and BIW."
- *Company (#39)*: Think they could get more work. The trouble is finding workers. Problem is overhead – they run one shift, need equipment to be running more hours to spread (amortize) overhead costs, such as machine payments.
- *Company (#17)*: Can't hire people. Not trying to grow, but need to be able to replace people that retire.
- *Company (#120)*: Their major challenge is finding workers. Could hire 50 right now if he could find them. Could easily hire 100 in next few years.
- *Company (#141)*: "We are turning down work because we can't get the people"

Barrier/Challenge #2: testing, certification and vendor qualification inhibit entry into new markets

- ❑ **Testing and certification adds additional costs**
 - 3rd party testing, audits and certifications
 - Training, documentation
 - Pilot or test runs (material, labor)
 - Engineering time
- ❑ **And slows entry into new markets**
 - Additional costs increase total investment to enter new market, and delay entry
- ❑ **DoD and prime contractor resistance to qualifying new vendors is part of the challenge**
 - Time and cost to evaluate new vendors (who pays for it?)
 - Limited incentive to switch (unless having problems with a vendor or can obtain dramatic innovation or cost savings)

Examples and Comments from Interviews

Company (#1): “Have not used our material inside jet engines. Must survive fire test. Costs \$20K for test, which is necessary just to see if they are interested – just to be considered.”

Company (#62): “Hard to get product evaluations and approvals. Requires engineering time to review test results. A shipyard engineering department needs to be able to charge time to something... In the Navy, have to convince someone it is worth the time to assign some engineering activity to it.”

Testing, certification, vendor qualification – examples and comments from interviews

Composites / Advanced Materials

- *Company (#3)*: Engaging in major initiative to gain ASME certification. \$200K cost, 18 month effort. They are seeing opportunities where ASME certification is spec'd in. Prefer ASME spec'd jobs. That "helps to limit competition and get competition on a more level playing field. Sometimes when ASME not spec'd in you get companies bidding that are not qualified and it gets to be more of a commodity and that is a waste of time."
- *Company (#1)*: Need to be AS9100 certified for specific customer opportunity. Plan to do so in 2020. Slows down conversation with new customer unless certified... Also barrier of perceived technical risk: "Have not used our material inside jet engines. Must survive fire test. Costs \$20K for test, which is necessary just to see if they are interested – just to be considered."
- *Company (#10)*: Gave multiple examples of testing costs for specific applications: for one example, costs \$38K for the test and \$15-20K for the material for a production run. For another application, testing and material cost might be \$100K.
- *Company (#7)*: New requirement to become certified supplier to DoD; required "god awful" testing related to strength and other parameters. Forced to hire part time engineer.

Testing, certification, vendor qualification – examples and comments from interviews

Marine Products

- *Company (#64)*: Growth target of energy market requires expensive testing. Gave example of test rig that costs \$75K.
- *Company(#62)*: A major barrier to new defense market opportunities is getting DoD and defense contractors to make changes in specs and approve vendor product evaluations and testing, as well as getting updated products re-qualified. “Hard to get product evaluations and approvals. Requires engineering time to review test results. A shipyard engineering department needs to be able to charge time to something. Need to find money and technical people to get evaluations/approvals to change. Shipyards just build to spec, unless see huge cost savings opportunity. They often defer to the Navy. In the Navy, have to convince someone it is worth the time to assign some engineering activity to it.”
- *Company (#68)*: Need to do fire testing on new product.

Machining Companies

- *Company (#16)*: Many expensive requirements for serving the aerospace market which they are pursuing, including: AS9100, specific lighting on the floor, quality software modules needed for first parts approval process, each fluid used in aerospace cells needs to be approved.
- *Company (#22)*: Not having the right certifications, qualifications are barriers to growth and diversification into medical and automotive markets.

Testing, certification, vendor qualification – examples and comments from interviews

Telecommunications, Defense and Miscellaneous Manufacturing and Service Companies

- *Company (#98)*: Difficult to become a qualified vendor in the defense market. No incentive for DoD or primes to do it: "DoD would have to do some of its own testing to qualify us – they would have to get someone to do it, and a budget for it... No incentive to do that."
- *Company (#90)*: Would benefit from doing some testing to demonstrate that they meet certain specs in advance of sales opportunities, such as customer vibration test or meeting milspec (and another standard) that covers a variety of parameters, such as vibration, EMI.
- *Company (#120)*: "Would be interested in use of OEA grant for certifications, such as NADCAP certification. It is expensive, need to get certified for each process, might be \$20K per process (e.g.; welding)." - Otherwise need to send it out to another shop that is certified in that process.
- *Company (#81)*: Needs to get team members trained and certified in specific skills to qualify for specific bid opportunities and increase labor rates.

ISO 9000 or AS9100

- 6 companies (composites/advanced materials, marine, machining, telecom) needed or were under pressure to become ISO 9000 or AS9100 certified. 3 additional companies were currently working toward certification. And many additional companies are already certified.

Barrier/Challenge #3: companies face challenges in sales, business development, marketing, product development

These challenges slow growth and expansion in new markets:

1. Small companies often have lean staffing in sales, business development, marketing and product development functions, which provide the critical bandwidth to develop new markets and acquire new customers
2. Companies would sometimes benefit from assistance in accessing new customers and markets – contacts, referrals, gaining access to “insular” new markets
3. Suppliers are sometimes unsure about how to navigate business development for DoD and prime contractor customers
4. Many companies have an idea of where to grow and diversify, but some need help to do market research to evaluate potential markets and develop a strategy for entry
5. Companies need improvements in marketing
 - Materials, tradeshow presence, web presence, search engine optimization
 - Inbound marketing (bring customers to you) in addition to outbound business development/sales
6. Many companies see growth potential in international markets, and outside assistance will help

Small companies often have limited staff or bandwidth in sales, marketing, product development functions

- ❑ **Small companies often have lean staffing in sales, business development, marketing and product development functions**
 - However these functions provide the critical bandwidth needed to acquire new customers and develop new markets
 - Sometimes companies self-identified the need for additional sales, marketing or engineering staff – in others, it emerged based on a strategic discussion about the company
 - Several firms had recently hired or were planning to hire new sales/business development staff in order to more aggressively pursue growth opportunities, affirming the conclusion that having adequate staff in these functions is a necessary ingredient for growth
- ❑ **A number of companies are heavily reliant on repeat business with their existing customer base because they don't have sufficient staff to acquire new customers and develop new markets**

Examples and Comments from Interviews

- *Company (#75):* “Huge deal for us to hire an engineer....There is a significant engineering component just to quote on a job. If had more capacity, more quoting, and could deliver jobs faster.” And they would also have more capacity to “get on the road” to sell/talk to customers. And could expend more efforts to get spec'd into jobs.

Sales, business development, marketing, prod dev staff – examples and comments from interviews

Examples and Comments from Interviews

Need Additional Sales and Business Development Staff

- *Company (#101)*: “If had more admin staff - estimators - that would free up time for business development”.
- *Company (#5)*: No real salesforce required now, but over the long term want to develop salesforce to find new applications and connect with new DoD units.

Need Additional Marketing Staff

- *Company (#62)*: No marketing staff. Challenged to explore and develop strategy for new markets - “not our strong point”
- *Company (#40)*: They do “zero marketing” (5 person company). Generate business from existing customers and word-of-mouth, and as customer engineers “bounce around” to different customers.

Need Additional Product Development and Engineering Staff

- *Company (#7)*: Need a product development engineer for testing, process improvements, PPAP process for new parts.
- *Company (#75)*: In the custom space, there is so much engineering involved. That can be a constraint. “Huge deal for us to hire an engineer... There is a significant engineering component just to quote on a job. If had more capacity, more quoting, and could deliver jobs faster.” And they would also have more capacity to “get on the road” to sell/talk to customers. And could expend more efforts to get spec’d into jobs.

Sales, business development, marketing, prod dev staff – examples and comments from interviews

Examples and Comments from Interviews

Need Additional Staff Across Multiple Functions

- *Company (#6)*: Innovative firm that needs marketing, selling, business development bandwidth or potentially a partner to handle these functions. Lost some of this staff when downsized. This includes a need to pursue international sales.
- *Company (#9)*: Need product development manager and a sales manager. Product development manager should be externally focused to develop new markets and applications, such as aerospace (and others). The sales manager would track and manage leads, analyze data, determine sales focus.
- *Company (#65)*: No marketing staff. CEO trying to retire; struggling to find or develop people to take over business development function.
- *Company (#68)*: Small company developing a new product – constrained by lack of business development bandwidth (and lack of dollars to spend). Need bandwidth (staff or contractors) to conduct market research, develop technical package, determine liability/risks.
- *Company (#18)*: To get to level of sales which is viable for the company, need a sales person (used to have one, no longer), an engineer and a quality person. But not enough people in the shop to produce enough volume to pay the bills. So how afford this overhead staff?

Recently Hired Additional Sales and Business Development Staff, Suggesting There Was (Until Recently) a Need to Expand Staff

- *Company (#3)*: Just hired dedicated salespeople for first time in company's history.
- *Company (#1)*: Currently hiring business development staff to enter/grow in new markets.
- *Company (#64)*: Not identified as barrier, but recently hired a 2nd sales engineer, so one could focus on new growth opportunity.
- *Company (#90)*: Now planning to hire outside sales and marketing person - never done that before.
- *Company (#97)*: Bringing in a new person to oversee operations, so top manager can focus on business development.

Companies would sometimes benefit from help in accessing new customers and markets

- ❑ **Companies often spoke about the challenge of breaking into “insular” new (sometimes niche) markets**

Examples and Comments from Interviews

- *Company (#10)*: Facing the challenge of getting into the insular/closed world of the ballistics market: not yet part of "club," need to break in.
- *Company (#70)*: Facing resistance to use of composites by specific type of customer – “old boys club” in that business.
- *Company (#69)*: Challenge to growth is networking/gaining access to offshore wind/energy market players – tends to be a “European boys club” and the supply chain is still emerging, and difficult to plug into the right spot (developer? contractor? subcontractor?). “Who are the right decision-makers?”
- *Company (#17)*: Company is trying to develop new business in a segment of the energy market – cold calls, developing relationships, getting referrals in – “cast wide net” hoping to connect with companies that want to switch suppliers. It's all about sales/business development effort – they have tried marketing activities in the past, such as tradeshow, email, etc. – “went nowhere.”
- *Company (#115)*: Perceive challenge of getting into Canadian market – they tend to prefer Canadian companies.
- *Company (#62)*: Trying to “crack” the submarine market – want someone to “give us a shot” – insular world. “We are considered a new supplier in that world”

Suppliers are sometimes unsure about how to navigate business development for DoD, primes

- ❑ **Companies where defense is a limited percentage of sales, were less familiar with how to navigate the acquisition process and identify bid opportunities**

Examples and Comments from Interviews

- *Company (#3)*: Challenge of navigating the government/defense acquisition process – difficult for a small business. They supplied a specific product (for the Navy) through a larger contractor. They were 1 of only 2 companies qualified to supply the product. Never heard about the next RFP, when it went to a different prime contractor – “not in their database.” Need business development people that know how to navigate in this world.
- *Company (#10)*: Challenge to get in touch with the right people in defense/military. “Not aware of us.”
- *Company (#18)*: See growth opportunities with DoD, but not sure how to identify or get notified about part opportunities that are a good match. Gave example: they do a particular part for the Navy. “They give us 100 pages of drawings with many parts. 90% of those parts would be a good match for our capabilities, but we are only asked to bid on 2. How do we get notified about the other opportunities to bid?” For BIW and defense contractors (versus DoD) – “impossible to get on their bid lists.”
- *Company (#81)*: “Trend in military work [like ours] being taken over by big contractors – General Dynamics, Boeing, Northrup Grumman – for jobs they don’t have anything to do with, and which are not in their wheelhouse. It gets added onto the big companies’ contracts. Often they sub to people like us anyway. They are not the experts. We ended up doing some of the exact same work outside of the [prime’s] contract – we did it at 1/3 of the price the primes charged to the government and in much less time.”

Suppliers are sometimes unsure about how to navigate business development for DoD, primes

Examples and Comments from Interviews

- *Company (#120)*: “Defense is small percentage of business. Would like to do more, but hard to figure out how to navigate – where to go, how to deal with red tape, getting certified.” No defense business has developed, so no longer pursuing at this point (had pursued it a few years ago with the hire of sales/business development person for defense). Need to have the right person in business development who knows how to navigate military. Need to know how to navigate the acquisition process.
- *Company (#97)*: “I lost 8 bids in the [in a particular portion of the Foreign Military Sales process] before I figured out how all this stuff works.”

Some companies need help to conduct market research to evaluate and develop strategies for potential markets

Examples and Comments from Interviews

- *Company (#9)*: "Need to figure out how to explore new markets in a repeatable, systematic way vs. one-off." [repeatable market research and business development processes]
- *Company (#64)*: Expressed interest in doing market research on their key growth market of oil and gas: where is it going? How large is the market for their products?
- *Company (#62)*: Still looking for a 3rd major business area to diversify the company that leverages their engineering skills. Have an engineer working on a new process that could be the core of this 3rd business area. Done some technical research and partnered with another company. Question of market strategy – "How do we do it? That is not our strong point. No marketing people. First need to establish market need, and determine price point." Also concerned about whether they are "being strategic" or just reacting to their partner. "Hesitant to hire people [to pursue this market] – must figure out market need and are we cost effective? Must also nail down technical specs."

For some companies the challenge is both market research and the need for a strategic process to determine where to focus efforts

- *Company (#6)*: Highly innovative small company that would benefit from assistance in marketing and business development, including the ability to evaluate numerous new market and product opportunities and develop strategies for entry and growth.
- *Company (#75)*: This company has to make strategic decisions about product mix and focus of business development efforts. Not well set up to manufacture large (non-custom) commercial products. But they get contacted by customers in this area, and there appears to be demand. Is there growth opportunity there? Parent company wants them to focus on higher margin custom products, and there is no capacity constraint on these products. Strategic question about where to pursue growth, given manufacturing constraints and margin goals.

Companies need improvements in marketing

- ❑ Often the issues reflected a lack of internal marketing staff or budget to develop marketing materials and content
- ❑ In other cases the challenge reflected a lack of expertise in using marketing tools to communicate capabilities and bring customers to them

Examples and Comments from Interviews

- *Company (#9)*: “In old days, could buy a list of people and call them... Today, hard to identify people and no one answers the phone. How to reach them?” How bring them to us? See the website as a big opportunity.

Companies need improvements in marketing – examples and comments from interviews

Examples and Comments from Interviews

- *Company (#1)*: Need “good presentation content” for business development team, “application profiles”, web content “tailored for different customers – for technical people and for buyers” and need to “improve low rank on search engine results”
- *Company (#9)*: “In the old days, could buy a list of people and call them... Today, hard to identify people and no one answers the phone. How to reach them?” How to bring them to us? See the website as a big opportunity.
- *Company (#64)*: Facing need for considerable marketing investment related to growth in oil and gas market: website upgrade, tradeshow, EU General Data Protection Regulation (GDPR) compliance. Considered hiring marketing firm, but expensive.
- *Company (#19)*: Some opportunities to improve marketing. “Don’t have a marketing person – all outsourced.” For example, “finding tradeshow is sometimes dumb luck – could use a menu of potential shows.” We redid our show booth. “Maine culturally is more steak than sizzle, but sometimes need some sizzle at shows.”
- *Company (#65)*: Sometimes we have a “lack of professionalism in marketing and graphic design”
- *Company (#68)*: “Screaming for help in marketing and sales. Need someone with industry knowledge – could use separate person to handle marketing and administer sales. Working on re-designing website, and questions keep coming back due to lack of industry knowledge.”
- *Company (#7)*: Due to financial challenges, they “run lean.” No money for marketing, tradeshow. They are updating their website through a grant program. Rely on past customers – most of their business is repeat vs. new customers.
- *Company (#69)*: Would like to have the money to send people to conferences, as well as for “making the rounds” (sales calls) in key markets.
- *Company (#97)*: “I could use help to offset the costs of marketing and promotion (to support Foreign Military Sales)”

Companies need improvements in marketing – machining sector

- ❑ **Some companies in the machining sector invest very limited resources in marketing, because of several factors:**
 - Previous investments were perceived as ineffective
 - Sales effort is perceived as more relevant and effective than marketing activities
 - A lack of resources
 - A lack of workers to support higher volume
- ❑ **However it is hard to avoid the conclusion that there is room for marketing improvements**

Examples and Comments from Interviews

- *Company (#18):* “Tried reps – did not work out. Had sales guy for a year, then gone. Get some leads through website, but much of our business is history with past customers. Not a lot of new customers. Get some one-time customers and never see again”... A large percent of the business is long-term repeat customers. No tradeshow and no advertising.
- *Company (#39):* They are “sticking with current customer base” – re-orders from them. Don’t have to go beyond that given workforce constraints.
- *Company (#40):* [How generate business?] “Existing customers and word of mouth, and customer engineers bounce around to different customers. We do zero marketing.”
- *Company (#17):* “Its all sales and business development effort. Not about marketing, like tradeshow, advertising, or email marketing – tried that stuff, and went nowhere. People we want to reach are like in a fortress – marketing not effective.”

Over half of the companies interviewed sell internationally¹

Level of International Sales for 36 Small and Mid-size Companies Interviewed

Significant International Sales (12) (generally $\geq 20\%$)	<ul style="list-style-type: none">• International part of growth plan• Already engaged with MITC
Some International Sales (7) (generally $<20\%$)	<ul style="list-style-type: none">• Several see growth opportunity in global markets• Generally engaged with MITC, a few opportunities to deepen connections and develop new relationships in construction/engineering/architecture
Zero (or Near Zero) International Sales (17)	<ul style="list-style-type: none">• 8 are machining companies, which tend to sell regionally and not internationally• For 9 non-machining companies, only 1-2 have international opportunity

Those companies that have international opportunity are engaged with MITC.

The companies that don't sell internationally, don't have much opportunity.

MITC service offerings match the needs identified in international business development and compliance

- ❑ **MITC offerings respond to the general needs and challenges identified in business development/marketing and compliance**
 - Business development/marketing
 - Tradeshow support
 - Identification/Evaluation/Matchmaking activities with potential foreign distributor/rep partners and customers (with US DOC or private consultants)
 - Foreign market contacts and intelligence
 - Export compliance and documentation
 - International Traffic in Arms Regulations (ITAR) and Export Administration Regulations (EAR)
- ❑ **There were no obvious service gaps identified**

Companies referenced a wide range of ITAR (International Traffic in Arms Regulations) compliance challenges

Examples and Comments from Interviews

ITAR = International Traffic in Arms Regulations

EAR = Export Administration Regulations

Interacting with Foreign Nationals

- *Company (#68)*: If they win a bid they are competing for, it might require them to bring in their partners – who are foreign nationals – into a US Navy program. Would need to ensure ITAR compliance. (Note: mentioned that ITAR training from MITC was very valuable.)

Obtaining an Export License and Developing a Compliance Program

- *Company (#5)*: Have some products in R&D now that would fall under ITAR.
- *Company (#69)*: Have a software product they could sell internationally, but would need to deal with ITAR compliance (have not sold any for that reason, but they do receive inquiries).

Foreign Ownership and Compliance Program

- *Company (#46)*: Owned by a foreign company and now forming separate Board to be ITAR compliant. Also were interested in use of OEA grant to do an ITAR audit to identify compliance gaps.
- *Company (#75)*: Owned by a foreign company. Need to ensure ITAR/EAR compliance program is “in order.” Could use assistance to clarify classification of products, for example.

ITAR Requirements for Suppliers (who supply components to exporters)

- *Company (#17)*: Customers are asking them to demonstrate ITAR compliance. Need someone to explain what that entails for their company as a supplier of components.
- *Company (#50)*: For DoD and aerospace – regulations and compliance are “hard to keep up with. For ITAR and AS9100 – we get audited all the time and new requirements are difficult to implement.”
- *Company (#16)*: Considered use of OEA grant for ITAR or EAR training.
- *Company (#39)*: To do defense work, they are expected to register for ITAR – but never sell internationally. \$2K per year to register. Why? That expense is a “big deal for us.”

Overcoming Past Problems

- *Company (#1)*: Had ITAR problems in the past, so now “super-conservative” regarding international. However get inquiries all the time from international customers.

Other Barriers/Challenges: cybersecurity and import duties

Cybersecurity

- ❑ **Companies are starting to “get the message” about DFARS cybersecurity requirements**
 - Several companies – across sub-sectors – were aware of the requirement, but uncertain about how to proceed
 - *Company Example:* [What about DFARS Cybersecurity?] I’m glad you brought that up! A NH company that we work with a lot asked us about it 2-3 weeks ago. It sounds extremely onerous. I have an IT person looking into it. I don’t know anything about it except it got dropped and was instantly a requirement”...would be interested in Maine training. “This is [the type of support-training] that should come out of your work - don’t you think?”
 - Others have completed an assessment and are working through their remediation plan
 - Large companies – while requiring compliance – expressed some uncertainty or lack of visibility about the level of compliance in their supply bases

Tariffs

- ❑ **Several companies identified US import duties as a barrier to growth, as it is increasing the cost of raw materials**
- ❑ **The impacts included**
 - Loss of customers
 - Reduced margin
- ❑ **In one case a company was fearful of European competition in the US home market**
 - European competitors do not have to pay a tariff on imported materials from China, and are able to ship finished goods into the US tariff free
 - So EU competitors now have a cost advantage even in the US market

Full Report – Findings and Basis for Recommendations

Recommendations

This section outlines the program recommendations resulting from this strategy development effort

- ❑ **The section starts with a consolidated and streamlined summary of the recommendations, as many of them overlap**
- ❑ **Then it explains in more detail the logical basis for the recommendations**
 - For each company need/challenge identified in the previous section – workforce, testing/certification, business development – this section outlines existing resources that can meet that need and identifies gaps to be filled with recommended programs and investments
 - Relevant background information on the existing resources and organizations is also provided
 - The objective is to fill gaps in existing resources, and not duplicate what already exists

This report offers 5 sets of program recommendations

- 1 Expand workforce programs**
- 2 Offer grant program for companies to support diversification and growth**
- 3 Provide assistance in navigating DoD/contractor procurement**
- 4 Offer new programs and tools to help companies improve marketing and business development**
- 5 Enhance cross-marketing and collaboration among economic development partners on existing programs that have value for defense companies**



Expand workforce programs

- ❑ Expand investment in workforce programs to increase the size of the qualified workforce, particularly in manufacturing
 - Particular importance of Maine Community College System/Maine Quality Centers
 - However all of the additional key workforce programs identified in this report need to be evaluated for potential expansion – Maine Apprenticeship Program, Maine CareerCenters, CareerTech, Jobs for Maine Graduates, MAME Manufacturing Career Connection programs



Offer grant program for companies to support diversification and growth

- ❑ Develop a defense cluster initiative matching grant fund to provide individual company grants to offset the costs of:
 - Hiring one additional sales, business development, marketing or engineering staff person (supporting a portion of compensation for 1 year).
 - Outside services for testing/certification/vendor qualification and engineering projects that accelerate acquisition of new customers or entry/expansion into new markets.
 - Could offset the cost of services from: Maine MEP for quality systems; testing/certification/analysis services from Composites Engineering Research Lab (CERL) and the UMaine Advanced Structures and Composites Center and Advanced Manufacturing Center; and services such as CE Mark from MITC affiliated consultants
 - Outside business development services related to expanding in new markets or growing the business (could be shared among multiple companies)
 - Could offset the costs MAME Business Growth Services and B2B lead generation, as well as MITC or US Department of Commerce Gold Key and B2B matchmaking services¹
 - Outside support for market research and strategy for evaluating, entering or expanding in new or growing markets, or to otherwise support business growth
 - Could be used to offset the costs of MAME Business Growth Services or MITC affiliated international market research firms
 - Outside services related to cybersecurity compliance with Defense Federal Acquisition Regulation Supplement (DFARs)
 - Provided by Maine MEP and MAME

Provide assistance in navigating DoD / contractor procurement

- ❑ Consider co-organizing a workshop/webinar¹ with PTAC on how to navigate DoD/prime procurement, including speakers such as:
 - PTAC staff
 - Prime contractors
 - Natick Soldier Research Center (where Maine companies are well connected)
 - other DoD offices and commands
 - Experienced defense suppliers

Offer new programs and tools to help companies improve marketing and business development

- ❑ Consider organizing the participation of Maine companies in a series of tradeshow, conferences and events targeting the aerospace and defense markets – focused on B2B matchmaking, networking and market intelligence. For example:
 - Pursue collaboration with NH, VT and other New England states on these events, possibly combining/collaborating on the NHADEC Aerospace & Defense Summit/Networking Event
 - Consider bringing a group of Maine companies to aerospace conferences or tradeshow (such as Aeromart which is focused on matchmaking) or arranging for meetings with major aerospace customers
 - These events could be anywhere in the US and international
 - These events could also be used to introduce Maine defense companies to each other, as they are often unaware of the capabilities of companies “down the street” who could become customers or partners
- ❑ Offer training/workshops (possibly as part of conferences/workshops described above) to help companies improve their marketing skills, particularly in such as areas as digital marketing, search engine optimization, content marketing, and international marketing. The goal is to help companies to bring customers to them.
- ❑ Work with Maine MEP to evaluate the potential benefits versus investment required to offer TDMI to Maine defense companies (These projects can leverage grant funding under recommendation #2.)
- ❑ Explore ways to enhance the functionality of the DIME website so that Maine defense companies can identify bid and collaboration opportunities
- ❑ Consider organizing a small number of targeted personal matchmaking introductions for larger companies to fill specific gaps in their supply base

Enhance cross-marketing and collaboration among economic development partners on existing programs

- ❑ Look for opportunities to enhance cross-marketing and collaboration among economic development partners around existing programs:
 - PTAC: Regional DoD Council matchmaking events, “Industry Day” events (where primes identify smaller suppliers), workshops, counseling
 - MITC: ITAR workshops, matchmaking and tradeshow support, international trade and business development workshops
 - Maine MEP/MAME: cybersecurity assistance

Implementation and sustainability

- ❑ **A critical challenge for OEA grants in other states has been sustainability of programs after the funding has ended**
- ❑ **For successful implementation and sustainability, it is recommended that the Defense Industry Maine (DIME) initiative have a ½ to full time staff person assigned to lead and spearhead these recommendations**
 - Maine DECD will need to determine where DIME resides
 - That staff person should reside in DECD or an existing economic development organization, to leverage existing company relationships and credibility
- ❑ **To further ensure sustainability, the preceding program recommendations each have specific economic development organizations identified to play important roles in implementation**
 - e.g. MITC, Maine MEP, MAME, Maine PTAC, etc.

The Basis for Recommendation #1: expand investment in workforce programs

- Increased investment in workforce programs is required to expand the qualified workforce, which is a constraint on growth and undermines national defense
- While this project was not primarily focused on workforce, it emerged as a top priority growth constraint – and this report provides data to support the importance of this challenge
- The recommendation is to evaluate opportunities to expand the programs below to meet the need for qualified workers

Company Need/Challenge	Existing Resources	Recommendations to Fill Gaps
Shortage of Qualified Workforce	<ul style="list-style-type: none">• Maine Quality Centers and Community Colleges• Career and technical education high schools• Jobs for Maine Graduates• Department of Labor: Maine Apprenticeship Program, Maine CareerCenters, job fairs, Maine JobLink, Hire a Vet campaign• MAME Manufacturing Career Connection (e.g.; Manufacturing Day, Educator focused Industry Tours, Online Jobs Board, Robotics Institute)	<ul style="list-style-type: none">• Need expanded investment in this area to increase the size of the qualified workforce.• Particular importance of community colleges/Maine Quality Centers.• All of the programs at left need to be evaluated for potential expansion – Apprenticeships, CareerCenters, CareerTech, Jobs for Maine Graduates, MAME Manufacturing Career Connection programs• Also need to consider investment in other programs that expand the size of workforce, such as in-migration or engaging new Mainers

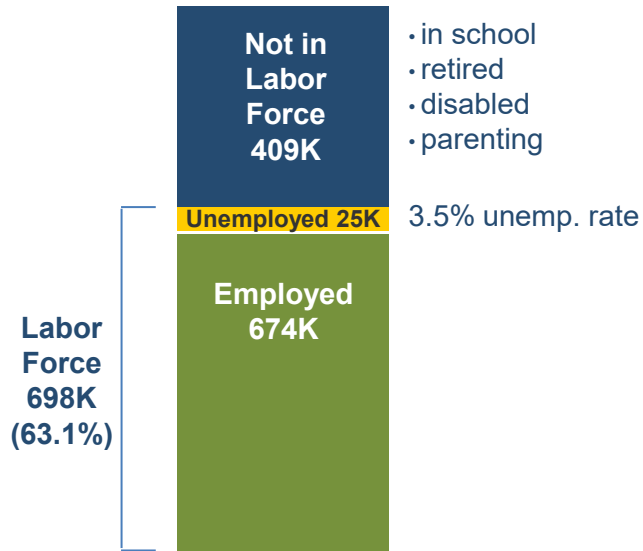
Workforce was not the focus of this report, but was identified by the companies as a major barrier to growth

- ❑ **This section provides**
 - A “reminder” on the workforce trends that have led to a shortage of qualified workers
 - Feedback from the companies about the importance of workforce resources and programs, particularly:
 - The Maine Community College System and the Maine Quality Centers
 - Maine Apprenticeship Program
- ❑ **These programs are critical to growth of the defense sector and to US defense readiness**

Maine is facing a shortage of qualified workers

Factors that Impact Tight Labor Market

2018 Total Civilian
Non-Institutional
Population (age 16+)
1,107K



Source: Maine DoL Center for Workforce Research and Information

- ❑ **Low unemployment** – 3.5% Maine unemployment rate in 2018
- ❑ **Slowed growth of workforce** – “Maine’s workforce grew by more than 20% per decade in the 1960s and 1970s; around 10% per decade during the 1980s and 1990s; around 1-2% in the current decade; and is projected to be essentially flat in the decade to come”¹
 - **Births/Deaths** – “Maine is one of only two states in the country in 2016-2017 that had more deaths than births”¹
 - **Retirements** – “Our imbalanced population structure means that we have many more people approaching retirement than we do young people approaching the age to enter the workforce”¹
 - Driven in part by baby boomer retirement²
 - **In Migration** – There was little net in migration for the first part of this decade²
 - **Decline in Workforce Participation** – From 69.0% in 2000 to 63.1% in 2018³
- ❑ **Manufacturing and trades worker shortage** – due to baby boomer retirements, negative perception of manufacturing, over-emphasis on a 4 year college, and shifting skills sets required by advanced technology⁴

1. *Making Maine Work, 2018*, Maine State Chamber of Commerce, Maine Development Foundation, Educate Maine (1st bullet cites data from “The Outlook for Workforce Growth to 2024”, Maine Department of Labor, July 2016)

2. *Workforce Trends & Outlook in Maine*, Glenn Mills, Chief Economist, Center for Workforce Research, Maine Department of Labor, Development, Presentation to Innovation, Economic Advancement & Business Committee, February 12, 2019

3. Maine Department of Labor, Center for Workforce Research and Information, Labor Force Participation and Employment Data

4. 2018 Deloitte and The Manufacturing Institute, *skills gap and future of work study*; company interviews

Maine defense sector companies have to come to rely on workforce partners – particularly MQC/MCCS

Maine Quality Centers / Maine Community College System

Overview

- New hire/pre-hire and incumbent training
- Adapted to meet company needs, e.g. schedule, location at worksite
- Training coordinated by MQC State Coordinator and delivered by community colleges
- Training for a wide array of industries and in a variety of skills, including the following areas of relevance to manufacturing and defense cluster:
 - Supervisory skills, leadership skills, project management, time management, communication, team building
 - Lean manufacturing
 - Welding, safety, marine design, high-pressure boiler
 - Precision machining, pipefitter, welding, manufacturing technician (e.g. for BIW – shipfitting, pipefitting, general trades)
- Skills must be portable – lead to test or certification

New-hire or Pre-hire Training

- Grant funded – no cost to trainees or businesses
- Often accelerates learning prior to in-house training
- If pre-hire, company agrees to interview those who complete program
- Most of MQC activity is new or pre-hire

Incumbent Worker Training

- Match requirement for companies with ≥ 51 employees

Other MQC Programs – different funding sources and constraints, but similar training approach

- Future for Maine/ York County Community College
 - 1 year program for skilled machinists – multiple employers
 - MQC providing grant to fund costs
- Put ME to work
 - Training programs for specific occupations, in partnership with industry
 - Grant pays for start-up costs of program – 50% match of business applicant
 - Example: professional logging contractors have a program
 - New hire or incumbent

MQC/MCCS have worked with many companies in the defense sector

Large Defense Companies

- ❑ **General Dynamics Bath Iron Works**
 - SMCC
 - Pre-hire training for manufacturing technicians (shipfitting, pipefitting, general trades) and welders
 - 120 hours of training over 3 months
 - This year's goal is 400-500 new employees through SMCC programs
 - Value: assists with recruitment and screening of potential employees and shortens time until productive
 - No cost to trainees or BIW
 - BIW agrees to interview prospective hires
- ❑ **Pratt & Whitney North Berwick**
 - YCCC
 - Pre-hire or new hire training for CNC machining and quality inspectors
 - P&W 1 week orientation + several weeks of training
 - Training 65 this year, adjust annually
 - Value: assists with recruitment and screening of potential employees, and shortens time until productive
- ❑ **Portsmouth Naval Shipyard**
 - Partner with YCCC on apprenticeship program (academic component)

SME Clients

(in dataset of companies that sell into defense markets)

- American Rheinmetall
- American Steel & Aluminum*
- Cianbro
- Custom Composites
- Kenway Corp
- Maine Machine Products
- Mid-State Machine
- Nautel Maine
- Northern Pride Communications
- Orion Ropeworks
- Precision Manufacturing
- Precision Screw Machine
- Somatex
- Tube Hollows*
- Yale Cordage

Note: * indicates incumbent; the remainder are pre-hire or new hire

Precision machining companies spoke explicitly about the importance of MCCS and career tech high schools

- ❑ All companies within the defense sector are challenged by the shortage of qualified workers
- ❑ However, precision machining companies – the largest sector of SME firms – clearly articulated the importance of workforce programs, particularly machine tool programs of the community college system/Maine Quality Centers
 - Most were connected to community college machine tool programs to recruit workers
 - Some lamented the loss or decline of these programs in nearby colleges
 - Many also had relationships with career/technical education high schools
 - They articulated the need for a community college system to train and “weed out” unqualified candidates
- ❑ Formal collaborations have emerged between some companies and community colleges/Maine Quality Center programs and high schools (see page 92)

Machining Company Example and Comment

Company (#17): “Can’t hire people. Did not reduce staff on purpose – but couldn’t hire. Community college that previously hired from – had machine tool program – that closed...”

...School weeds people out more easily than trying to do it via hiring/firing. Do they have math skills or not? And will they stick with it? Could hire someone who decides to quit after 6 months; but machining program is 2 years – shows if they will stick with it. Hard to hire someone with no training, schooling, experience...

...Central and Northern Maine community colleges train people, but they’re [too far away] , and not putting out enough people. And Southern Maine people won’t come up here. Some companies offer internships and then keep them/offer a job – before they get to us.”

Large defense companies rely on other Maine public workforce programs as well (in addition to MQC/MCCS)

Interviews with large defense companies referenced the following additional programs

Program	Description / Comment
Maine Apprenticeship program	BIW, PNS, P&W all run formal Maine Apprenticeship programs
CareerTech (CTE) High Schools	Recruitment mechanism
Penobscot Job Corps	Recruitment mechanism
Jobs for Maine Graduates	Non-profit that offers “continuum of support to help students transition from middle school through high school graduation, onto post-secondary education through degree attainment and connections to successful career pathways”...JMG partners with schools, “tailoring its role to support individual curriculum, cultures, and offerings by filling voids and gaps that existing resources can't meet.”
Dream it. Do it.	National program, run in Maine by State Chamber (formerly by MAME) that works to promote the image of manufacturing with students, parents, and educators
Hire a Vet Campaign	Maine CareerCenter program that provides support for employers to expand the hiring of veterans and military families
College and CTE job/career fairs	Recruitment mechanism
Robotics Institute	Student robotics competitions (MAME is a partner)

Innovative partnerships have emerged between educational institutions and industry to train machinists

Thornton Academy Internship – Collaboration with Arundel Machine, Pratt & Whitney

- ❑ “Thornton’s program combines an online curriculum from the National Tooling & Machining Association, or NTMA, with hands-on experience at Pratt & Whitney and other Maine manufacturers, including Yale Cordage and Arundel Machine Tool, to expose students to options of a career in manufacturing”*
- ❑ “Thornton was the first high school in the country to adopt the NTMA curriculum”*
- ❑ SMCC professor brings students into machine shop lab at Biddeford vocational center for basic equipment training
- ❑ Companies pay license fees for online learning and offer part-time and summer jobs to students
- ❑ Thornton Academy pays for an instructor and a van to transport students between their learning and work locations
- ❑ “Of the 10 Thornton students who enrolled in the first NMTA program and performed internships, all 10 graduated and have internships, jobs or went to college”*

Maine Quality Center/York County Community College Future for Maine Project

- ❑ “To meet the demand from multiple employers for skilled machinists in York County, an MQC grant is funding the costs of instruction for two groups of 12 students each in a 1-year certificate program in precision machining operations”*

*Sources: quotes are from Portland Press Herald Article, 8-24-17, *Thornton Academy Internships Introduce Kids to Manufacturing*; additional information from Portland Press Article by Charles Lawton, Planning Decisions, 4-5-16, *Two innovative programs prepare students for the workforce*; and an Interview with Arundel Machine on 11-5-18

*Source: *Maine Quality Centers FY 2017 Annual Report*; Interview with Maine Quality Centers, 11-2-18

The Basis for Recommendation #2: grant program to support new business development, diversification, growth

The grant would:

- ❑ Offset the costs of testing, certification and vendor qualification to accelerate market expansion**
- ❑ Offset the cost of defense company business development and marketing to accelerate diversification and growth. The grants would cover:**
 - A portion of the compensation (for one year) of hiring one additional sales, business development, marketing or engineering staff person
 - Outside business development services related to expanding in new markets or growing the business
 - This expenses could be shared among multiple companies
 - As will be discussed further in the next section, the grant would also cover
 - Outside support for market research and strategy for evaluating, entering or expanding in new or growing markets, or to otherwise support business growth
 - Outside services related to cybersecurity compliance with DFARs requirements
- ❑ Be positioned as a defense cluster initiative matching grant fund**

The grant is designed to fill gaps in existing resources by reducing the cost and risk of investing in growth

Company Need/Challenge	Existing Resources	Recommendations to Fill Gaps
Testing, Certification, Qualification	<ul style="list-style-type: none"> • Maine Technology Institute (financial) • MITC/STEP (grants) • UMaine – Advanced Structures and Composites Center • Maine MEP (ISO 9000 and AS9100) • CERL (testing) 	<ul style="list-style-type: none"> • The recommended grant program would offset the costs of testing/certification/qualification, and accelerate entry and expansion into new markets. It will ease the administration of grants if they are part of a combined defense cluster initiative. • Funds can be used to offset the fees associated with Maine MEP quality management services, UMaine/CERL testing services, and MITC affiliated consultants on international standards/certifications • The grant would be matched by company investment in these services
Understaffed/ Limited Bandwidth in Sales, Business Development, Marketing, Engineering	<ul style="list-style-type: none"> • SBA/banks (debt financing) • UMaine – Advanced Structures and Composites Center, Advanced Manufacturing Center (engineering support) • MAME (lead generation, Business Growth Services) 	<ul style="list-style-type: none"> • The recommended grant funding (with match requirement) will reduce the risk of hiring staff in sales, marketing, engineering and business development. Reducing the risk of hiring staff may be the most important investment to be made to support long term growth and diversification of the defense sector. • Currently only debt funding is available from banks/SBA programs, which does not sufficiently de-risk the hiring decision. • The grant could also be used to offset the costs of outside services to provide temporary support in engineering, business development, or marketing. For example, the UMaine Advanced Manufacturing Center can provide temporary engineering bandwidth, and grant funding could encourage greater use of those resources. The grant could also support outside business development consulting services. For some companies who are not ready to hire someone, this could provide temporary support to enter a new market. (Note the grant could also be used to support a shared outside resource retained by multiple companies interested in the same market.)
Market Research and Strategy	<ul style="list-style-type: none"> • MTI (grant support for research, market research support for SBIR) • MITC (int'l research) 	<ul style="list-style-type: none"> • The grant program would make the costs of these services affordable for SMEs.

The Maine Technology Institute (MTI) would be a logical source of potential funding for a defense cluster grant

Mission and Objectives

- ❑ Their core mission – “to diversify and grow Maine’s economy”¹ – is perfectly aligned with DIME’s objectives
- ❑ A significant portion of their investments are in innovation, growth and new market expansion for established or mature companies, which are the focus of this defense supply chain effort
- ❑ They are able to provide financial support – in the form of grants, loans, and occasional equity – to support market research, development, testing and commercialization of innovative new products, materials or processes required to enter or expand in new markets, if the companies are
 - In MTI’s key target sectors, which includes composites and advanced materials, marine products and precision machining – all key defense sub-sectors as well
 - And if these investments demonstrate significant potential economic impact

Investments in Defense Companies

- ❑ They have provided support for at least two dozen of the Maine defense companies in the dataset developed for this project²
- ❑ The Maine Technology Asset Fund – administered by MTI – includes significant investments to support growth of two Maine companies with defense sales
- ❑ They are supporting significant investments in additive manufacturing at UMaine that will enhance the capabilities of the defense base

1. MTI Annual Report 2018 and MTI 2017 Strategic Plan

2. MTI Website listing of awardees

Additional Sources: Interview with MTI, MTI website; Interviews with UMaine Advanced Structures and Composites Center and Advanced Manufacturing Center

Engineering and testing support from UMaine (AMC, ASSC) and CERL can be offset with the grant

❑ UMaine Advanced Manufacturing Center (AMC)

- Can be an engineering resource for established manufacturing companies that are understaffed or have limited bandwidth in engineering
- Areas of expertise that might be relevant to growth strategy for companies in defense sectors include automation, process improvement, prototype machining
- They are also working to raise funding to obtain an additive metal/3D metal printing capability – reputedly the first in the state – which is intended to rapidly produce tooling, including for a major defense contractor in Maine

❑ Composites

- Maine composites (and advanced materials) companies have the benefit of the UMaine Advanced Structures and Composites Center (ASSC) and the Composites Engineering Research Lab (CERL) to
 - Conduct testing (both ASSC and CERL)
 - Collaborate on engineering projects or leverage technical expertise in areas which are important to the growth of Maine defense companies
 - For ASSC that could include their expertise in smart materials, ocean engineering and offshore wind/energy, structural concepts and structural thermoplastics, civil infrastructure, wood and bio-based composites, among others

The Basis of Recommendations #3-5: derived from company needs on the next two pages

1

Expand workforce programs

2

Offer grant program for companies to support diversification and growth

3

Provide assistance in navigating DoD/contractor procurement

4

Offer new programs and tools to help companies improve marketing and business development

5

Enhance cross-marketing and collaboration among economic development partners on existing programs that have value for defense companies

The recommended assistance in new business development and marketing is designed to fill gaps

Company Need/Challenge	Existing Resources	Recommendations to Fill Gaps
Accessing New Customers, Markets	<ul style="list-style-type: none"> • MITC (international) • ME PTAC (matchmaking events) • MAME Aerospace Alliance 	<ul style="list-style-type: none"> • Leverage and improve cross-marketing (among economic development organizations) of existing programs – particularly PTAC/Regional DoD Council matchmaking events, PTAC “Industry Day” events for large primes to identify smaller suppliers, and MITC matchmaking capability (and STEP funding) for international. • Consider organizing the participation of Maine companies in a series of tradeshow, conferences and events targeting the aerospace and defense markets – focused on B2B matchmaking, networking and market intelligence. For example <ul style="list-style-type: none"> – Pursue collaboration with NH, VT and other New England states on these events, possibly combining/collaborating on the NHADEC Aerospace & Defense Summit/Networking Event – Consider bringing a group of Maine companies to aerospace conferences or tradeshow (such as Aeromart which is focused on matchmaking) or arranging for meetings with major aerospace customers – These events could be anywhere in the US and international • Explore ways to enhance the functionality of the DIME website so that Maine defense companies can identify bid and collaboration opportunities.
Navigate DoD/Prime Procurement	<ul style="list-style-type: none"> • ME PTAC (workshops, counseling) • Maine MEP and MAME Cybersecurity 	<ul style="list-style-type: none"> • Improve cross-marketing of existing PTAC workshops, counseling on this topic. • Consider co-organizing a workshop/webinar with PTAC on how to navigate DoD/prime procurement, including speakers such as PTAC staff, prime contractors, Natick Soldier Research Center, other DoD offices, experienced defense suppliers. • Consider organizing a small number of targeted matchmaking introductions for larger companies to fill specific gaps in their supply base, as companies are not fully aware of the local Maine supply base • Continue to offer support for cybersecurity compliance with DFARs to ensure continued eligibility for defense contracts.

The recommended assistance in new business development and marketing is designed to fill gaps

Company Need/Challenge	Existing Resources	Recommendations to Fill Gaps
Market Research and Strategy	<ul style="list-style-type: none">• MTI (grant support for research)• MITC (research)	<ul style="list-style-type: none">• Work with Maine MEP to evaluate the potential benefits versus investment required to offer TDMI to Maine defense companies. TDMI is well regarded by OEA and throughout the MEP National Network, and these projects could leverage the grants to make the costs of these services affordable.
Marketing	<ul style="list-style-type: none">• MITC (workshops)• MAME Business Growth services	<ul style="list-style-type: none">• Offer training/workshops to help companies improve their marketing skills, focused on digital marketing, SEO, content marketing, international marketing. The goal is to help companies bring customers to them.
International	<ul style="list-style-type: none">• MITC (matchmaking, shows, ITAR, STEP)	<ul style="list-style-type: none">• Jointly promote existing MITC ITAR workshops with PTACs• Re-educate partners on MITC matchmaking and tradeshow support and training/workshops.

Maine PTAC offers a number of services that help defense companies navigate DoD / prime acquisition

- ❑ **The Maine Procurement Technical Assistance Center offers a number of services that meet the needs of defense companies trying to navigate DoD and prime contractor acquisition processes and gain new customers**
 - Workshops, on such topics as federal contracting and subcontracting strategies
 - Counseling, which includes assistance in navigating the defense procurement process
 - Matchmaking/connections for small businesses with prime contractors at DoD Northeast Regional Council Matchmaking events
 - Industry Days organized to find small suppliers for specific defense contractors
 - Assistance in identifying defense/federal bid opportunities (among others) through BidMatch
- ❑ **There may be opportunities to enhance cross-marketing of their programs through MITC, MAME, Maine MEP and other economic development partners**

In conclusion

- ❑ **Implementation of these recommendations offers an excellent opportunity to grow the high wage / high value traded sector of Maine's economy and to support the US defense industrial base**
- ❑ **In addition, the program recommendations apply to other companies outside of the defense sector, so it would make sense to consider offering these programs to a wider range of Maine companies.**
 - In other words these programs can be part of a broader plan to support the growth and diversification of Maine companies, rather than being considered a more narrowly focused program only for defense
 - The recently initiated statewide economic development plan for Maine will be a perfect opportunity to consider expanding the scope of these recommendations to more broadly support Maine economic advancement.

Appendix

Lessons Learned from other OEA Funded Programs

Lessons learned from OEA programs in other states contributed to and validated recommendations

Program Type	Information from Other States' OEA Programs
1. Expand workforce programs	<ul style="list-style-type: none"> Other states are challenged by shortages of qualified workers, and are enhancing workforce programs.
2. Offer grant program for companies to support diversification and growth (for individual companies)	<ul style="list-style-type: none"> Many OEA funded programs included grants to support individual technical assistance projects, including Maine. Several themes emerged from reviewing other state programs <ul style="list-style-type: none"> Technology Driven Market Intelligence projects (offered by MEP Centers) were perceived very favorably as reported by interviewees in NH and MD. NIST client surveys of companies that have engaged in TDMI projects with MEP Centers nationwide also demonstrate strong quantifiable results (average impact of \$850K in increase sales). For this reason, TDMI is specifically recommended as a potential service offering for Maine. RI validated the challenges identified in interviews with Maine companies related to the need for improvements in sales/business development and marketing, and the challenge of limited company staff bandwidth in these functions. As stated in the Polaris MEP final report on their role in the OEA initiative... <ul style="list-style-type: none"> <i>“Marketing and sales held 3 of the top 10 spots on the list of areas to improve. Most companies have a limited sales force and an already overcommitted CEO is also trying to do the bulk of the sales. Some 43% – 13 of the 30 companies – were rated at a “1” in sales process; another 6 were rated at a “2” meaning that 63% of the companies were at a significant sales disadvantage in the marketplace. Marketing and all other areas in this category were below average.”</i> Assistance for companies related to cybersecurity compliance with DFARs was incorporated into OEA grants in 19 states in 2018, and states we looked at more closely – such as RI and WA – validated the idea that assisting defense suppliers in this area was of continuing importance going forward. (RI indicated, smaller firms were just starting to recognize this as an issue and WA recently organized an event for Northrup Grumman to educate their suppliers about DFARs.)

Sources: OEA/I41 Initiative Final Performance Reports, East Central WI Regional Planning Commission, 2/6/19 and 2/4/19 reports on aerospace implementation ; WMEP Presentation on OEA Oshkosh Regional Defense Industry Diversification Initiative (ORDIDI), 4-8-19; Stone & Associates involvement in the OEA Maryland Defense Diversification Assistance Program, 2018-19; RI Polaris MEP Report on OEA Funded Manufacturing Innovation Challenge, 5/30/2018; Interviews with Nate Nelson, DED, state of New Hampshire, 5-16-18 and 12-5-18. Interview with Jennifer White, Office of Military and Federal Affairs, Maryland Department of Commerce, 1-24-19; TDMI project data from MEP National Network, 2011-17, based on NIST survey and analysis by RTI; Interview with Impact Washington, 1-17-18; NIST MEP cybersecurity program flyer; DVIRC/PA MEP Press Release, *Regional Manufacturing Leaders Gather, Share Best Practices for Working with Department of Defense*, 10-24-17

Lessons learned from OEA programs in other states contributed to and validated recommendations

Program Type	Information from other States' OEA Programs
3. Provide assistance in navigating DoD/contractor procurement	<ul style="list-style-type: none"> • Several regions (NH, WI, WA, PA, MD) organized events focused on matchmaking or forging business connections between large/prime contractors and suppliers in defense or aerospace; educating suppliers on how to do business with DoD and prime or large contractors (in defense or aerospace); connecting regional defense companies with each other to potentially team or collaborate; and connecting companies with expert resources and economic development organizations. Interviews suggest these events were perceived favorably by participants (NH, WA). • Numerous states/regions developed online directories/databases of defense contractors. Some of the robust examples we identified included WI, MD, and GA. See the following pages for a more detailed discussion of this aspect of the OEA initiative.
4. Offer new programs and tools to help companies improve marketing and business development	<ul style="list-style-type: none"> • As noted above, several regions offered individual technical assistance related to market research, diversification opportunities, and evaluation of potential new markets for specific technologies or products. TDMI projects in particular generated positive feedback from interviews. • As noted above, RI validated the need (also perceived in Maine) for assisting companies with improvements in sales/business development and marketing.
5. Enhance cross-marketing and collaboration among economic development partners on existing programs that have value for defense companies	<ul style="list-style-type: none"> • No obvious lessons learned related to this recommendation from other OEA programs

Online databases of defense companies, created for OEA funded projects, are built around searchable company directories

Database Function	WI	MD	GA
Sellers market to buyers (searchable company directory/vendor lookup based on profiles of defense companies and their capabilities)	X	X	X
In-state companies can find teaming and subcontracting partners (directory)	X	X	X
Buyers can find suppliers (directory)	X	X	X
Buyers can post RFPs	X		X
Sellers can search bid opportunities (i.e.; search databases, such as link to fedbizops)		X	X
Economic development organizations can identify companies with specific capabilities	X	X	X
Hiring/job postings	X		
Source of news and information, such as events, press releases, information on doing business with government, ITAR, selling internationally, and more	X	X	X
Broader directory of companies beyond defense	X	X	
Defense contract information, e.g.; identify companies with current defense contracts, identify expiring contracts, pre-generated reports, such as top state defense contractors		X	X
Search defense patents database		X	
Post discussion threads, queries		X	

Going beyond the supply chain database

- ❑ **Several regions are considering development of state/regional supply chain networks that go beyond an online database**
- ❑ **These initiatives recognize some of the gaps in database tools**
 - Not national in scope
 - Supplier capabilities not vetted, or validated, lack of objective performance metrics
- ❑ **Recommendations / Plans Proposed by States or Regions To Go Beyond Databases**
 - Supply Chain Network – WI
 - “The formation of a series of supply chain networks, consisting of purchasing, operations, and sales representatives from regional firms...By connecting the purchasing staff of large, end producers with sales representatives of local firms that may represent needed goods or processes, the region can facilitate additional beneficial relationships.”¹
 - Trusted Supplier Network - New England region OEA grant holders
 - Have initiated a project to create a New England-wide “pool” of trusted defense suppliers for primes/OEMs, based on an “industry-wide assessment program” that allows “defense and aerospace suppliers to achieve the standard of a ‘trusted’ supplier.”²
 - Local Purchasing Incentive – WI
 - “Promote a regional purchasing incentive, similar to the “Buy America” program. A number of states, including MI, OH, and PA offer refundable tax credits for manufacturers who purchase goods from in-state suppliers. This incentive structure could be modified to reward local firms who transfer supply contracts from an out-of-market firm to a local supplier. This would require action at the state level.”¹

Other OEA programs invested effort in regional technology development and transfer

- ❑ **These efforts included**
 - Accelerators and assistance to entrepreneurs to help them commercialize technology for defense and commercial markets
 - Mechanisms to transfer DoD innovations and technology to regional companies
- ❑ **These activities were often focused on early stage or start-up companies vs. established defense contractors, subcontractors and suppliers**
 - As a result, this was not a major focus of this project – which was primarily intended to strengthen the existing defense supply base
 - This project did consider resources that can help established companies innovate or develop new technology, such as MTI or UMaine
- ❑ **Nevertheless, technology development and transfer for early stage companies is an important aspect of economic development strategy and an important contributor to innovation for national defense**
 - There may be value in future efforts to delve more deeply into this topic
 - The next few pages provide some examples of activities under OEA grants from other regions in the area of technology development and transfer
 - Some for existing companies
 - Others for start-up and early-stage companies
 - An additional non-OEA funded example is also provided illustrating efforts to develop new technologies that are of importance to the military

Sources: <https://deftechmd.net/>; Interview with Jennifer White, Office of Military and Federal Affairs, Maryland Department of Commerce, 1-24-19; OEA/I41 Initiative Final Performance Reports, East Central WI Regional Planning Commission, 2/7/19, Report on UW Oshkosh AeroInnovate; <http://aeroinnovate.org>; OEA Tech Transfer Strategy & Feasibility Study, PA Consulting Group, 8-31-16; ; 107
RI Polaris MEP Report on OEA Funded Manufacturing Innovation Challenge, 5/30/2018.

Other OEA programs invested effort in regional technology development and transfer

Programs Targeted at Established Businesses

- ❑ **RI:** “RI is home to world class universities including Brown, RISD and URI, the Naval Undersea Warfare Center (NUWC), and a significant population of industrial designers and private researchers, yet there is not a coherent system for manufacturers to partner with the innovators to prototype, small batch manufacture to develop processes, or to manufacture the new products or components of products...The gap between the idea and commercialization of a component or product is significant...The Manufacturing Innovation Challenge team referred 5 companies into the RI Commerce Corporation’s Innovation Voucher and Innovation Voucher for Manufacturing. These are competitive programs that provide up to \$50K to support R&D in house or in partnership with knowledge partners, typically at universities.”



The grant program outlined in the recommendations would – like this voucher program – facilitate collaboration between defense companies and innovation partners.

Programs Targeted at Start-ups and Early Stage Companies

- ❑ **MD:** DefTech is a “hub for collaboration” that advances “commercialization of US Army technologies spinning out of Aberdeen Proving Ground” by facilitating technology transfer to private companies and entrepreneurs.
- ❑ **WI:** AeroInnovate Accelerator program assisted start-up and early stage companies in the aerospace sector.
- ❑ **WA:** As part of OEA effort, WA conducted a study to 1) develop a strategy for small business incubation, technology transfer and diversification in and out of the defense sector, and 2) assess the feasibility of establishing an Incubation Center of Excellence for Military and Defense Manufacturing to accelerate technology transfer, entrepreneurship and commercialization.



These initiatives are not focused primarily on established companies in the current defense contractor base, so this project did not delve deeply into these types of programs.

Some OEA programs included activities to educate defense companies about advanced manufacturing technologies

- ❑ **Additive Manufacturing – WI**
 - Conducted two additive manufacturing symposiums for aerospace companies in 2017-18
- ❑ **Manufacturing USA Access Project – Delaware Valley Industrial Resource Center/PA MEP**
 - Currently using OEA funding to accelerate adoption of advanced manufacturing technologies by connecting manufacturers to the DoD funded Manufacturing USA Institutes
 - Manufacturing USA is a network of public/private partnerships that focus on developing and scaling up critical manufacturing technologies
 - The technology focus areas of the institutes involved in this effort included 3D printing/additive manufacturing, robotics, biopharmaceuticals, digital manufacturing, and functional fabrics

Maine's role in developing the next generation of technologies that are important to the military could be the focus of a valuable future strategic planning effort

- ❑ **As noted above, this project focused on the existing defense contractor base and how to help them diversify and grow**
- ❑ **However Maine is playing a role in development of new technologies, materials and products that have importance to the military**
 - Which may offer future opportunities for Maine companies
- ❑ **Example from UMaine¹**
 - DLA has funded UMaine since 2010 to develop a process to convert cellulosic material, such as recycled paper or cardboard, into jet fuel as an alternative to petroleum based fuel
 - DLA has funded the Biomass to Bio-products Pilot Plant at the University of Maine's Technology Research Center.
 - “The plant is capable of processing up to 1 ton of woody biomass per day into chemicals that can be used to manufacture bio-products, including biofuels, bio-chemicals and advanced materials.”
 - “In fiscal year 2018, an additional \$5.8 million in congressional funding was added. UMaine intends to explore additional up-scaling options, develop new strategies for producing finished fuel blends through hydrotreating, and develop additional co-product revenue streams to improve the economics of fuel production.”
 - In addition they are working toward certification of cellulosic fuel as an acceptable alternative based on both commercial and military specs

Appendix

Sub-sector Analysis

This section provides supporting research and analysis of specific industries / sub-sectors

❑ Sub-sectors

- Advanced materials
 - Composites
 - Technical textiles
- Marine products
- Precision machining
- Defense products / weapons
- Telecom
- Construction / Engineering / Architecture

❑ This section provides additional perspective on

- Recent growth and decline of Maine companies in these sub-sectors
- Major segments of the global market and growth outlook
- Current markets and target growth markets for Maine companies in each sector
- Areas of Maine strength in each sub-sector

Summary of conclusions that emerge from the sub-sector analysis

Common Challenges and Barriers Across Sub-sector

Companies across all sub-sectors faced the challenges and barriers to growth outlined in the main body of the report

- ❑ Workforce shortages
- ❑ Testing/certification/vendor qualification barriers
- ❑ Business development and marketing challenges

Observations from Sub-sector Analysis

Beyond those common challenges, the sub-sector analysis uncovered additional findings

- ❑ Significant growth opportunity exists across sub-sectors
- ❑ Reinforced the importance of aerospace and defense/naval as key target growth markets for Maine defense sub-sectors
 - Including advanced materials, marine, machining, telecom and obviously defense products
 - Actual defense and naval spending (resulting from political and budget negotiations) will have a significant impact on the Maine defense sector – particularly whether the Navy will expand its fleet aggressively according to their long term plans
- ❑ Maine has clusters in “soldier systems” (based mainly on advanced materials) and in smart materials
- ❑ Some clusters have not been identified previously and may benefit from support
 - RF/Microwave antenna and telecom cluster may benefit from opportunities to collaborate
 - Need to educate the construction/engineering cluster that economic development organizations can help them diversify and grow
- ❑ The experience of the machining sector in particular highlights the risks of being overly dependent on one market or customer

Maine composites companies that sell into defense markets

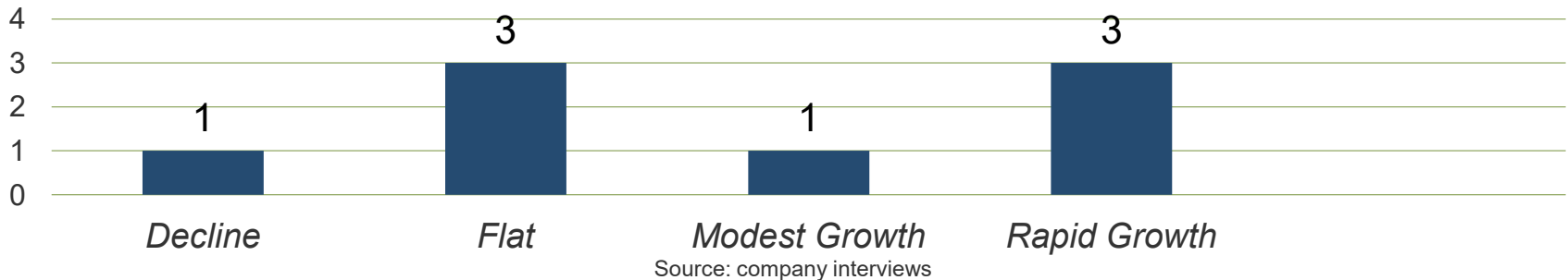
Company	City	Description
Compotech	Brewer	Primarily blast/ballistic protection shelters for the military.
Custom Composite Technologies	Bath	Custom composite parts and tooling – proof of concept, prototype, limited production runs for marine, transportation, robotics, art, architecture and defense applications and markets.
Fiber Materials (FMI)	Biddeford	High temperature composites and advanced materials, particularly for defense and space/aerospace applications.
Kazak Technologies	Georgetown	Design, engineering analysis, prototype testing and low rate initial production of composite structural systems that solve customer problems in the military and non-military markets, including energy storage, small craft, ship structures, marine hardware and numerous commercial applications. Active in the SBIR program.
Kenway	Augusta	Composites particularly for anti-corrosion and structural applications in industrial fluid process industries (e.g.; pulp and paper, chemicals), power, mining, marine, defense, municipal wastewater, waterfront and highway infrastructure.
Wizbe Innovations	Manchester	Product development based on expertise in advanced materials and composites. Current focus is on ComposiMold – a hot melt reusable, biodegradable mold-making and casting polymer material used by artists, chefs, hobbyists, crafts makers, and others. Also history of SBIR funded innovations in such areas as ballistics protection, parachutes and steerable kites (NASA applications), personnel lowering device, and many others.

Maine technical textile and rope companies that sell into defense markets

Company	City	Description
Auburn Manufacturing	Mechanic Falls	Advanced textiles for extreme heat environments in range of applications – such as welding, fire protection, insulation and safety – for a range of markets – including oil and petrochemical, ship building/repair, mining, steel, aluminum, power generation, glassmaking, data centers, and defense .
Orion Ropeworks	Waterville	Natural and synthetic rope for a wide variety of markets and applications, including construction, marine, fall protection, theatrical, utilities and Coast Guard and military nets.
Parent Technology Group / New Concepts Engineering	Windham	<i>Parent Technology Group</i> development of photovoltaic textiles; <i>New Concepts Engineering</i> engineering services, particularly related to coating, as well as other automated processing systems.
Sterling Rope	Biddeford	Ropes for climbing, fire, rescue, arborist and industrial safety markets and applications
Tex Tech Industries	Portland (HQ)	High performance technical textiles for a wide range of applications, including aerospace, ballistics/armor, automotive, tennis ball felt and protective/safety (e.g.; non-flammable fabrics).
US Felt	Sanford	Rolled felt and felt products for defense, motor manufacturers and a variety of other markets.
Yale Cordage	Saco	Synthetic performance cable and rope products for a variety of markets and applications, including utility poles, arborists, industrial, mining, oceanographic and naval.

Composites / technical textiles / rope: several companies interviewed reported rapid growth and the sector overall is projected to continue growing

**Recent Revenue Trends – Companies Interviewed
(last 3-5 years)**



Important Target Growth Markets for Maine Companies

- Defense – particularly blast/ballistics protection and naval
- Aerospace
- Marine
- Energy, Utilities, Oil & Gas
- General industrial
- Chemical, petrochemical
- High-temp materials for metal, glass furnaces
- Racing / motor sports

Source: Company interviews, company websites

Market Demand Drivers

- Strong demand overall for composites and technical textiles
- Defense and aerospace are major drivers for Maine companies in this sector
- Strong projected growth for composites in aerospace and defense, and energy related (pipe and tank, oil & gas, wind) – see later in this section
- Tech textiles – transport is large segment (auto, aircraft, ships) expected to be >20 % of market in 2026
- Tech textiles – fastest growing segment is construction / building

Source: See pages later in this section.

Rapid growth is projected in global composites markets where Maine has strengths – aero & defense, pipe & tank

	% of Global Market Value (\$)	Growth Per Annum 2016-21	Share of World Market Growth 2016-21	
Automotive/Ground Transport	25%	4%	20%	
Building/Construction	14%	5%	13%	
Electrical/Electronic	14%	5%	15%	
Aerospace/Defense	13%	6%	16%	Areas of strength for Maine cos that sell to defense
Pipe/Tank	10%	6%	12%	
Consumer Goods	8%	4%	7%	
Wind Energy	8%	5%	9%	
Marine	3%	3%	1%	
Other	5%	5%	5%	
Total	100%	5%¹	100%	

Source: JEC Group, *Overview of the Global Composites Market*, 2017 edition, p. 35, 93


1. Grand View Research projected global composites market growth for 2016-24 to be even faster - 7.8% (July 2018 Report on Global Composites Market).

Maine companies are targeting a number of composites markets for growth

Advanced
Materials

Maine
Composites
Companies
That Serve
Defense



 = Maine strength

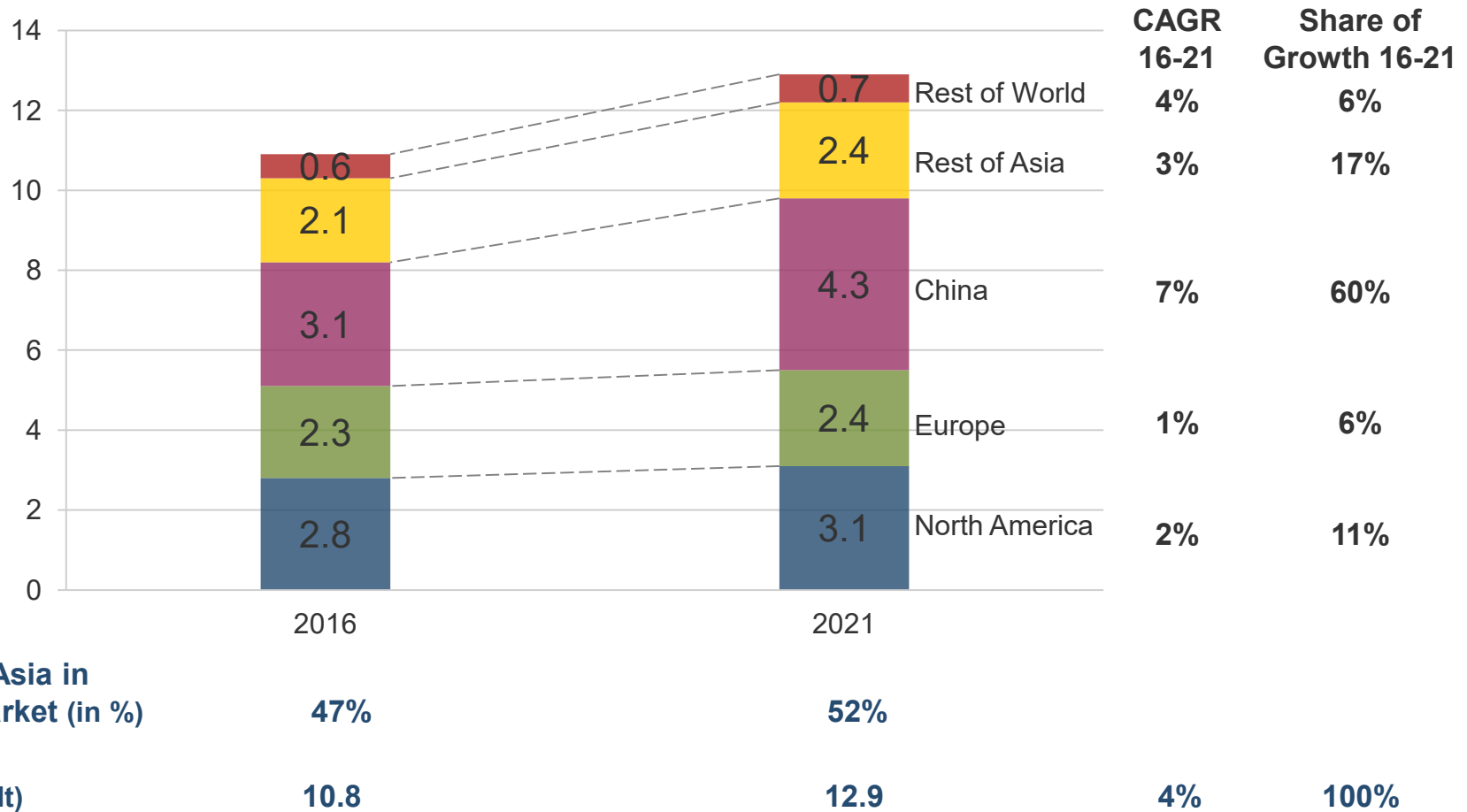
	Important Current Market for ME	Important Growth Target for ME	Market Drivers / Trends
Auto / Ground Transport	●	● (racing)	<ul style="list-style-type: none"> Key driver of growth will be light weighting in electric, hybrid, and autonomous vehicles – driven by investment in China. To increase penetration need to develop higher volume, lower cost manufacturing processes, recyclable parts
Building / Construction	●	●	<ul style="list-style-type: none"> Continued growth driven by building and infrastructure construction. Long service life of composites infrastructure and building components also driving growth.
Electrical / Electronic			<ul style="list-style-type: none"> Continued strong growth driven by composites in PCBs
Aerospace/ Defense	●	●	<ul style="list-style-type: none"> Strong long-term demand and growth in aircraft. Composites have increasingly penetrated aircraft Further growth in penetration of composites is uncertain, partly dependent on next generation of aircraft, such as 320neo
Pipe / Tank	●	●	<ul style="list-style-type: none"> Most of the market: oil and gas (onshore and offshore), chemical, pulp and paper, and waste/waste water apps Growth driven by oil and gas, and replacement of tanks in corrosive environments.
Consumer/ Sport Goods	●	●	<ul style="list-style-type: none"> e.g.; golf, bikes, tennis rackets, kites, snowboards, toys. Composites quickly penetrated skis and snowboards. Penetration in golf has been slower; may have topped out in bikes.
Wind Energy			<ul style="list-style-type: none"> Use of composites has increased in wind applications and has allowed for larger blades. Carbon fiber is gaining ground. Potentially very large market if it takes off
Marine	●	●	<ul style="list-style-type: none"> Smaller market & composites use has likely maxed out. Growth tied to overall growth of boat industry and GDP

Sources for previous page

- ❑ Important current markets and important target markets for growth for Maine companies in this sector. Sources: company interviews and websites (composites, technical textiles, rope)
- ❑ Sources for the assessment of end market trends primarily summarized from JEC Group, *Overview of the Global Composites Market*, 2017 edition.
- ❑ In addition, the following additional sources corroborated specific statements
 - *Composites 2019: A Multitude of Markets*, 11/16/2018, <https://www.compositesworld.com/articles/composites-2016-a-multitude-of-markets>;
 - The Markets – Aerospace 2019, <https://www.compositesworld.com/articles/the-markets-aerospace-2016>
 - *Aerospace outlook: A dynamic, evolving supply chain and market*, 1/1/2019, <https://www.compositesworld.com/articles/aerospace-outlook-a-dynamic-evolving-supply-chain-and-market>
 - *The Maine Jobs Project A Guide to Creating Jobs in Offshore Wind*, June 2018

China represents over 50% of the global composites market and China accounts for 60% of projected growth

Global Composites Market by Region



Composites – trends, drivers and competition

- ❑ The use of carbon fiber increasing – driven by aerospace, defense, automotive, marine, pressure vessels
- ❑ The use of thermoplastics is increasing vs. thermoset materials
- ❑ The industry is being challenged to increase the use of recyclable composites material
- ❑ The industry is maturing – with an increasing emphasis on cost, higher volume production, development of standards, and gaining acceptance for use of composites in additional markets

Sources: Grand View Research, July 2018 Report on Global Composites Market; JEC Group, *Overview of the Global Composites Market*, 2017 edition; MENAFN.com Aug 2018 summary of MarketsandMarkets composites report; *SAMPE 2018 keynote looks to the composites future*, Composites World, Blog, Donna Dawson, 6/5/2018; *Can we achieve global standards for composites?*, 7/1/2018, <https://www.compositesworld.com/articles/can-we-achieve-global-standards-for-composites>; *Looking ahead at composites trends in 2019*, 1/1/2019, *Composites World*; *A Strategic Outlook for the Global Composite Materials Market to 2028*, Industrial Goods Monitor Worldwide, 3/29/2018

Technical textiles global market segments and growth – the overall market is projected to continue its growth (particularly Asia-Pacific)

Market Segment ¹	Example / Explanation	Additional Information ²
Protective / Safety	Worker safety garments	
Agricultural	Crop protection, erosion prevention	
Construction / Building	Includes “GeoTech” such as reinforcement in embankments	<ul style="list-style-type: none"> Fast growing segment, 6.7% CAGR (Global Industry Analysts)
EcoTech/Environmental Applications	Landfills, air cleaning, prevention of water pollution, waste treatment	
Industrial	Wide range of applications, including “silk-screen printing, filtration, plasma screens, propulsion technology, lifting/conveying equipment, sound proofing elements, melting processes, roller covers, grinding technology, insulations, seals, and fuel cells”	
Transportation	Auto, aircraft, ships	<ul style="list-style-type: none"> Largest segment (Allied Market Research) > 20% of the market by 2026 (GrandView) Fast growing (Markets and Markets)
Consumer	Including clothing, sportswear, home furnishings	
Medical	Bandages, sutures, wound dressings	
Packaging	Packaging materials	
Total Market	Total global market estimates for 2016 and 2017 range from \$147 - \$158 billion**	<ul style="list-style-type: none"> Estimates of growth (CAGR) for 2016/17 to 2022/24/27 range from 4.6% to 5.9%² Asia-Pacific is the largest and fastest growing region, representing 46.2% of the world market in 2017 and a 7.5% CAGR (Global Industry Analysts)

1. Market segment definitions from Health and Safety Middle East magazine, *Technical Textiles*, 12-15-15 (the same segmentation is used in a variety of commercial market research reports);

2. Sources for this column: Global Industry Analysts, *Technical Textiles*, May 2018; Grandview Research, *Technical Textiles Market*, 12-14-18; Markets and Markets, *Technical Textile Market by Material, Process, Application and Region – Global Forecast 2022*; Allied Market Research, *Global Technical Textile Market*, November 2018

Maine has a sub-cluster in “soldier systems” based on expertise in advanced materials (and connection to Natick)



<https://www.wired.co.uk/article/smart-soldiers-technology>

Maine Advanced Materials Companies involved in Soldier Systems

- Tex Tech Industries – ballistics
- DownEast Innovation – pack frames/load carriage
- Compotech – blast/ballistics protection
- Wizbe Innovations – ballistics protection, personnel lowering device
- Yale Cordage – rope for Navy SEALs
- UMaine Advanced Structures and Composites Center – blast and ballistics protection, smart textiles
- Parent Technology Group – photovoltaic textiles

Many of these companies have developed products for (or funded by) the Army Natick Soldier Research Center

Maine has activities in smart materials connected to the Natick Soldier Research Center

Smart Materials

- *Definition:* “Materials that sense and react to environmental conditions or stimuli”¹
- *Growth and Segments:* Rapidly growing global market, estimates range from 18 – 25% per year²
 - Transportation/Auto (27% of market)
 - Military/Government (21%)
 - Industrial/Commercial (20%)
 - Sports/Fitness (17%)
 - Medical/Healthcare (8%)
 - Fashion/Entertainment (7%)
- *Maine Activities:*
 - UMaine Advanced Structures and Composites Center established a smart materials lab in 2016¹ based on MTI funding and equipment donations from US Army Natick Soldier Research and Development Center. Steering committee members include several defense sector companies, including Auburn Manufacturing and Tex Tech Industries.
 - Parent Technology Group is developing photovoltaic powered textiles³ and received funding from Natick Soldier Research Center in 2014.⁶

Examples of Military Applications of Smart Materials (national, not specific to Maine)

- “The Army’s Ballistic Combat Shirt”...provides ballistic protection...the Army is also developing new ballistic plates with a smart sensor to increase protection while reducing total weight even more.”⁴
- US Army, MIT, UCSB, Air Force Civil Engineering Center: “working on a prototype chem-bio protective uniform called “second skin,” which is a protective fabric designed with a textile substrate that uses responsive polymer gels. The fabric will be able to sense chem-bio agents and subsequently cause the gels to swell – closing the pores of the textile and keeping the dangerous agents out. Once the threat has passed, the second skin returns to its normal state.”⁴
- “Solar-powered fabric is of interest to the military as a way to reduce the weight from batteries needed to power the equipment that warfighters carry.”⁴
- “In August 2017, the US Army Natick Soldier Systems Center issued a solicitation for a new generation ULCANS netting system,” which is designed to camouflage “forward bases of operations” from detection by various sensor and imaging technologies.⁵

1. Interview with UMaine Advanced Structures and Composites Center, 2-26-19; News Release, *UMaine Composites Center to establish Smart Materials Lab, consortium with MTI funding*, 12-22-16

2. wiseguyreports.com report Global Smart Textiles Market 2016-20, 6-20-18, cited in MENAFN.com and Specialty Fabrics Review, *A market overview of developments, successes and standards for electronic fabrics*, 8-1-18 citing data from presenter at IFAI Smart Fabrics Summit

3. <https://www.gwi.net/news/spotlight-tech-in-maine-parent-technology-group/>, 8-21-18

4. Specialty Fabrics Review cited above

5. Textile World, *State of the Technical textile Market*, part 2, 5-16-18

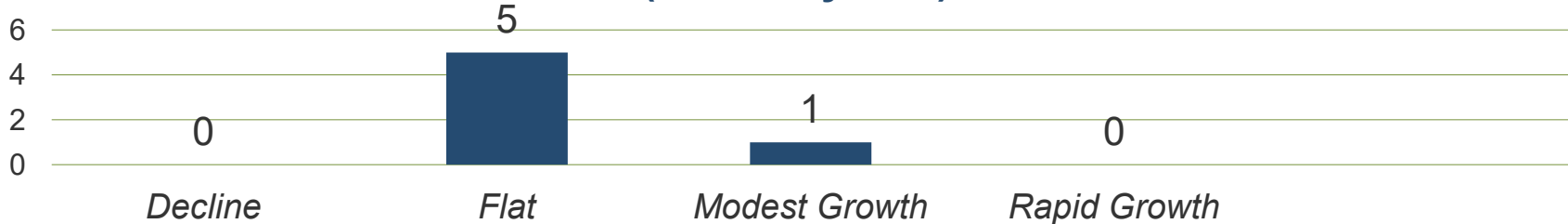
6. www.globalbiodefense.com, 10-6-14

Maine marine companies that sell into defense markets

Company	City	Description
Deepwater Buoyancy	Biddeford	Subsea buoyancy products for oceanographic and offshore energy, military and other markets.
Dirigo Strategies	Thomaston	Consulting, project support; leverage knowledge and experience with Coast Guard.
Howell Labs	Bridgton	Primarily systems for naval ships – water treatment for ships (potable and anti-fouling for seawater), compressed air dryers, moisture measurement.
Maine Marine Composites	Portland	Engineering in marine environments.
Maritime Applied Physics	Brunswick	Ocean/marine engineering and products, significant naval work. Examples include ship personnel safety barriers, unmanned surface vessels, specialized boats, life raft pods.
Ocean Rescue Systems International	S. Portland	Ocean/water rescue training, including for Coast Guard.
P.J. Schwalbenberg & Associates	Cushing	Service engineering on board ships – steam turbines, reduction gears, compressors, generators, pumps and related equipment.
Pole Star Maritime	Woolwich	Sales representative for engineered shipboard and offshore energy habitability outfitting, such as blast and fire resistant wall systems.
Superior Welding & Fabrication	Ellsworth	Aluminum gangways, including use at naval facilities.
Boothbay Harbor Shipyard	Belfast	Shipyards/boatbuilders who do some defense work. Small percentage of sales.
Front Street Shipyard	E. Boothbay	
Hodgdon Yachts / Defense Composites	Thomaston	
Lyman Morse Technologies	Boothbay Harbor	

Maine marine companies reported flat revenues, but naval demand may drive future growth

Recent Revenue Trends – Companies Interviewed (last 3-5 years)



Source: marine company interviews

Target Growth Markets

Important target growth markets for Maine companies in this sub-sector

- Naval ships, vessels
- Commercial ship and boat building
- Offshore oil and gas
- Alternative energy
- [aquaculture to a limited extent]

Additional important current markets

- Oceanographic, undersea engineering
- Pleasure yacht and boatbuilding
- Coast Guard

Source: marine company interviews

Market Demand Drivers

Naval shipbuilding is the biggest market driver

- The Navy has published an aggressive plan to expand the fleet from 285 to 355 battle force ships
- The CBO has questioned whether this level of spending is realistic
- However it does indicate an intent to expand naval ship purchases

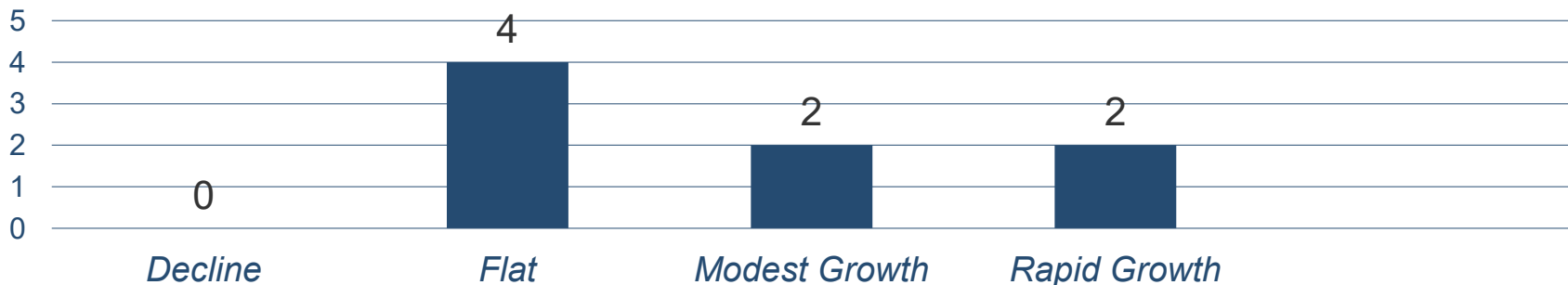
Global ship and boat building more broadly has been in decline, but some are predicting growth going forward

- *IBIS World Annual Growth 2013-18*: -4.6%
- *Business Research Co*: CAGR through 2022: ~3%

Source: CBO, *An Analysis of the Navy's Fiscal Year 2019 Shipbuilding Plan*, October 2018; *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2019*, Office of the Chief of Naval Operations, Feb. 2018 **126**

There is strong demand in the precision machining sector; Maine company sales are driven by strong naval, aerospace demand

Recent Revenue Trends for Companies Interviewed (last 3-5 years)



Source: machining company interviews

Growth Outlook

- Strong demand for precision machined parts
- In Maine, growth opportunities driven by demand in aerospace, defense/naval and telecom markets (see details on next page)
- Near term: 84% of tooling and machining companies surveyed by the National Tooling and Machining Association in December 2018 reported business conditions were either “good,” “very good” or “excellent”. 58% of companies expected business to increase over the next 6 months¹
- Strong projected overall market growth of >11% CAGR, 2017-22 in precision parts (broader than just machining)²

1. National Tooling and Machining Associates (NTMA), *Business Conditions Report*, Prepared February 2019 for period ending Dec. 31, 2018

2. Research and Markets, *Precision Parts Market - Global Outlook and Forecast 2017-2022*, Nov 2017

Maine machining companies have deep experience, and are experiencing strong market demand, in aerospace, defense / naval & telecom markets

Markets		Important Current Markets ²	Important Growth Targets ²	Market Drivers / Trends
<div>Maine Machining Companies That Serve Defense</div>	Aerospace	●	●	<ul style="list-style-type: none">Huge and growing market in next 20 years, 2018-37¹<ul style="list-style-type: none">4.7% annual global traffic growth (RPK)3.5% global fleet growth - commercial airplanesCommercial airplane fleet more than doubles in 20 years, nearly 43K deliveries and \$6.3 trillion in market value over this period
	Defense / Naval	●	●	<ul style="list-style-type: none">Strong growth in naval shipbuilding (ships and submarines, Navy plan to grow from 285 to 355 ships, see marine section)Primes leverage small machine shops to meet small business targets
	Telecom	●	●	<ul style="list-style-type: none">Companies report strong demand in telecom, partly driven by Maine telecom customer
	Oil & Gas, other Energy	●	●	<ul style="list-style-type: none">One company expects this market to pick up again after a period of being flat
	Semiconductor / Electronics	●	●	<ul style="list-style-type: none">Company interviews indicate they expect this market to grow
	Medical	●		
	Optics	●		
	Other Markets	-	-	
TOTAL MKT		-	-	<ul style="list-style-type: none">Strong overall market growth of >11% CAGR, 2017-22 in precision parts (broader than just machining)³

= Maine Strength

1. Boeing *Commercial Market Outlook*, 2018-37
2. Important current markets and important target markets for growth for Maine companies in this sector. Sources: machining company interviews and websites
3. Research and Markets, *Precision Parts Market - Global Outlook and Forecast 2017-2022*, Nov 2017

Maine machining companies that sell into defense markets

Company	City	Description
Albion Manufacturing	Winslow	<ul style="list-style-type: none"> Precision machining Range of markets, applications and materials (most highly diversified; others focused on a limited number of markets) Generally also offer secondary value added operations in addition to machining, such a fabrication, welding, assembly, finishing/coating Some produce more complex products with exotic materials Range of volume from prototype and small volume to high volume parts
Archer Machine	Limington	
Arundel Tool and Machine	Arundel	
B&B Precise Products	Waterville	
Brackett Machine	Westbrook	
Central Machine	Winslow	
Howard Tool	Bangor	
J&M Machining	Skowhegan	
Kennebec Technologies	Augusta	
Knox Machine	Warren	
Maine Machine Products	So, Paris	
Masters Machine	Round Pond	

Maine machining companies that sell into defense markets

Company	City	Description
Mid State Machine Products	Waterville	<ul style="list-style-type: none"> Precision machining Range of markets, applications and materials (most highly diversified; others focused on a limited number of markets) Generally also offer secondary value added operations in addition to machining, such a fabrication, welding, assembly, finishing/coating Some produce more complex products with exotic materials Range of volume from prototype and small volume to high volume parts
Northwest Precision	Rumford	
Odat Machine	Gorham	
Paradise Machine Company	Fryeburg	
Precision Manufacturing Solutions / Nikel Precision Group	Biddeford	
Precision Screw Machine Products	Biddeford	
PTE Precision Machining	Kittery	
Specialty Products Company / William Smith Enterprises	Whitefield	
LAI International	Scarborough	Machining, machinery, additive
D&G Machine	Westbrook	Machining, welding, fabrication
TEM, Inc / Technology Engineered Manufacturing	Buxton	Machining, metal fabrication

Maine machining companies that sell into defense markets

Company	City	Description
Contour360 Corporation	Cornish	Cutting tools
KV Tooling	Augusta	
Grover Gundrilling	Norway / Oxford	Drilling, gun drilling, machining, tubing
Hunting Dearborn	Fryeburg	
Tube Hollows	Windham	
Varney CNC	Brunswick	Composites machining

Precision machining companies demonstrated the risks of not being diversified

Several companies interviewed are recovering after being over-reliant on major customers or markets; examples:

- ❑ *Company (#16)*: In 2014-15, lost customer that was 85% of the business (firearms), and have been transforming from captive shop to diversified shop.
- ❑ *Company (#40)*: Lost customer (scanners used in national security) that represented >40% of business, have diversified since then.
- ❑ *Company (#39)*: Struggling financially as they have lost major business producing component for DoD weapons and guns.

Other shops have or are consciously diversifying to reduce risk; examples:

- ❑ *Company (#20)*: Have consciously diversified in response to individual market volatility. Strong revenue growth.
- ❑ *Company (#19)*: Maine facility has significant reliance on major semi-conductor customer, however experiencing rapid growth and consciously diversifying to enhance valuation.

Investing in up-to-date machining equipment and technology is critical to performance

- ❑ **Machine shops need to invest in new equipment to keep up with technology or to enter/expand in new markets**

Company examples and comments:

- ❑ *Company (#20):* “Technology advancing in equipment very rapidly, every 6-18 months. Have to keep up year over year – ‘insane.’ The US is 5 years behind foreign competitor nations (e.g.; Japan, Poland, Germany) where they make machine tools (don’t make them here) – so their machining companies have access to new techno 5 years ahead of US. Work becomes more challenging, tolerances get tighter, because the technology has improved – so it drives everyone to do more challenging work.”
- ❑ *Company (#16):* Pursuing new major aerospace customer – which requires investment in new equipment. “Employees (from this customer) are calling them, but can’t quote ‘til we show we have specific equipment they need. But we can’t afford to buy the lathe now – don’t have cash – unless have PO so can get bank financing – chicken & egg problem.” New lathe would be \$100K, could buy used one for less.
- ❑ *Company #18:* “On the technology side, see the market shifting to 3D printing/additive. If could offer 3D metal parts capability, that would help, but \$250K - \$500K investment. It is definitely going to 3D for low volume, prototype work” (like ours).”

Top performing shops are more likely to make investments in machining / manufacturing technology

Modern Machine Shops “Top Shops” Benchmarking Survey

Technology	2018 Benchmarking Survey		2017 Benchmarking Survey		Benefit
	Top Shops	Other Shops	Top Shops	Other Shops	
CNC Horizontal Machining Centers	64%	51%	55%	48%	“Higher spindle uptime than vertical machining centers” (“dual-pallet design enables a new job to be set-up on one pallet while machining is performed on the other pallet”).
Five-axis Machining (full contouring)			31%	24%	“Minimizing the number of set-ups a job requires and enabling more complex, contoured geometries to be machined.”
Five-axis Machining (positioning only)			44%	22%	
3D Printer or Additive Manufacturing Machine			37%	17%	“Seeing increased use not only for creating prototypes, but also for quickly and sometimes less expensively creating jigs, fixtures and related workholding components.”

Maine has a cluster of telecom companies focused on RF and microwave antennas

RF/Microwave Antenna Cluster

- ❑ Many sell into defense markets, among others
- ❑ The sector appears to have growth opportunity
 - Two companies interviewed have been growing
 - Market research firms forecast strong global market growth
 - RF and microwave antenna market, nearly 17% annual growth (2019-24)¹
 - Broadcast Equipment market nearly 5% CAGR (2017-23)²
 - Point-to-point microwave antenna sales > 8% annual growth (2019)³
 - Mobile communications antenna market >10% annual growth (2017-21)⁴

Opportunity for Collaboration

- ❑ This cluster has flown “under the radar” in the past, but there may be an opportunity to facilitate collaboration around shared interests, such as
 - Workforce recruitment and training
 - Joint bidding and business development
 - Development of new products
 - Manufacturing collaboration
 - Succession planning

1. Absolute Reports, 2019, *Global Antennas for the RF & Microwave Market Insights, Forecast to 2024*

2. MarketsandMarkets. Aug. 2017

3. Future Market Insights, Jan. 2019

4. Technavio, Nov 2018

Maine telecom companies that sell to defense markets

Company	City	Description
Comnav Engineering	Portland	Microwave filters for wireless communication & navigation systems.
Distributed Communication Systems	Cumberland Center	Custom supervisory control and data acquisition (SCADA) systems for use remote locations where traditional communications such as cellular data are not available. The Distributed Communication Systems team includes expertise with systems for government, professional and recreational markets.
Mega Industries	Gorham	Microwave and RF transmission equipment, including waveguides, coaxial transmission lines and RF broadcast components (for terrestrial, over-the-air TV and radio broadcasters). For sophisticated customers in the scientific, commercial, and military sectors.
Micronetixx Technologies	Lewiston	High-power RF and microwave technologies and equipment for military/ defense, industrial, digital TV and radio broadcast transmission applications.
mWave	Windham	Custom and commercial microwave antennas with special focus on 60, 70, 80, 94, & 110 GHz Millimeter Wave Reflector Antennas. Wide variety of applications, including scientific and academic, telephony, broadcast, cellular, public safety, defense, utility pipeline, aviation, satellite communications, among others.
Nautel	Bangor	Global leader in the design, manufacture, sales and support of transmitters for AM/FM radio stations, navigation, sonar systems, and industrial RF technology. More than 16,000 customers in 177 countries rely on Nautel's RF solutions. Markets include aerospace, communications, industrial RF, broadcast, defense, navigation, oil & gas, science and research.

Maine telecom companies that sell to defense markets

Company	City	Description
Northern Pride Communications	Topsham	Specialize in microwave, cellular and LTE tower site construction, installations, maintenance and repair. Completed projects include system installations for public broadcasting, utility companies, and local, state and federal government agencies. We have the skills and the capacity to complete projects from remote mountain tops to urban rooftops.
Shively Labs (part of Howell Labs)	Bridgton	FM broadcasting equipment and antennas.
Yankee Microwave	Harrison	Microwave antennas and towers – installation, site infrastructure, inspection & maintenance, energy systems. Engineer, install, test, commission, and service a broad range of wireless technologies, point to point, and broadcast systems available today. Most recent projects for defense and public safety.

Note: Dielectric is also an important Maine telecom company that specializes in RF antenna and signal transmission solutions for TV and radio broadcasters, however they do not appear to sell into defense.

Defense products and weapons companies will benefit from increases in defense spending

- ❑ **Identified 10 companies in this segment that makes firearms, weapons or other products specific to military needs**
 - This sub-sector also includes coatings companies that serve firearms markets
- ❑ **The two end-markets that predominate and determine growth potential of the sector are**
 - Civilian firearms
 - US Defense

Civilian Firearms

- Significant market volatility driven by political concerns about increasing gun controls
- Sales slowed down since 2016 election, though reportedly started to pick up late in 2018

Defense

- There is considerable uncertainty around budgetary negotiations and the political process...
- However some analysts believe Congress will again agree to set aside Budget Control Act limits allowing for robust defense spending
- Market analysts also see significant *global* growth in the military market for small arms and light weapons

Sources: company interviews, Product Finishing, 2-1-19, *Firearms and Flatware Feed Silvex's Growing Electroplating Operation*

Sources: National Defense Magazine articles: 4-2-19, *Repealing the Budget Control Act Long Overdue* and 4-1-19, *Budget Numbers Add Up to Possible Sequestration*; *Small Arms Light Weapons Global Market Report*, Grand View Research, 2017; ResearchandMarkets, *Global Light Weapons Market*, 2018; Panel Discussion on Defense Budget at OEA Industry Resilience Conference, 5-9-19, Panelists: Mackenzie Eaglen, Resident Fellow, American Enterprise Institute and Michael O'Hanlon, Senior Fellow and Director of Research, Brookings Institution

Maine defense products and weapons companies that sell to defense markets

Company	City	Description
American Rheinmetall Systems	Biddeford	Key sub-supplier to Kongsberg for the US Army's CROWS program, producing mounts, firing mechanisms and video imaging modules. The American Rheinmetall Systems product portfolio includes but is not limited to: fire control systems, laser aiming devices, laser range finders, and weapon improvement packages.
Civil Arms Inc	Skowhegan	Fully-licensed distributor/export management company, importer and exporter of firearms.
Die-Matic LLC	Belfast	Boresight alignment kit and spares for CROWs
Down East Innovation Inc	Bridgton	Manufacture pack-frames (and related products such as packs, padsets, buckles) for all branches of the US Military and many allied countries.
General Dynamics Weapon Systems	Saco	Machine and Gatling guns, grenade launchers, fire control equipment, ammunition handling systems, gun turret systems, gun barrels. Serve military.
Howe & Howe Technologies (part of Textron)	Waterboro	World leader in extreme vehicle fabrication and one of the foremost creators of advanced robotic platform solutions and applications. Primarily serve defense and firefighter markets, but also commercial markets (such as off road enthusiasts)
Northeast Coating Technologies	Kennebunk	Engineered surface treatment solutions including Physical Vapor Deposition and DLC coating as well as plasma and salt bath nitriding. Serve firearms and medical markets.
Rapid Assault Tools	So Portland	Manufacturers of forced entry tools for military, law enforcement and firefighters.
Silvex Inc	Westbrook	Full service electroplating and surface finishing company who's experience includes silver and platinum plating or aluminum anodizing, phosphating. Primary markets are firearms, hotel-ware/silverware. Also serves defense, aerospace, telecom, water purification and power generation.
Windham Weaponry Inc	Windham	AR type rifle manufacturer.

Construction, Engineering and Architecture is a significant segment of the Maine defense sector

- ❑ **This project identified 20 Maine companies in this sub-sector**
 - That serve defense/military customers
 - Are traded (i.e. work outside of) Maine and Northern New England
 - Many have multiple locations, with HQ or branch location in Maine
- ❑ **Companies were reluctant to speak with us because they don't perceive themselves as typically the recipients of economic development programs**
 - There may be missed opportunities to assist these firms
- ❑ **Companies can be segmented into several groups**
 - Construction (the largest group, 15 of 20 companies)
 - General contractors
 - Specialty trades contractors
 - Design/Engineering/Architecture
 - Miscellaneous

There is strong demand in the construction industry, but workforce shortages are a major concern

- ❑ Strong demand is perceived by contractors across all market segments
- ❑ However the shortage of qualified workers and subcontractors is a critical challenge
 - 78% of contractors in the Northeast expect to increase their headcount in 2019¹
 - At the same time 79% say they are having a hard time filling some or all positions
- ❑ Southern Maine has lost construction workers to other New England states that pay at higher rates
- ❑ SMCC (with Maine Quality Center funding) established the Construction Institute to train employees for the industry, offering a program that is shorter in duration and more flexible than its full one and two year degree programs²

The Associated General Contractors of America, 2019 Construction and Hiring Business Outlook

“Construction executives appear to remain confident about their market prospects for 2019, although they are simultaneously concerned about finding qualified workers to execute projects. Both the optimism about workloads and the worry about worker availability cut across all regions, project categories and types of contractors.”

Construction companies that sell to defense markets

Company	City	Description
General Contractors		
CCI Solutions LLC	Augusta	Alliance of companies. Provide construction management including design-build, bid-build; energy services including development, designing, installing conservation solutions; and professional services including engineering, design, QA and environment professionals.
Cromedy Construction Corporation	Wells	Provides innovative, practical solutions for general construction, construction management and HVAC/sheet metal fabrication construction services.
KMK Construction Inc	Eliot	Provides general contracting, facilities maintenance and design/build services to federal and municipal agencies, particularly for US Navy, US Army, US Air Force/National Guard, Dept of VA, or GSA
PC Construction	Portland	Offers general contracting, construction management and design-build services to private and public companies for projects of all sizes.
Twinfork Enterprises	Pittston	A design/build commercial contractor of steel structures: commercial buildings, storage buildings, institutional buildings and arenas, residential barns, and horse arenas. Also specialize in roof coatings.
Specialty Contractors / Specialists		
Engineered Construction Services Inc	Raymond	General contractor that specializes in projects in the power and utility support industries (e.g. piping, pressure vessels)
Federal Program Integrators LLC	Indian Island	Works to compete and negotiate for federal contract opportunities including Small Business contracts, including full competition, 8(a) set-asides, Hubzone Set-asides, and grants. Mix of construction, engineering, facilities maintenance and other contracts,

Construction companies that sell to defense markets

Company	City	Description
Specialty Contractors / Specialists <i>(continued)</i>		
Industrial Concrete Services Inc	Gorham	Floor coating and floor polishing concentrating on servicing industrial and commercial projects.
Jacobs Glass Inc / Windows Plus	Winslow	Commercial glazing and window restoration focusing on serving building owners, architects and general contractors.
Knox Masonry LLC	Bucksport	Full service masonry company specializing in historic masonry restoration and renovation for commercial and residential projects.
Maine Track Maintenance Inc	Fairfield	Full service railroad contractor providing maintenance, new construction, road crossings, surfacing, rehabilitation, rail design/engineering and 24/7 emergency call out.
R C Specialty Fabrication Inc	Lewiston	Specialize in make-to-order aluminum, steel, and stainless steel fabrications for the construction trades, e.g. rails, guardrails, ladders, metal stairs, custom fabrications
Rubb Building Systems	Sanford	Started making engineered fabric structures and has become a world leader in the design, manufacture, delivery and erection of fabric building solutions with complete engineering, design and production facilities.
The Lander Group	Greenville	Clients include DOD, DOT, DHS, VA, Federal Emergency Management Agency. Particular focus on “horizontal civil” services: site prep, excavation, paving, surface milling, erosion/sediment control, drainage relocation/installation, clearing/grubbing, utility relocation

Engineering / Design / Architecture companies that sell to defense markets

Company	City	Description
Colby Company Engineering	Portland	Created as a one-stop shop for mechanical, plumbing, fire protection, electrical, structural and civil engineering, and architecture.
Enterprise Engineering Inc	Falmouth	Multi-disciplined engineering firm providing civil/structural/mechanical engineering services and mechanical integrity assessments with specialty expertise covers planning, design, and inspection of fuel storage and distribution systems. Have completed projects at over 315 military installations in the Continental United States, Alaska, Hawaii, the Pacific Islands, and Europe, EEI is recognized by the Department of Defense (DoD) as a leader in design and integrity assessments of aircraft fueling systems. Work includes storage tanks, pipelines, truck and rail car loading and off-loading facilities, and aircraft hydrant systems.
JV Casco Bay Engineering	Portland	Structural and civil engineering consulting services to architects, contractors, government agencies and other entities.
Oak Point Associates	Biddeford	Full service design studio for sustainable, architecture, interior design, landscape architecture, structural/electrical/mechanical and civil engineering.
SMRT Inc	Portland	Full service design studio; featured services include architecture, energy, engineering, interiors, planning and site design.

Miscellaneous Maine companies serving the defense market by category

Company	City	Description
Electronics Manufacturing		
Elscott Manufacturing LLC	Gouldsboro	Provides electronic contract manufacturing services to industries such as aerospace and defense, medical and automotive
Enercon Technologies Inc	Auburn	Fully integrated design engineering and electronics contract manufacturing for the medical, industrial and defense markets
Pure-Stat Engineered Technologies	Lewiston	ESD Packaging: anti-static, ESD Shielding, and barrier films & bags.
Saunders Electronics	So Portland	Provides electronic contract manufacturing services to industries such as military, medical, industrial controls, and other leading markets.
Sierra Peaks Tibbetts Corporation	Camden	A leader in design, engineering, development, manufacture and testing of unique electro-mechanical systems for various branches of the US Government, military, law enforcement and commercial sectors, including aerospace, automation and biometrics. Camden Maine location manufactures sub-miniature microphones and accessories production lines.
Crane and Scaffolding		
Greisen Aerospace LLC	Brunswick	Engineering firm that specializes in the design and manufacture of tooling and satellite ground support equipment. Product line includes lifting hardware especially designed for high-risk lifts and the satellite industry.
New England Crane Inc	Lewiston	Provides high quality bridge crane service and new installations in New England.
Scaffolding Consultants International / Terence Marks	Biddeford	Supplier of scaffolding, shoring, or formwork systems.
Somatex Inc	Detroit	Builds and services overhead cranes, hoists, and lifting devices.

Miscellaneous Maine companies serving the defense market by category

Company	City	Description
Miscellaneous Manufacturing		
Caron Engineering Inc	Wells	Develops advanced retrofit solutions for CNC machines to improve performance, productivity and profitability.
Cascon Inc	Yarmouth	Designer and producer of custom engineered pumps for specialty applications, particularly positive displacement hydraulic pumps for OEM customers
CellBlock FCS	Standish	Packaging and services used to safely handle, transport and store lithium-ion batteries and other dangerous goods.
CRI-SIL Silicone Technologies	Biddeford	Supplier of custom formulated silicone and flourosilicone elastomers
Eldertde LLC	Dresden	A certified organic processor and manufacturer of standardized nutraceuticals.
Elmet Technologies Inc	Lewiston	A global leader in high-performance tungsten and molybdenum refractory metal product manufacturing and machining services.
Environetix Technologies Corporation	Orono	Provides high quality custom wireless sensor solutions to meet the challenges of measuring high temperature, pressure, vibration, and strain in harsh and extreme environments.
Exact Dispensing	Newcastle	Designs, builds and installs precision meter-mix and dispense systems in a wide variety of manufacturing markets around the world, including general manufacturing, motors and windings, electronics, automotive, filtration and military/aerospace.
Globe Footwear LLC / MSA	Auburn	Boots for firefighters

Miscellaneous Maine companies serving the defense market by category

Company	City	Description
Miscellaneous Manufacturing <i>(continued)</i>		
JSI Store Fixtures	Bangor	Creates best-in-class fixtures for retail food shopping environments.
Kardex Remstar	Westbrook	Manufactures computer controlled automated storage and retrieval systems for a wide range of applications. Westbrook is US HQ
Loring Industries	Limestone	Refurbishes vehicles, equipment and component parts to like-new condition, including transit buses and Howitzers for the military
New England Castings LLC	Standish	Manufacturer of precision alloy investment castings using the lost wax method producing parts ranging from fractional ounces to several hundred pounds in size.
Numberall Stamp & Tool Company	Sangerville	Manufacturer of metal marking equipment for industry.
Patriot Healthcare Services LLC	Bangor	Provides medical supplies and equipment to businesses and organizations in the medical field. Part of Lander Group
Peregrine Turbine Technologies LLC	Wiscasset	Bringing a whole new level of performance, fuel efficiency and low emissions to the turbine world.
Tasman Leather Group LLC	Hartland	Major supplier of USA material to the global leather market.
Thermoformed Plastics of New England	Biddeford	Custom thermoforming company that offers complete design, prototyping, tooling and production services.

Miscellaneous Maine companies serving the defense market by category

Company	City	Description
Chemical and Biological Testing Products		
Maine Molecular Quality Controls Inc	Saco	Designs and markets molecular controls for use in inherited disease testing, infectious disease detection, and pharmacogenetics.
Orono Spectral Solutions Inc	Hermon	Technology for product sampling for a broad range of industries. For example products that measure oil and grease in a wide range of fluids from water, ammonia, and air, and surface sampling of unknown materials for identification
Sensor Research & Development Corporation	Orono	A premier solid-state chemical gas sensor research and development source for the Departments of Defense, Homeland Security and Energy.
Testing Labs (and supplier of software for labs)		
Cal Lab Access	Saco	Developed, and continually improves, calibration management software platform for small to medium laboratories.
Credere Associates LLC	Westbrook	Completes long-term, sustainable Brownfields Programs and private redevelopment projects including environmental assessment, re-use planning and remediation and redevelopment engineering.
Katahdin Analytical Services Inc	Scarborough	Offers a full range of environmental testing and sampling services for industrial, commercial, municipal and federal governmental projects throughout much of the US
LAW Calibration LLC	Saco	Accredited calibration services for all of your test and measurement equipment.
Woods End Laboratories	Mt Vernon	Founded as a soil testing lab specializing in soil biology, WEL has grown and evolved into a firm providing discrete scientific services to enable more successful interaction of agriculture with nature.

Miscellaneous Maine companies serving the defense market by category

Company	City	Description
Material Handling Automation Integrator		
Automation Integrators Inc	Auburn	Applies innovative thinking and advanced technologies to solve a company's greatest automation challenges utilizing the best in industrial automation technologies and equipment.
Aviation Services (MRO)		
C&L Aerospace LLC	Bangor	Global aviation services and aftermarket-support provider for regional and corporate aircraft specializing in quality parts, service, sales, leasing, maintenance, aircraft refurbishment and aircraft re-marketing.
Consulting		
Fisher Engineering (acquired Fire Risk Management Inc 11/2018)	Bath	Provides fire protection engineering services to clients across the US and internationally.
GSK Inc	Orrs Island	Technical and program management consulting for the DOD.
Hanna Consultants	Kennebunk-port	Statistical modeling for air quality and gas turbulence/dispersion
Kleinschmidt Associates	Pittsfield	Provides engineering, regulatory, and environmental consulting services to energy companies and government agencies across North America.
T2E Solutions	Springfield	Provides analytical, technical and professional engineering services to Department of Defense customers.
Training		
International Management Inc	Rumford	Full spectrum "skill set" oriented services firm oriented to specific training, language and facilities management needs of our clients in the US Government, allied and coalition militaries, defense contracting.

Miscellaneous Maine companies serving the defense market by category

Company	City	Description
Information Technology		
AizoOn USA Inc	Lewiston	Designs, develops and supports software and systems that create smarter factories, well-managed warehouses, seamless supply chains, and safer, secure networks.
Introspective Systems LLC	Portland	Breakthrough software platform helps a business wrangle their entire ecosystem, collaborate seamlessly, and optimize their distributed systems.
Maritime Surveillance Associates	Brunswick	Software engineering firm dedicated to developing custom software solutions..
Penbay Solutions LLC	Topsham	Software solution for facility management
Penobscot Bay Media LLC	Rockland	Specializes in web-based solution design, development, implementation and support as well as offering GIS and video production expertise.
Technology Systems Inc	Brunswick	IT services
Wholesalers / Distributors		
American Steel & Aluminum LLC	So Portland	Distributor of range of steel, aluminum and other metal products; products include sheet and plate, pipe and tube, bars, beams, and angles; steel service centers with value added operations such as blanking, slitting, shearing, cutting
Downeast Logistics LLC	Scarborough	Supplier of variety of products - medical, technical and industrial equipment and supplies mainly to DoD
Franklin Marketing Inc / Markstaar	Scarborough	Distributor of high quality commercial/residential products and site amenities for use in business, government, education, healthcare, hospitality, industrial, military and public/residential environments.

Miscellaneous Maine companies serving the defense market by category

Company	City	Description
Wholesalers / Distributors <i>(continued)</i>		
Maine Hotel - Motel Supply Inc	Brewer	Wholesale supplier of furnishings to hotels, motels
Monroe Infrared Technology Inc	Brunswick	Supplies state of the art IR cameras, diagnostic equipment, infrared certification training and professional IR inspection services.
Sands Business Equipment & Supplies LLC	York	Office equipment distributors.
Tanks Unlimited Inc	Portland	Multi-faceted company that designs, distributes and services petroleum, chemical and water systems

Appendix

Implications for Attraction of Foreign Direct Investment

Implications for attraction of foreign direct investment (FDI)

Assumptions

- ❑ This project did not conduct a thorough review of Maine's FDI attraction strategy
- ❑ The focus in this project was to identify defense sector assets that could be promoted to potential investors
- ❑ Maine's strengths in important sub-sectors within defense are already well known, including advanced materials, marine products and shipbuilding and repair

Implications – Additional Assets to Promote

- ❑ There are over 150 companies with experience in the defense market in Maine. These companies can be potential collaborators, customers, suppliers or sources of skilled labor with experience in defense
- ❑ In particular, there is a significant base of precision machining companies with defense and aerospace experience
 - We are already aware of one company considering future operations in Maine as a result of the large base of machining companies with defense experience
- ❑ There is a very specific cluster of telecom companies focused on RF and microwave antennas and related products; companies in this sector, or those that sell to/buy from this sector, might benefit from locating in Maine
- ❑ There may be an opportunity to target suppliers to the big 3 Maine defense companies (BIW, PNS, P&W), and encourage them to re-locate or establish operations near their Maine customers. However this is unlikely to be effective unless a large percentage of their sales is to these Maine customers. This strategy would require further collaboration with the big 3.

Appendix

Results from Implementation Grants and Training

Results from implementation grants and training offered to support Maine defense company diversification

Implementation Description

- During the development of the strategic plan the MITC team provided grants to offset the costs for Maine defense companies to use outside services to advance diversification and growth
- Grants were up to \$14,000 per company
- In addition, MITC delivered or supported four training programs

Training programs

- Canadian Procurement (10 attendees)
- ITAR Training (20 attendees)
- Import Compliance Training (14 attendees)
- Partnered on PTAC Matchmaker event educational breakout sessions (300+ attendees)

Grants (as of 5-2-19)

- 23 companies leveraged the grants for 35 discrete projects
- Project breakdown
 - 11 Market research and diversification
 - 14 compliance and certification
 - Participation in 10 industry events or trainings

Lessons Learned

- Many companies wanted to use the grant to cover staff time for research vs using outside services, which supported the recommendation to offer grants that could cover hiring of additional staff
- Companies also wanted to use the grant to cover travel for tradeshows, which supported our inclusion of tradeshows, conferences in the recommendations