Phase II 2020 Hawaii Defense Economy (HDE) SWOT Analysis & Report

DBEDT

STATE OF HAWAII • DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Authors:

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JEFFREY DONOHOE ASSOCIATES	**Jeffrey Donohoe Associates, LLC** is a multi-discipline economic and real estate consulting firm. The firm is based in New Hampshire, and provides a comprehensive range of advisory, marketing and management services to clients in the private and public sectors.

Cover Page Photo: The crew of the Virginia-class fast-attack submarine USS Missouri (SSN 780) render honors to the Battleship Missouri Memorial while arriving at Joint Base Pearl Harbor-Hickam as part of a homeport change from Groton, Conn. Photo By: U.S. Navy, Mass Communication Specialist 2nd Class Michael H. Lee.

CASSIDY INTERNATIONAL AIRPORT, Kiribati - MV-22 Ospreys and KC-130J Hercules are parked during Marine Rotational Force - Darwin trans-Pacific flight, Cassidy International Airport, Kiribati, Sep. 19, 2019. The flight was conducted to improve upon the Osprey trans-Pacific concept that has been developed and refined over the past three MRF-D iterations. Photo By: 1st Lt. Colin Kennard.

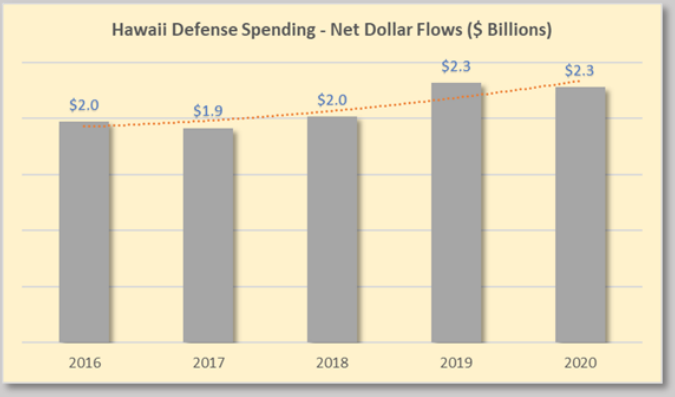
Table of Contents

Executive Summary

Hawaii's strategic importance is as important now as it has ever been with continued threats and instability in the Asia-Pacific region, home to more than 50% of the world's population, several of the world's largest militaries, and two of the three largest economies in the world. The U.S. Indo-Pacific Command (USINDOPACOM), headquartered in Honolulu, along with other strategic and important commands, facilities and bases in the state, clearly make Hawaii vital to U.S. interests in the region. The U.S. Navy's Pacific Missile Range Facility (PMRF) is the world's largest instrumented multi-environmental range capable of supported surface, subsurface, air, and space operations simultaneously and is the third-largest employer on Kauai. Pearl Harbor Naval Shipyard (PHNSY) is our nation's largest, most comprehensive fleet repair and maintenance facility between the U.S. West Coast and the Far East. It is the largest industrial employer in the state, with a civilian workforce of more than 5,000 and over 500 active-duty Navy personnel. Finally, Tripler Army Medical Center (TAMC) is the largest military treatment facility (MTF) in the Pacific Rim. It serves more than 260,000 beneficiaries in Hawaii and another 170,000 across the region.

HDE Overview & Report Objectives

Hawaii is ranked #2 nationally in state defense spending as a percentage of Gross Domestic Product (GDP) at **7.7%**. Total defense-related payroll and contract spending accounted for **$7.2B**, including **$4.9B** in payroll and **$2.3B** in contract spending.[1] Net dollar flows entering Hawaii from contract awards support approximately **30K** jobs and contribute **$4.2B** in Economic Impact to the economy.[2]



Given the size of the defense market, it is critical that the state be proactive to ensure Hawaii's economy is resilient to any potential changes in defense spending. Likewise, the recent impacts from the COVID-19 global pandemic have highlighted the importance of defense spending on the state's economy, as Tourism, Hawaii's #1 industry, has become the hardest hit economic sector in 2020 with significant job losses.

This report provides a comprehensive analysis of strengths, weaknesses, and potential opportunities and threats (SWOT) for key industries that play or could play a major role in Hawaii's defense economy. It identifies military defense sectors and other industries most vulnerable to economic downturns or changes in DoD spending. It also determines prospective areas to transition capacity and services in the private sector to support the military industry and sustain the local economy. Finally, it identifies and prioritizes potential areas for economic adjustment and growth.

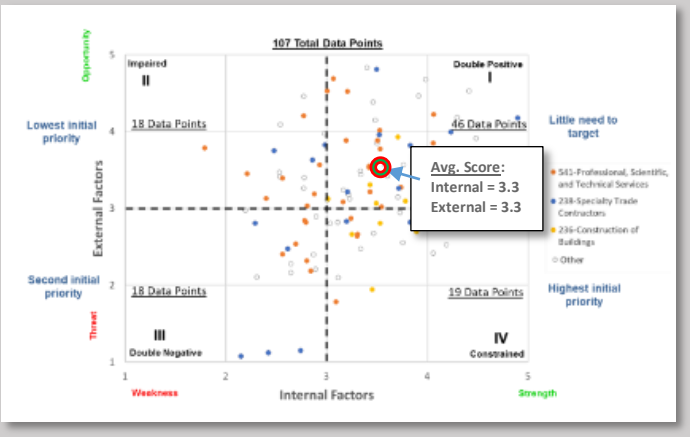
HDE SWOT Analysis

The HDE project team conducted a SWOT analysis using an online survey deployed to 507 contractors located in Hawaii, and received a 21% response rate. 89% of the respondents were small businesses and 84% were service providers. **Financial Health** and **Defense Market Outlook** received the highest ratings in terms of Strengths and Opportunities, indicating the defense market has been financially rewarding to contractors and is expected to continue with more opportunities in the future. On the other hand, **Market Flexibility** received the lowest rating in terms of weakness, indicating it is difficult for defense firms to serve both public and private (commercial) markets. Overall DoD dependency is moderately high at an average of 46% across the firms surveyed. This indicates some degree of weakness with the potential of a threat in the event of a defense market downturn in spending.

The following scatter plot chart shows the 107 responses plotted on a SWOT quadrant chart and a representative single plot, reflecting the center mass of responses, based on the average internal and external scores. The colored respondent points reflect the Top 3 three-digit NAICS that responded to the survey – 541: *Professional, Scientific, and Technical Services*; *238: Specialty Trade Contractors*; and *236: Construction of Buildings*. Each industry appears to be well

[1] Office of Economic Adjustment's (OEA) Fiscal Year 2018 state report for Hawaii
[2] HDE Website (http://defenseeconomy.hawaii.gov/)

represented in Quadrant I with 46 organizations plotted or 43% of the respondents.



NAICS 236 appears to have more resiliency than NAICS 541 and 238 with overall more favorable internal and external factor SWOT scores. NAICS 238 respondents indicated a challenging ***Workforce Outlook*** (*skilled labor retention*), a weakness, while the majority of NAICS 541 respondents agree that the ***Business Climate*** and ***Labor Market*** (*Skilled Labor Availability*) are significant challenges, both threats to these two industry sectors.

Defense Sector Analysis

Over the last 12 months, *NAICS 23: Construction* accounted for the largest industry sector (2-digit NAICS) with **$719.6M** in net dollar flows, followed closely by *54: Professional Services* at **$621.8M**. *NAICS 33: Manufacturing* held third place with **$286.6M**. Together, these Top 3 industry sectors support over **20K** jobs in Hawaii.

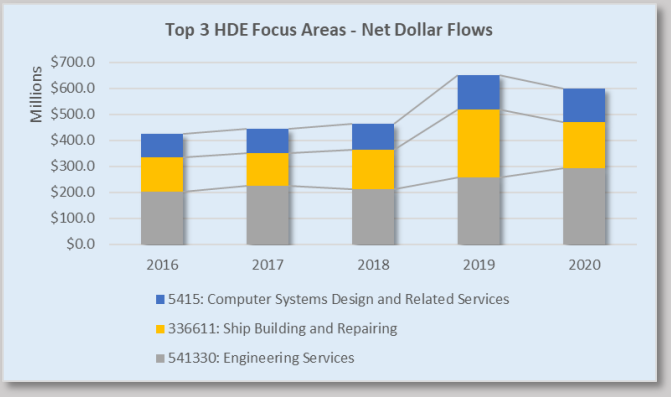
Missile Defense, Cybersecurity, and Ship Repair were identified as Phase 1 industry sector focus areas. Each has direct and indirect alignment to *NAICS 54: Professional Services* and the Hawaii Defense Economy. Missile Defense supports a number of occupations within *NAICS 541330: Engineering Services*, but also facility-related construction. Since Missile Defense spending comes from multiple DoD agencies, it is difficult to track this particular sub-sector of the economy. *NAICS 541330: Engineering Services* is an easier industry sector to monitor, substantial in terms of annual defense spending in Hawaii, and more inclusive of other important, higher paying occupations within the state. ***The HDE project team recommends adjusting the focus area from Missile Defense to NAICS 541330: Engineering Services***

Similarly, Cybersecurity fits very well within *NAICS 5415: Computer Systems Design and Related Services*, but there are many other IT services that are also included, making it difficult to associate defense spending to this specific sub-sector. Outside of the Hawaii Defense Economy, Cybersecurity also supports jobs across multiple industries located in the state, including finance/ banking, transportation/ shipping, tourism etc., beyond just professional services. Given the size of defense spending within NAICS 5415, its relatively high paying occupations, positive job growth outlook, and the DoD mandates for cybersecurity, ***the HDE project team recommends adjusting this focus area to include not only cybersecurity specifically, but also other IT occupations within NAICS 5415: Computer Systems Design and Related Services***.

After making the focus area adjustments within *NAICS 54: Professional Services*, the Top 3 HDE Focus Areas are:

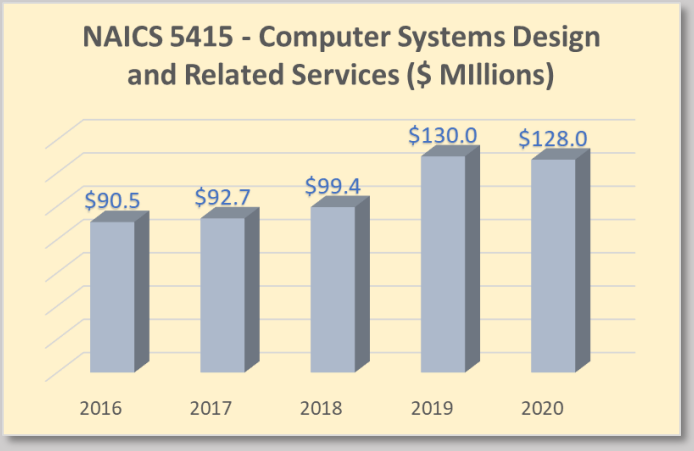
- 541330: Engineering Services,
- 336611: Ship Building and Repairing, and
- 5415: Computer Systems Design and Related Services

These areas show sizeable spending and high growth rates.



IT Services & Cybersecurity (NAICS 5415)

Defense-related contract awards in Hawaii within NAICS 5415 have risen over the last 5 years, approaching **$128M** in 2020, approximately equal to the prior year. Net dollar flows entering Hawaii from contract awards support approximately



1,700 jobs and contribute **$240M** in Economic Impact to the economy.[3]

In addition to its high annual spending and fast growth rate, new DoD mandates highlight the continued importance of cybersecurity. DoD's Cybersecurity Maturity Model Certification (CMMC) program is a new set of cybersecurity standards to protect defense companies from cyberattacks. The CMMC program will require certification for all companies doing business or who want to do business with DoD. Certified Third-Party Assessment Organizations (C3PAO) will certify companies against the different CMMC standards/levels. All companies on contract with the DoD will need at least CMMC Level 1 certification.

Defense agency spending in NAICS 5415 only tells part of the story of its economic contributions within Hawaii. IT Services within the private sector is also growing, particularly in the cybersecurity area. The Bureau of Labor Statistics (BLS) identified ***Information Security Analysts*** (15-1122) as the Top 6 fastest growing jobs in the U.S. at 32% from 2018-2028 (projected).[4] Information Security Analysts are high paying occupations. However, in Hawaii the median pay is only $90,100, approximately $10K lower than the national median.[5]

Hawaii's location quotient for this occupation is 0.63, suggesting it is under-represented among other occupations.[6] For perspective, Virginia, DC, and Maryland have the highest location quotients and combined are an important DoD/ intelligence regional hub, which is something Hawaii could aspire to achieve – through workforce development programs, such as Cyber Hawaii.

Job posting data for Hawaii provides important insights and a wider view of IT related jobs beyond just the public sector:[7]

- Median advertised salary was $70K
- Software Developers, Applications held the top spot for the most monthly postings in Hawaii
- Information Security Analysts held the Top 4 ranking
- Postings required Top Secret-Sensitive Compartmented Information (TS/SCI) clearances more often than the rest of the workforce at 12% versus 2%, reflecting the substantial presence of DoD-related work.
- Cybersecurity skills were required at a frequency of 7% versus 1% nationally.[8]
- Information Assurance/ Security industry qualifications were frequently required the most above all others in job postings.

The HDE project team developed and conducted an industry sector occupational gap analysis survey of Hawaii-based companies to provide feedback on perceived gaps between skilled labor needs and the labor pool of current Hawaiian residents. The majority of respondents predominantly employ Hawaii-based residents. The survey also revealed large gaps for the following IT occupations:

- 15-1221: Computer and Information Research Scientists (Data Scientists).
- 15-1212: Information Security Analysts.

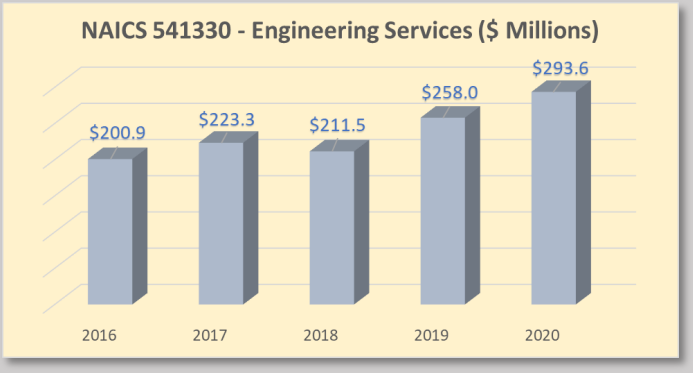
The gaps were noted most heavily in the *Moderately* to *Highly* experienced job levels, not entry level. ***70%*** of respondents indicated they would be interested in participating in a future partnership/alliance with stakeholders representing industry, government, and academia within Hawaii to build the labor force related to *NAICS 5415: Computer Systems Design and Related Services*.

According to the Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES), the Top 3 occupations by total Hawaii employment include 1) ***Software Developers & QA***, 2) ***Computer Systems Analysts*** and 3) ***Computer Occupations, Other***. Four out of the Top 5 have both low location quotients (under-represented in the state economy compared to nationally) and noticeably lower median salaries as compared to the median national salaries. ***Software Developers & QA*** and ***Computer User Support Specialists*** (Help Desk Techs.) have significantly lower location quotients. The data suggests that the local economy may not be substantially diverse enough to provide the demand needed to increase both the median salaries and location quotients closer to national levels.

[3] HDE Website (http://defenseeconomy.hawaii.gov/)
[4] https://www.bls.gov/ooh/computer-and-information-technology/information-security-analysts.html
[5] BLS Occupational Employment Statistics (OES) for SOC 15-1212 (Information Security Analyst).
[6] BLS OES. Location quotient represents ratio of an occupation's share of employment in a given area to that occupation's share of employment in the U.S. as a whole.
[7] University of Hawaii Community Colleges report on Job Posting Analytics using Emsi's Q2 2020 Data Set for May 2020.
[8] Top Hard Skills; Emsi Q2 2020 Data Set | www.economicmodeling.com

Engineering Services (NAICS 541330)

Defense-related contract awards in Hawaii within *NAICS 541330 Engineering Services* have risen over the last 5 years, approaching **$293M** in 2020, representing a substantially large sector in Hawaii.



Net dollar flows entering Hawaii from contract awards support approximately **4,490** jobs and contribute **$569M** in Economic Impact to the economy.[9] The sector has a 5-year growth rate of **3.4%**.

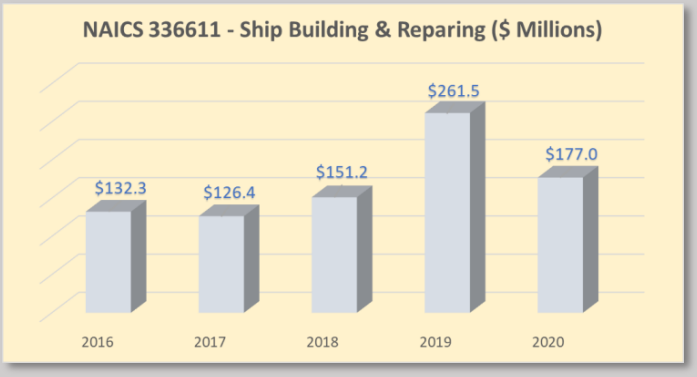
The HDE project team developed and conducted an occupational gap analysis survey of Hawaii-based companies. ***Overall, the survey revealed only slight and moderate gaps, indicating a healthy industry sector in terms of needs versus the local skilled labor pool. Similarly, even fewer gaps were noted in the technician and technologist trades***. In addition, the majority of respondents employ Hawaii-based residents. ***62%*** of respondents indicated they would be interested in participating in a future partnership/alliance with stakeholders representing industry, government, and academia within Hawaii to build the labor force related to *NAICS 541330: Engineering Services*, slightly lower than for IT Services.

According to the BLS OES data, the Top 3 "*Engineer*" occupations by total Hawaii employment include 1) ***Civil***, 2) ***Electrical*** and 3) ***Mechanical Engineers***. The high employment and location quotient for Civil Engineers aligns well with the large defense construction spending in the state. All three have median average salaries that are lower than the median national salaries. The data suggests that the demand and supply is relatively balanced within the engineering services sector.

For the "*Technologist/ Technician*" occupations, the Top 3 occupations are 1) ***Electrical and Electronic Engineering Technicians***, 2) ***Calibration and Engineering Technicians***, and 3) ***Architectural and Civil Drafters***. In contrast to the "*Engineer*" occupations, these jobs have a higher median salary in Hawaii as compared to the rest of the U.S.

Ship Building/Repairing (NAICS 336611)

Defense-related contract awards in Hawaii within *NAICS 336611 – Ship Building and Repairing*. Defense-related net dollar flows in Hawaii have risen over the last 5 years, approaching **$177M** in 2020, down from the year before, which was substantially higher at $261.5M.



Net dollar flows entering Hawaii from contract awards support approximately **1,820** jobs, and contribute **$305.5M** in Economic Impact to the economy.[10] The sector has a 5-year growth rate of **33.9%**, factoring in relatively high spending in 2019.

The HDE project team developed and conducted a general workforce gap analysis survey of Hawaii-based companies. Due to the large number of occupational codes that relate to this industry sector, this survey only requested feedback in general on the perceived severity of any gaps between the organization's skilled labor needs and the availability of skilled Hawaii resident workers. 43% noted no gaps. For the 57% that indicated moderate and large gaps, the experience level that had the biggest shortage were *Moderately Experienced* skilled workers. The following provides the comments offered to explain the noted large gaps:

- *Shortage of skilled marine welders, pipefitters, blasters and painters.*
- *Need vocational training starting at the High School level.*

86% of respondents indicated they would be interested in participating in a future partnership/alliance with stakeholders representing industry, government, and academia within

[9] HDE Website (http://defenseeconomy.hawaii.gov/)
[10] HDE Website (http://defenseeconomy.hawaii.gov/)

Hawaii to build the labor force related to *NAICS 336611: Ship Repairing & Building*, higher than the other two sectors.

According to the BLS OES data, the Top 3 occupations by total Hawaii employment include 1) ***Plumbers, Pipefitters, and Steamfitters***, 2) ***Welders, Cutters, Solderers, and Brazers*** and 3) ***Misc. Assemblers and Fabricators***. Most of the trades have relatively high median average salaries compared to the nation as a whole and very low location quotients (under-represented in the state economy compared to nationally). It is unclear if this is due to Hawaii's national ranking as a service-based economy as opposed to manufacturing, which would explain lower location quotients in these occupations, or if there is truly a skilled labor gap. Of particular interest is ***51-4121: Welders, Cutters, Solderers, and Brazers***, which has relatively high employment in the state, high median salary, but a very low location quotient. This occupation is typically associated with Ship Repair/Building within Hawaii.

Summary Recommendations

In this section we summarize HDE project team's recommendations for DBEDT to implement in a Phase III Action Plan. For the ***IT Services & Cybersecurity (NAICS 5415)*** focus area:

1. Partner with INNOVATE Hawaii (MEP) and support program to establish cybersecurity clinics and reviews for DoD small businesses.
2. Lead or support efforts to build a cybersecurity ecosystem within the state
3. Develop way forward to help local small businesses obtain sponsorship opportunities from DoD agencies or large primes to obtain facility clearances.
4. Increase access to in-demand cybersecurity training certifications for the local workforce.

For the ***Engineering Services (NAICS 541330)*** focus area, the team recommends no action at this time, given the relative health of this industry sector to the other two focus areas. In addition, industry indicated lower interest in participating in alliances or partnerships to grow the workforce. The team recommends continued monitoring of spending trends because it is a substantially large and important sector for the Hawaii economy.

Finally, for the ***Ship Building/Repairing (NAICS 336611)*** focus area, the team recommends:

5. Evaluate opportunities to expand the existing HCC apprenticeship program for contractors supporting defense-related ship repair or implementation of other alternative training programs.
6. Evaluate opportunities to offer vocational training at the High School level.

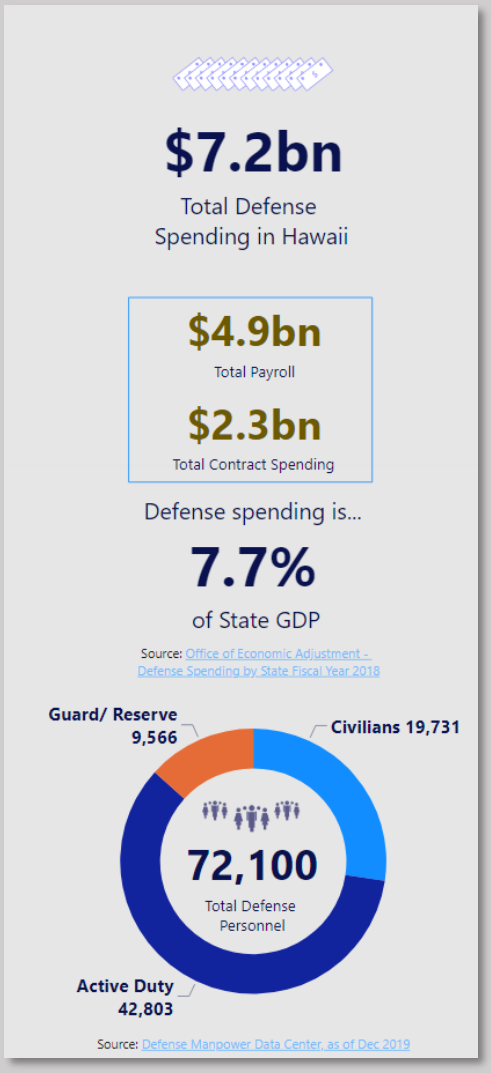
Section 1 – Hawaii Defense Economy (HDE) At-a-Glance

According to the Department of Defense (DoD) Office of Economic Adjustment (OEA) in its Fiscal Year 2018 state report, Hawaii is **ranked *#2*** in state defense spending as a percentage of Gross Domestic Product (GDP) at ***7.7%***, just behind the Commonwealth of Virginia at 10.3%.[11]

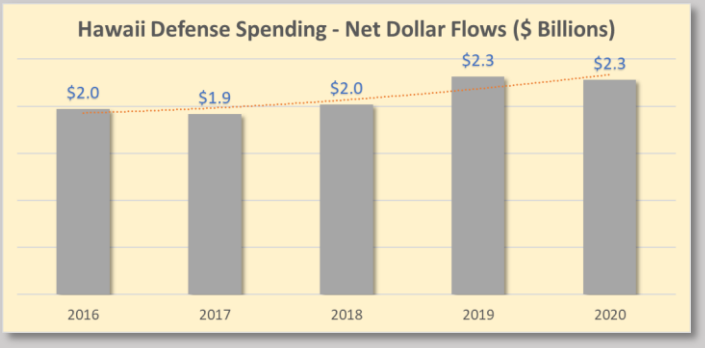
In addition to its strategic importance, Hawaii's relationship with the military is a vital part of the state's economy. From jobs for civilians and contracts for local businesses, to spending by active duty military personnel deployed in Hawaii and their families, the defense industry is a critical sector of Hawaii's economy, second only to Tourism. OEA estimated total defense-related payroll and contract spending accounted for ***$7.2B*** in FY 2018.

Hawaii is home to a significant number of military personnel and their families. With all branches of the military represented in the state, active duty service members, defense civilians, military dependents and veterans are all a critical part of the many communities across the Hawaiian Islands. Total defense related **payroll** accounted for the largest component of total defense spending in Hawaii at ***$4.9B***, **ranking *#9*** among the 50 states. Total defense personnel in 2020 is estimated to be ***71,604***, including 42.4K active duty, 19.6K DoD civilians, and 9.6K guard/ reserve personnel.[12]

Hawaii is home to all branches of the U.S. armed forces, including U.S. Army, U.S. Marine Corps, U.S. Navy, U.S. Air Force, U.S. Coast Guard, and U.S. Space Command. The Army National Guard and the Air National Guard are reserve components of their services and operate in part under state authority. The Department of the Navy is the largest contracting entity in Hawaii, followed by the Department of the Army and Air Force in second and third place, respectively. With total **contract awards** accounting for ***$2.3B***[13], any changes in DoD spending will have a significant impact on the state's economy. It is critical that the state be proactive to ensure Hawaii's economy is resilient to any potential changes in defense spending.



Hawaii has long been recognized for its strategic importance and unique relationship with the military. The military is present in all four counties across the state. Hawaii's strategic importance is as important now as it has ever been with continued threats and instability in the Asia-Pacific region, home to more than 50% of the world's population, several of the world's largest militaries, and two of the three largest economies in the world. China poses a major challenge to the U.S. military's ability to achieve and maintain wartime control of blue-water ocean areas. In addition, North Korea continues to test ballistic missiles that can reach our allies and the U.S. The U.S. Indo-Pacific Command (USINDOPACOM), having an area of responsibility encompassing nearly half of the earth's surface and headquartered in Honolulu, along with other strategic and important commands, facilities and bases in the state, clearly make Hawaii vital to US interests in the region.



[11] https://oea.gov
[12] Defense Manpower Data Center, December 2019
[13] The HDE Project Team utilized a rolling 12-month spending analysis to allow comparison across annual periods; 2020 includes a portion of calendar year 2019 awards.

HDE Phase II Objectives

Objective 1: Develop a comprehensive analysis of strengths, weaknesses, and potential opportunities and threats (SWOT) for key industries that play or could play a major role in Hawaii's defense economy. A current and more in-depth analysis will help to identify military defense sectors and other industries most vulnerable to economic downturns or changes in DoD spending. It will also determine prospective areas to transition capacity and services in the private sector to support the military industry and sustain the local economy.

Note: The three military defense sectors identified as critical and opportunistic during the Phase I research and analysis process included ship repair, cybersecurity and missile defense. Conducting a more comprehensive SWOT analysis through further research, surveys and/or interviews will help the State and OEA confirm whether these or other sectors should be prioritized in the follow up action plan.

Objective 2: Identify and prioritize potential areas for economic adjustment and growth and develop a detailed action plan and Scope of Work that will strengthen Hawaii's ability to provide services and commodities to the defense industry and prepare for any potential changes to defense contracts.

In the subsequent report sections, the HDE project team has provided various insights from defense spending, using various reports provided in the newly updated HDE website (www.defenseeconomy.hawaii.gov), a SWOT survey and analysis of defense contractors located in Hawaii, three industry sector workforce surveys and analyses, and various other relevant reports and data sources.

USMC Sniper Team Photo– Marine scout snipers with Weapons Company, 2nd Battalion, 3rd Marine Regiment, conduct high angle shooting on Range 10. The training was different from their typical flat level or slight elevation ranges. The high angle is considered anything 30 degrees or greater. Photo By: Sgt. Sarah Dietz.

Section 2 – HDE SWOT Survey & Analysis

The HDE project team conducted a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis using an online survey deployed in February 2020 to 507 contractors located in Hawaii, including prime contractors and reported subcontractors.[14] The survey received 107 responses (**21%** response rate) from a wide range of industries.[15] The following provides a break-down of the majority of responses:

- **89%** Small business
- **84%** Service providers
- **77%** had DoD business in Hawaii for 10+ years
- **65%** Prime contractors

The survey included questions (*Strongly Disagree to Strongly Agree on a 1-5 scale*) that evaluated the respondent's *internal* strengths and weaknesses along the dimensions of Financial Health, Market Flexibility, DoD Dependency, and Workforce Outlook.

Internal Factors	
Financial Health	Assessment of HDE firms' overall financial outlook
Market Flexibility	Assessment of HDE firms' abilities to serve a variety of markets (to include commercial markets)
DoD Dependency	Measure of the extent to which firms are reliant on DoD business to operate profitably
Workforce Outlook	Assessment of the current and future stability of HDE firms' skilled and unskilled labor

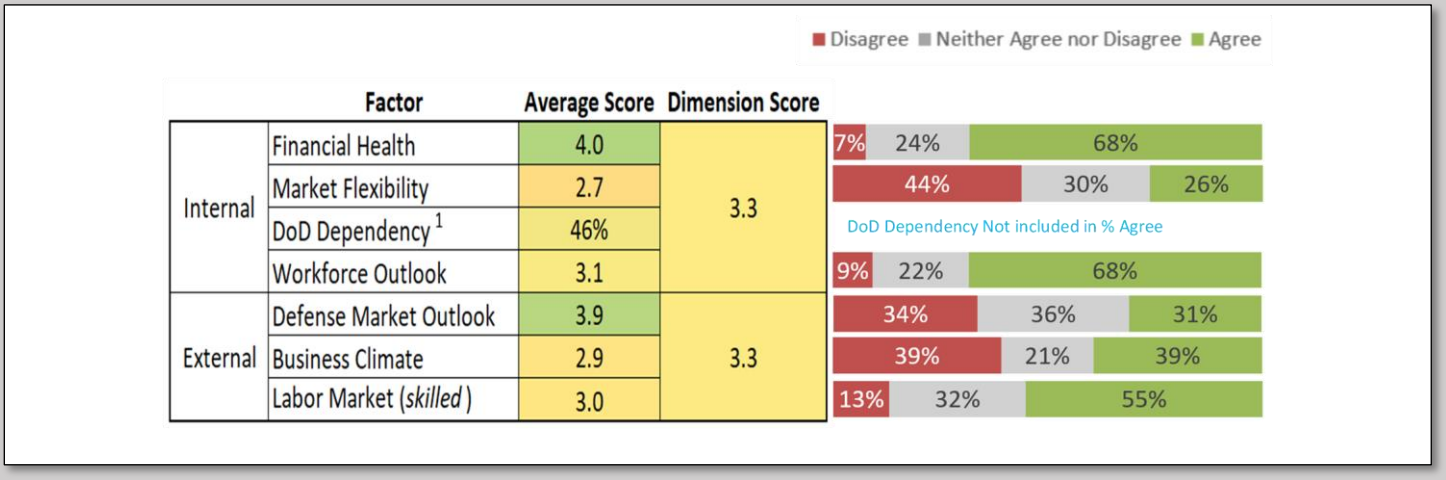
[14] Survey distributed Feb. 18, 2020 to 507 organizations physically located in Hawaii with DoD related contracts >$25K over most recent 2-year period.
[15] The survey received relatively low representation from the Ship Repair (336611) industry. Although this industry segment has significant annual awards, the dollars are concentrated on a small number of contractors.

Similarly, the survey also evaluated the respondent's *external* opportunities and threats, including Defense Market Outlook, Competitive Environment, and Labor Market.

External Factors	
Defense Market Outlook	Assessment of the growth potential of the markets which HDE firms currently serve or have the potential to serve
Business Climate	Assessment of Hawaii's business environment compared to other states/locations
Labor Market	Assessment of the Hawaii labor pool's ability to meet the current and future needs of HDE firms

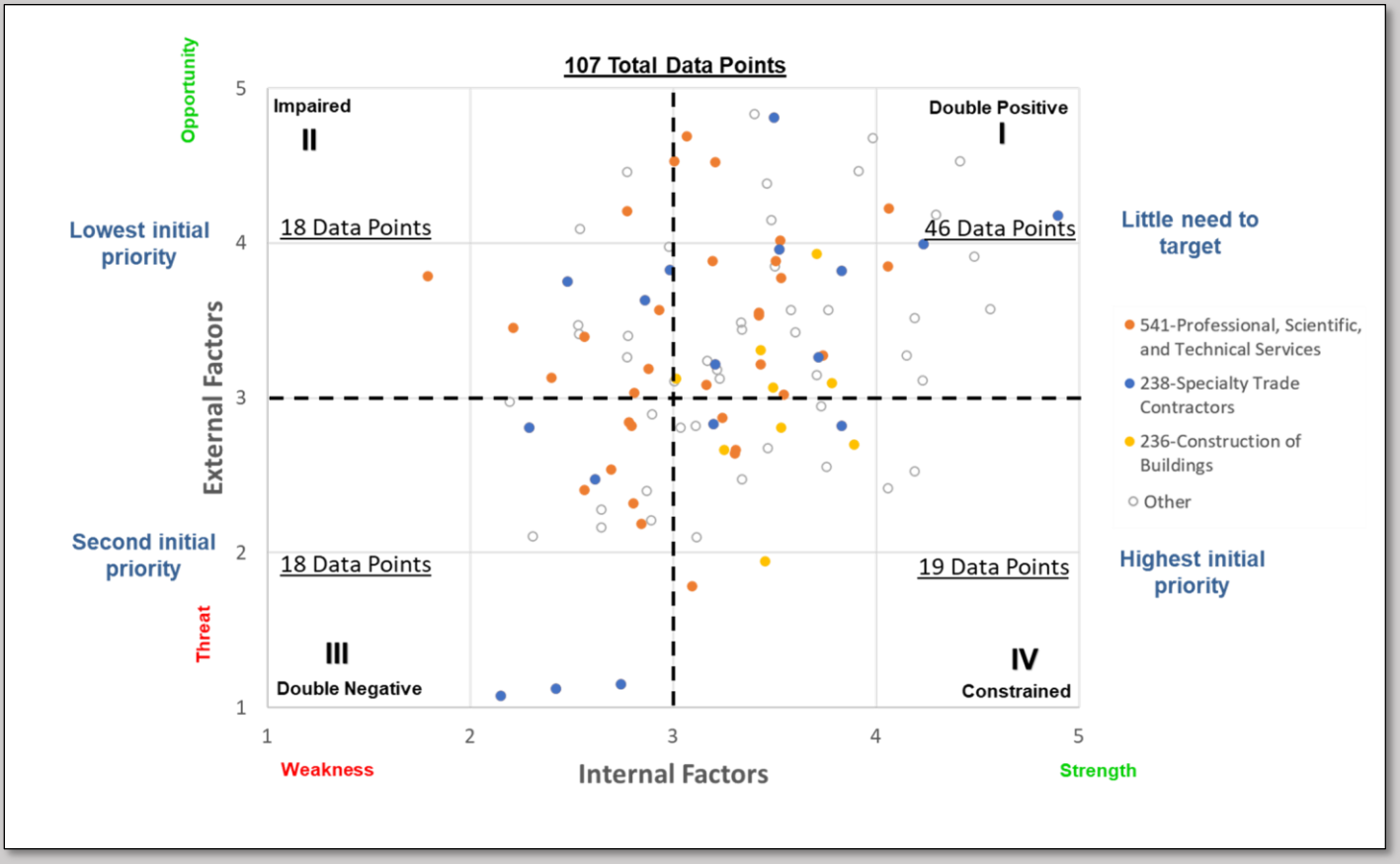
Special care was taken to develop a survey instrument that could be completed quickly with little burden placed on the respondent, while ensuring feedback could be obtained along each factor and dimension.

Financial Health (*4.0 avg./ 68% Agree*) and ***Defense Market Outlook*** (*3.9 avg./ 68% Agree*) received the highest ratings in terms of average score and also percent of agree (*Agree and Strongly Agree responses*), indicating the defense market has been financially rewarding to contractors and is expected to continue with more opportunities in the future. On the other hand, ***Market Flexibility*** (*2.7 avg./ 26% Agree*) received the lowest rating, indicating it is difficult for defense firms to serve both public and private (commercial) markets. Overall DoD dependency is moderately high at an average of 46% across the firms surveyed.



	Factor	Average Score	Dimension Score	Disagree	Neither Agree nor Disagree	Agree
Internal	Financial Health	4.0	3.3	7%	24%	68%
	Market Flexibility	2.7		44%	30%	26%
	DoD Dependency [1]	46%				
	Workforce Outlook	3.1		9%	22%	68%
External	Defense Market Outlook	3.9	3.3	34%	36%	31%
	Business Climate	2.9		39%	21%	39%
	Labor Market (*skilled*)	3.0		13%	32%	55%

The following scatter plot chart shows the 107 responses plotted on a SWOT quadrant chart. The majority of responses (46) fall in Quadrant I (Double Positive), which demonstrates an overall healthy defense market in terms of internal and external SWOT factors. The colored respondent points reflect the Top 3 three-digit NAICS that responded to the survey – *541: Professional, Scientific, and Technical Services*; *238: Specialty Trade Contractors*; and *236: Construction of Buildings*. Each industry appears to be well represented in Quadrant I.



The following heat map provides a cross-tab view of the same Top 3 three-digit NAICS. NAICS 541 received the most responses at 34. This cross-tab heat map shows considerable differences among respondents – NAICS 236 has overall higher internal and external factor and dimension percentages of agree *(% that indicated Agree and Strongly Agree*) at 75% versus 42% for NAICS 541 and 238. Although NAICS 236 has higher DoD/ Federal percentage of sales (DoD dependency), it appears to have more resiliency than the others with higher percentages of favorable agreement in each dimension – both strengths and opportunities.[16] NAICS 238 respondents indicated a challenging ***Workforce Outlook*** (*skilled labor retention*), a weakness, while the majority of NAICS 541 respondents agree that the ***Business Climate*** and ***Labor Market*** (*Skilled Labor Availability*) are significant challenges, both threats to these two industry sectors.

	Factor	3-Digit NAICS (top 3)			Overall Average
		541-Professional, Scientific, and Technical Services	238-Specialty Trade Contractors	236-Construction of Buildings	
Internal	Financial Health	76%	59%	100%	68%
	Market Flexibility	12%	12%	44%	26%
	DoD Dependency	50%	53%	72%	46%
	Workforce Outlook	41%	29%	89%	44%
External	Defense Market Outlook	71%	65%	100%	68%
	Business Climate	18%	29%	56%	31%
	Labor Market (*skilled*)	26%	47%	67%	39%
	Overall Average	**42%**	**42%**	**75%**	**46%**
	Number of Respondents	**34**	**17**	**9**	**107**

[16] Note: Only 9 responses were received for NAICS 236, so the insights are not statistically representative, but rather more feedback oriented.

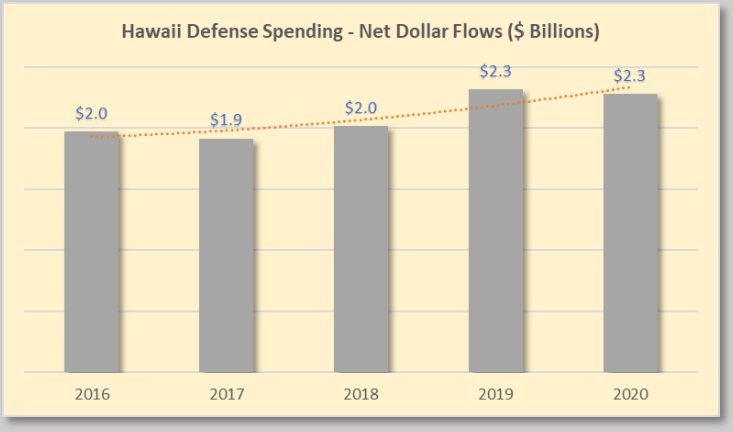
The crew of the Virginia-class fast-attack submarine USS Mississippi (SSN 782) returns to Joint Base Pearl Harbor-Hickam following a six-month Western Pacific deployment, March 30, 2018. Photo By: Petty Officer 2nd Class Michael.

Section 3 – Defense Sector Analysis

The HDE Phase I research and analysis process identified Ship Repair, Cybersecurity and Missile Defense as critical and opportunistic industry sectors. This section provides analysis and recommendations on overall critical defense sectors in Hawaii. Defense-related contract awards in Hawaii have risen over the last 5 years, approaching **$2.3B** in 2020, down slightly from the prior year, and representing a $300M gain since 2016.

Net dollar flows entering Hawaii from contract awards support approximately **30K** jobs and contribute **$4.2B** in Economic Impact to the economy.[17]

Over the last 12 months, *NAICS 23: Construction* accounted for the largest industry sector (2-digit NAICS) with $719.6M in net dollar flows, followed closely by *54: Professional Services* at



[17] HDE Website (http://defenseeconomy.hawaii.gov/)

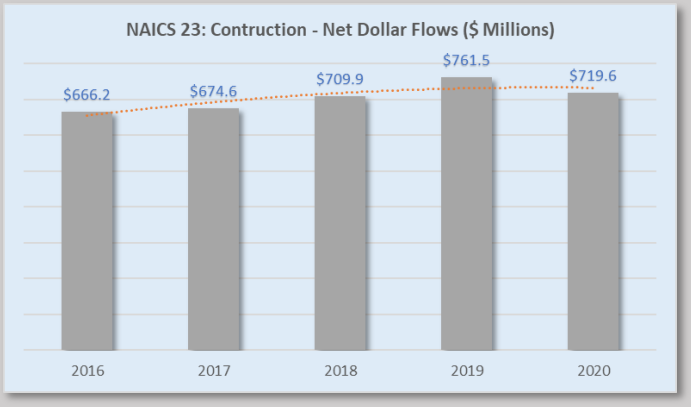
$621.8M. *NAICS 33: Manufacturing* held third place with $286.6M. Together, these Top 3 industry sectors support over 20K jobs in Hawaii.

NAICS	Net Dollar Flows	Net Jobs
23: Construction	$719,645,066	9,313
54: Professional Services	$621,811,921	9,356
33: Manufacturing	$286,177,151	2,647
56: Administrative & Support	$226,561,752	4,383
48: Transportation & Warehousing	$129,536,449	1,289
51: Information	$54,142,700	411
31: Manufacturing	$31,070,522	291
22: Utilities	$30,627,357	165

Within ***NAICS 23: Construction*** spending is concentrated most heavily (60%) in NAICS 236220: *Commercial and Institutional Building Construction*, followed by NAICS 237110: *Water and Sewer Line and Related Structures Construction*. Industry responses within the 2020 HDE SWOT survey indicated that this industry sector is more resilient in its ability to move back and forth between the defense and private sectors.

NAICS	Net Dollar Flows	Net Jobs
236220: Commercial and Institutional Building Construction	$430,841,331	5,575
237110: Water and Sewer Line	$120,298,433	1,557
237310: Highway, Street, and Bridge Construction	$47,847,941	619
237130: Power and Communication Line	$40,165,174	520
237120: Oil and Gas Pipeline	$30,926,420	400

Although 2020 was a slightly lower year than the previous one, spending in NAICS 23: Construction has been relatively stable over the last 5 years.



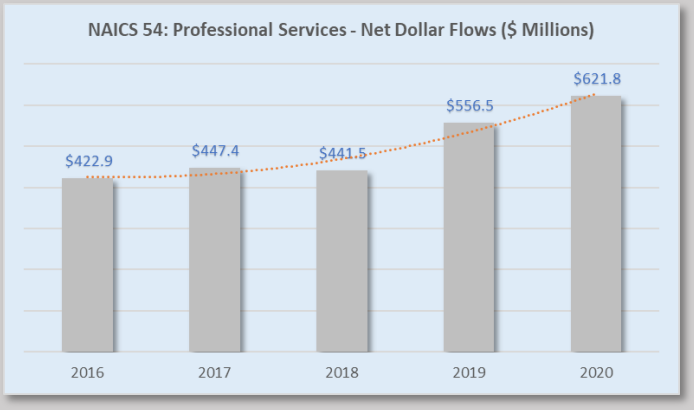
Within ***NAICS 54: Professional Services*** spending is concentrated most heavily (47%) in NAICS 541330: *Engineering Services*. If NAICS 541712 and 541715 (R&D classifications) were combined, they would take the #2 ranking in spending behind Engineering Services at $128.3M. NAICS 541512 and 541519 (*Computer Systems Design and Related Services and Other Computer Related Services*) take the actual 2nd and 5th spot in spending. Overall, NAICS 5415 accounted for $128M in 2020.

NAICS	Net Dollar Flows	Net Jobs
541330: Engineering Services	$293,623,577	4,490
541512: Computer Systems Design Services	$65,531,282	972
541712: R&D in the Physical, Engineering, and Life Sciences	$62,842,292	1,002
541715: R&D in the Physical, Engineering, and Life Sciences	$29,218,455	961
541519: Other Computer Related Services	$26,060,191	447

Missile Defense and Cybersecurity, and to some extent Ship Repair (Engineers) are aligned well to *NAICS 54: Professional Services* and the Hawaii Defense Economy. Missile Defense supports a number of occupations within *NAICS 541330: Engineering Services*, but also facility-related construction. Since Missile Defense spending comes from multiple DoD agencies, e.g. U.S. Navy for the Pacific Missile Range Facility (PMRF) in Kauai versus more limited outlays from the Missile Defense Agency (MDA), it is difficult to track this particular sub-sector of the economy. *NAICS 541330: Engineering Services* is an easier industry sector to monitor, and is more inclusive of other important, higher paying occupations within the state. ***The HDE project team recommends adjusting the focus area from Missile Defense to NAICS 541330: Engineering Services.***

Cybersecurity fits very well within *NAICS 5415: Computer Systems Design and Related Services*, but there are many other IT services that are also included, making it difficult to associate defense spending to this specific sub-sector. Outside of the Hawaii Defense Economy, Cybersecurity also supports jobs across multiple industries located in the state, including finance/ banking, transportation/ shipping, tourism etc., beyond just professional services. Given the size of defense spending within NAICS 5415, its relatively high paying occupations and positive job growth outlook, and the DoD mandates for cybersecurity, ***the HDE project team recommends adjusting this focus area to include not only cybersecurity specifically, but also other IT occupations within NAICS 5415: Computer Systems Design and Related Services***.

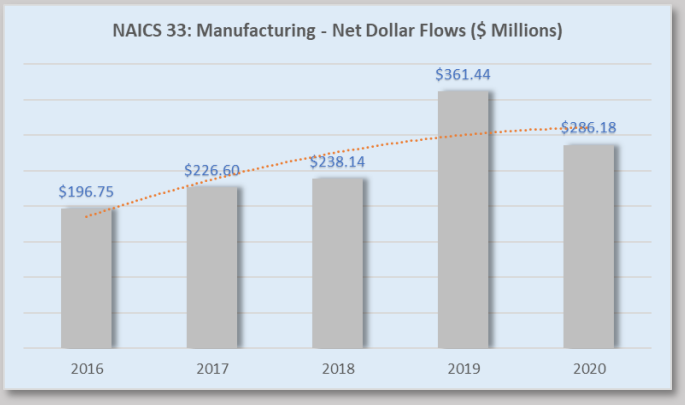
NAICS 54 has experienced significant growth each year with a gain of almost $200M (50%) since 2016.



Within ***NAICS 33: Manufacturing*** spending is concentrated most heavily (62%) in NAICS 336611: *Ship Building and Repairing*. This sector still remains an important part of the Hawaii Defense Economy and can be readily tracked at the 6-digit NAICS level with most of the spending concentrated at the Pearl Harbor Naval Shipyard (PHNSY).

NAICS	Net Dollar Flows	Net Jobs
336611: Ship Building and Repairing	$177,018,523	1,820
334511: Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	$24,706,814	200
334111: Electronic Computer Manufacturing	$20,819,758	288
339113: Surgical Appliance and Supplies Manufacturing	$7,464,159	66
334220: Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	$6,785,499	49

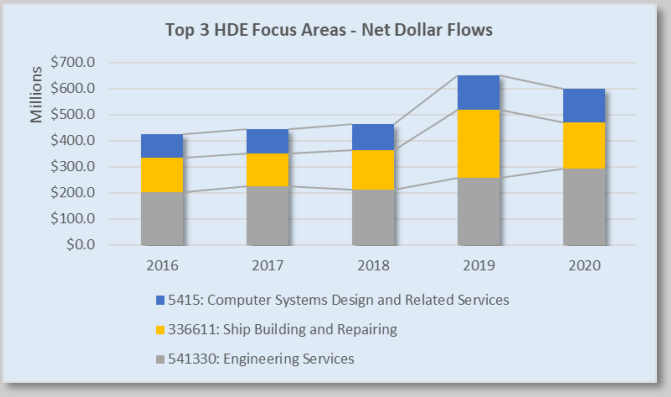
NAICS 33 has also experienced significant growth especially in 2019 the highest year of spending since 2016. 2020 is down somewhat from 2019, but overall higher than 2016 – 2018.



After making the focus area adjustments within *NAICS 54: Professional Services*, the Top 3 HDE Focus Areas are:

- 541330: Engineering Services,
- 336611: Ship Building and Repairing, and
- 5415: Computer Systems Design and Related Services

These areas show sizeable spending and high growth rates.

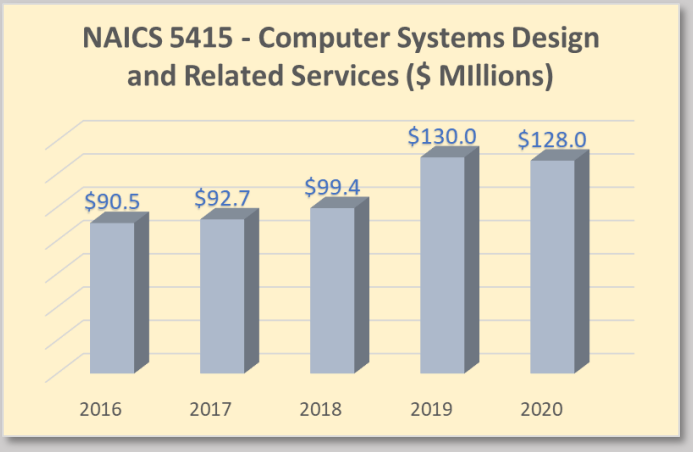


HONOLULU, Hawaii - Eight U.S. Air Force F-22 Raptors, a KC-135 Stratotanker and a C-17 Globemaster III taxi on the runway during a routine training schedule April 21, 2020, at Honolulu International Airport, Hawaii. Given the low traffic at the airport due to COVID-19 mitigation efforts, the active-duty 15th Wing and the Hawaii Air National Guard's 154th Wing seized an opportunity to document the operation which showcases readiness and their unique Total Force Integration construct. The units of Team Hickam work together seamlessly to deliver combat airpower, tanker fuel, and humanitarian support and disaster relief across the Indo-Pacific. Photo By: Senior Airman John Linzmeier.

Section 4 – IT Services & Cybersecurity (NAICS 5415)

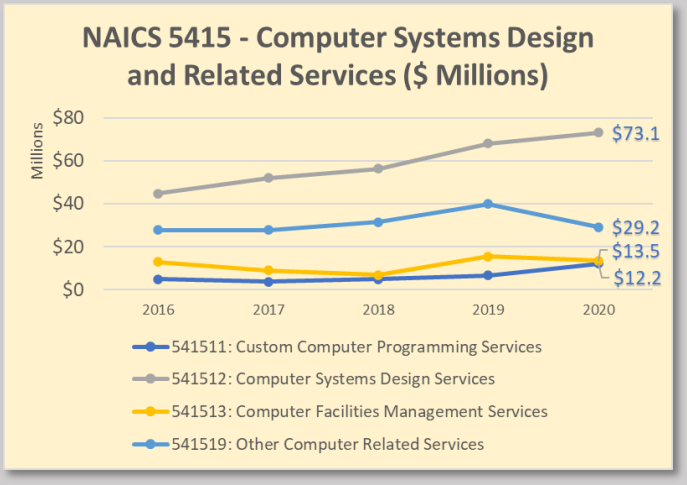
The HDE Phase I research and analysis process identified Cybersecurity as a critical and opportunistic industry sector. Defense-related contract awards in Hawaii have risen over the last 5 years, approaching **$128M** in 2020, approximately equal to the prior year.

Net dollar flows entering Hawaii from contract awards support approximately **1,700** jobs in *NAICS 5415: Computer Systems Design and Related Services* and contribute **$240M** in Economic Impact to the economy.[18]

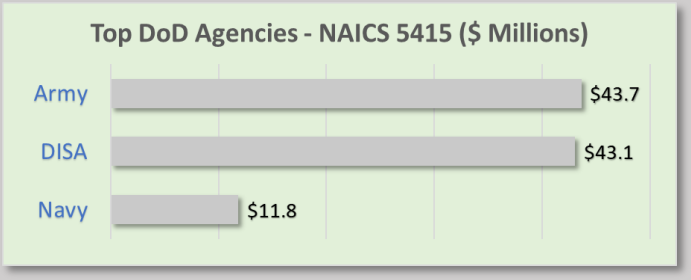


[18] HDE Website (http://defenseeconomy.hawaii.gov/)

NAICS 541512: Computer Systems Design Services is the largest 6-digit NAICS of spending with **$73M** in 2020 and 5-year growth rate of **10.3%**.



The Army accounted for the largest spend in 2020 in NAICS 5415 at $43.7M, followed closely by the Defense Information Systems Agency (DISA) at $43M.



Johnson Controls Building Automation Systems, LLC received the highest award amount in 2020, likely related to military construction work (NAICS 23) in Hawaii, the single largest industry sector with spending totaling $833M. Headquartered in Hawaii, Kaihonua LLC is an SBA Certified Native Hawaiian Organization 8(a) Small Business specializing in global information technology, including cybersecurity.

Over the last 12 months, Hawaii has been a beneficiary of "*Leakage*" from other states, as approximately $2.5M in net contract awards flowed into Hawaii over the last 12 months for NAICS 5415 from Virginia.

In addition to its high annual spending and fast growth rate, new DoD mandates highlight the continued importance of cybersecurity. The threats facing DoD's unclassified information have dramatically increased as the department is relying on external service providers to help carry out a wide range of missions and business functions using information systems. Many contractors process, store, and transmit sensitive federal information to support the delivery of products and services, e.g. providing financial services; providing web and electronic mail services; processing security clearances or healthcare data; providing cloud services; and developing communications, satellite, and weapons systems. The protection of Controlled Unclassified Information (CUI) residing in contractor systems (non-federal organizations) is of paramount importance to federal agencies and can directly impact the ability of the federal government to successfully conduct its essential missions and functions.

Defense Federal Acquisition Regulation Supplement (DFARS) Clause 252.204-7012 requires DoD contractors, including small businesses, to provide adequate security to safeguard covered defense information that resides in or transits through their internal unclassified information systems from unauthorized access and disclosure. National Institute of Standards and Technology (NIST) publication SP 800-171 focuses on protecting the confidentiality of CUI in non-federal systems and organizations, and recommends specific security requirements to achieve that objective. Although these requirements may initially seem overwhelming, small businesses can use this framework to divide the project into

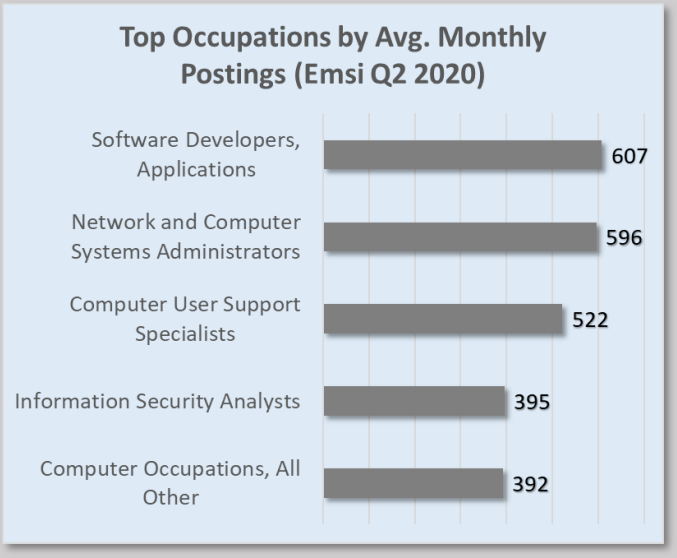
small, manageable segments and work toward attaining compliance.

Small manufacturers are often seen as an easy entry point into larger businesses and government agencies. With limited resources and budgets, small manufacturers need cybersecurity guidance, solutions, and training that is practical, actionable, cost-effective and helps manage their cybersecurity risks.

DoD's Cybersecurity Maturity Model Certification (CMMC) program is a new set of cybersecurity standards to protect defense companies from cyberattacks. ***The CMMC program will require certification for all companies doing business or who want to do business with DoD***. Certified Third-Party Assessment Organizations (C3PAO) will certify companies against the different CMMC standards/levels. All companies on contract with the DoD will need at least CMMC Level 1 certification.

Defense agency spending in NAICS 5415 only tells part of the story of its economic contributions within Hawaii. IT Services within the private sector is also growing, particularly in the cybersecurity area. The Bureau of Labor Statistics (BLS) identified ***Information Security Analysts*** (15-1122) as the Top 6th fastest growing jobs in the U.S. at 32% from 2018-2028 (projected).[19] Although there is not a NAICS code specifically for cybersecurity, it is an important occupation within NAICS 5415 and across the broader economy. Information Security Analysts are high paying occupations with a 2019 median pay of $99,730 per year in the U.S.[20] However, in Hawaii the median pay is only $90,100, approximately $10K lower, although the cost of living is higher.[21] Hawaii's location quotient for this occupation is 0.63, suggesting it is under-represented among other occupations.[22] For perspective, Virginia, DC, and Maryland have the highest location quotients and combined are an important DoD/ intelligence regional hub, which is something Hawaii could aspire to achieve – through workforce development programs, such as Cyber Hawaii. Cyber Hawaii's mission is to develop and accelerate educational opportunities from K-12 into higher education and ensure students are job ready upon graduation and successful in securing cybersecurity jobs in Hawaii.

In May 2020, the University of Hawaii Community Colleges published a report on Job Posting Analytics using Emsi's Q2 2020 Data Set, which provides a wider view of IT related jobs beyond just the public sector. According to the report, median advertised salary was $70K. Software Developers, Applications held the top spot for the most monthly postings in Hawaii with Information Security Analysts at the Top 4 ranking.



Job postings in Hawaii required Top Secret-Sensitive Compartmented Information (TS/SCI) clearances more often than the rest of the workforce at 12% versus 2%, reflecting the substantial presence of DoD-related work. These clearances are difficult to obtain and represent a barrier to entry to skilled IT resources looking to make a transition to DoD contracts. Similarly, Cybersecurity skills were required at a frequency of 7% versus 1% nationally.[23] Several Information Assurance/ Security industry qualifications were frequently required the most above all others in job postings:

- CompTIA Security+[24] at 1,112 postings.
- IAT Level II Certification[25] at 1,004 postings.

[19] https://www.bls.gov/ooh/computer-and-information-technology/information-security-analysts.html
[20] Ibid
[21] BLS Occupational Employment Statistics (OES) for SOC 15-1212 (Information Security Analyst).
[22] BLS OES. Location quotient represents ratio of an occupation's share of employment in a given area to that occupation's share of employment in the U.S. as a whole.
[23] Top Hard Skills; Emsi Q2 2020 Data Set | www.economicmodeling.com
[24] CompTIA Security+ is a global certification that validates the baseline skills you need to perform core security functions and pursue an IT security career. Security+ focuses on the latest trends and techniques in risk management, risk mitigation, threat management and intrusion detection. https://www.comptia.org/certifications/security.
[25] Information Assurance Technical (IAT) Level II; DoD approved IA baseline certifications aligned to each category and level of the IA Workforce IAW DoD 8570.01-Manual. Personnel performing IA functions must obtain one of the certifications required for their position, category/specialty and level to fulfill the IA baseline certification requirement. Most IA levels within a category or specialty have more than one approved certification and a certification may apply to more than one level. https://public.cyber.mil/cw/cwmp/dod-approved-8570-baseline-certifications/.

- Certified Information Systems Security Professional[26] at 582 postings.

The HDE project team developed and conducted an industry sector occupational gap analysis survey of Hawaii-based companies with a primary NAICS listed in SAM.gov of 5145.[27]

The respondents predominantly employ Hawaii-based residents – the workforce of 73% of the respondents consists of 75% or more Hawaii residents. The following table shows the number of respondents indicating a slight, moderate or large gap between skilled labor needs and the labor pool of current Hawaiian residents.

Standard Occupational Classification (SOC) codes	Not applicable	Slight gap	Moderate gap	Large gap	Total Answered
15-1211: **Computer Systems Analysts (Computer/Business System Analysts)**	4	11	10	5	30
15-1212: **Information Security Analysts (Cybersecurity Analysts)**	4	5	10	11	30
15-1221: **Computer and Information Research Scientists (Data Scientist)**	9	2	7	12	30
15-1231: **Computer Network Support Specialists**	7	13	7	3	30
15-1232: **Computer User Support Specialists (Help Desk Technicians)**	6	18	4	2	30
15-1241: **Computer Network Architects**	7	7	6	10	30
15-1244: **Network and Computer Systems Administrators**	7	11	9	3	30
15-1245: **Database Administrators and Architects**	7	8	5	10	30
15-1251: **Computer Programmers**	5	8	10	7	30
15-1257: **Web Developers and Digital Interface Designers**	5	9	10	6	30
15-1299: **Computer Occupations, All Other**	8	13	6	3	30

The survey revealed gaps for the following IT occupations:

Large Gaps:

- 15-1221: Computer and Information Research Scientists[28] (*Data Scientists*); ***12*** responses.
- 15-1212: Information Security Analysts[29]; ***11*** responses.

Slight Gaps:

- 15-1232: Computer User Support Specialists[30] (*Help Desk Technicians*); ***18*** responses.
- 15-1231: Computer Network Support Specialists[31]; ***13*** responses.

The gaps were noted most heavily in the *Moderately* to *Highly* experienced job levels, not entry level. Anecdotally, several respondents echoed 1) the salary gap between technology professionals in Hawaii versus counterparts on the mainland, and 2) difficulty finding security (SECRET, TOP SECRET) cleared candidates to fill security sensitive computer systems-related positions. ***70%*** of respondents indicated they would be interested in participating in a future partnership/alliance with stakeholders representing industry, government, and academia within Hawaii to build the labor force related to Computer Systems Design and Related Services (NAICS 5415).

The following table provides the total employment, location quotient and median annual salary data for IT Services-related occupations from the Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES).[32]

[26] CISSP is an independent information security certification granted by the International Information System Security Certification Consortium, also known as (ISC)2. https://www.isc2.org/Certifications/CISSP.
[27] Survey sent to 90 organizations listed in SAM.gov with primary NAICS = "5415XX" and physical location state = "HI". 37 responses received for an estimated 41% response rate. Note: Very few companies surveyed had DoD contract awards (17 organizations).
[28] https://www.bls.gov/oes/current/oes151221.htm
[29] https://www.bls.gov/oes/current/oes151212.htm
[30] https://www.bls.gov/oes/current/oes151232.htm
[31] https://www.bls.gov/oes/current/oes151231.htm
[32] May 2019 data from https://www.bls.gov/oes/

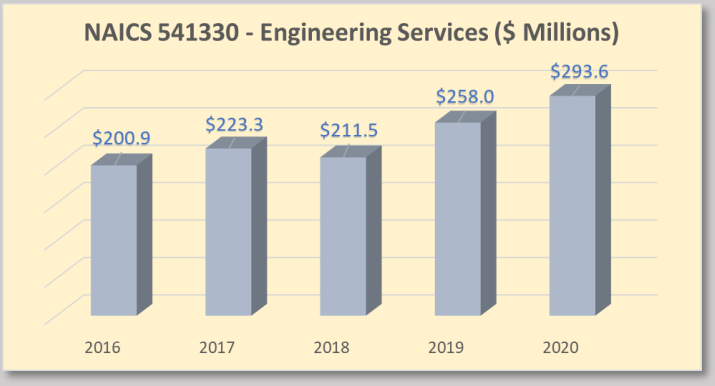
OCC	OCC Name	Location Quotient	Median Hawaii Salary	National Median Salary	Salary Index	Employment
15-1256	Software Developers & QA Analysts/Testers	0.31	$90,840	$107,510	0.84	1880
15-1211	Computer Systems Analysts	0.70	$76,600	$90,920	0.84	1780
15-1299	Computer Occupations, All Other	1.00	$91,020	$88,550	1.03	1700
15-1244	Network/Computer Systems Administrators	0.82	$81,030	$83,510	0.97	1260
15-1232	Computer User Support Specialists	0.41	$48,280	$52,270	0.92	1150
15-1231	Computer Network Support Specialists	1.05	$62,990	$63,460	0.99	840
15-1251	Computer Programmers	0.54	$84,600	$86,550	0.98	470
15-1241	Computer Network Architects	0.64	$96,210	$112,690	0.85	420
15-1212	Information Security Analysts	0.63	$90,100	$99,730	0.90	340
15-1245	Database Administrators and Architects	0.57	$94,050	$93,750	1.00	310
15-1257	Web Developers/Digital Interface Designers	0.46	$62,630	$73,760	0.85	300
15-1221	Computer/Information Research Scientists	0.60	*	$122,840		80

When sorted by total Hawaii employment (*largest to smallest*), the Top 3 occupations include 1) ***Software Developers & QA***, 2) ***Computer Systems Analysts*** and 3) ***Computer Occupations, Other***. Four out of the Top 5 have both low location quotients (under-represented in the state economy compared to nationally) and noticeably lower median salaries as compared to the median national salaries, as shown by a lower Salary Index. ***Software Developers & QA*** and ***Computer User Support Specialists*** (*Help Desk Techs.*) have significantly lower location quotients. The data suggests that the local economy may not be substantially diverse enough to provide the demand needed to increase both median salaries and the location quotients closer to national levels.

A common hypersonic glide body (C-HGB) launches from Pacific Missile Range Facility, Kauai, Hawaii, at approximately 10:30 p.m. local time, March 19, 2020, during a Department of Defense flight experiment. The U.S. Navy and U.S. Army jointly executed the launch of the C-HGB, which flew at hypersonic speed to a designated impact point. Concurrently, the Missile Defense Agency (MDA) monitored and gathered tracking data from the flight experiment that will inform its ongoing development of systems designed to defend against adversary hypersonic weapons. Information gathered from this and future experiments will further inform DOD's hypersonic technology development. The department is working in collaboration with industry and academia to field hypersonic warfighting capabilities in the early- to mid-2020s. Photo By: U.S. Navy.

Section 5 – Engineering Services (NAICS 541330)

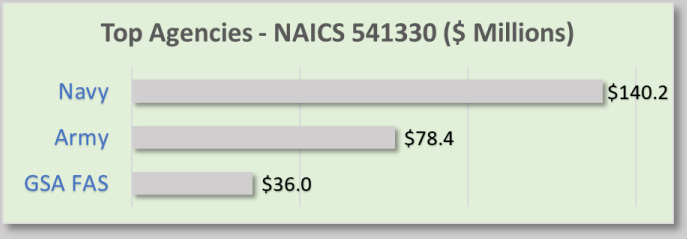
The HDE Phase I research and analysis process identified Missile Defense as a critical and opportunistic industry sector. This industry segment includes critical engineer and technician / technologist disciplines within NAICS 541330 Engineering Services[33]. Defense-related net dollar flows in Hawaii for this NAICS have risen over the last 5 years, approaching **$293M** in 2020, representing a substantially large sector in Hawaii.



Net dollar flows entering Hawaii from contract awards support approximately **4,490** jobs in NAICS 541330 – Engineering Services, and contribute **$569M** in Economic Impact to the economy.[34] The sector has a 5-year growth rate of **3.4%**.

[33] https://www.bls.gov/oes/2017/may/naics5_541330.htm
[34] HDE Website (http://defenseeconomy.hawaii.gov/)

The Navy accounted for the largest spend in 2020 in NAICS 541330 at $140.2M, followed by the U.S. Army at $78.4M.



AECOM Technical Services, Inc. had the highest net dollar flows at $28.9M, followed by HII Mission Driven Innovative Solutions (*a Division of Huntington Ingalls Industries - HII*) at $17M.

Approximately $11.8M in net contract awards flowed out of Hawaii over the last 12 months, commonly referred to as "*Leakage*". California was the largest recipient at 63.8%, attributed largely to Lockheed Martin Corporation subawards of $9M to PTSI Managed Services, Inc. for an Army prime contract.

The HDE project team developed and conducted an occupational gap analysis survey of Hawaii-based companies with a primary NAICS listed in SAM.gov of 541330.[35] The respondents predominantly employ Hawaii-based residents – 76% of their workforce is comprised of 90% or more Hawaii residents. The survey requested feedback on the local skilled labor pool for *Engineers* only, *Technicians* and *Technologists* only, or *Both* segments.

Standard Occupational Classification (SOC) codes	Not applicable	Slight gap	Moderate gap	Large gap	Total Answered
17-2011: **Aerospace Engineers**	21	1	1	0	23
17-2051: **Civil Engineers**	10	5	4	4	23
17-2061: **Computer Hardware Engineers**	18	2	1	2	23
17-2071: **Electrical Engineers**	12	2	5	4	23
17-2072: **Electronics Engineers, Except Computer**	21	0	1	1	23
17-2081: **Environmental Engineers**	18	2	3	0	23
17-2111: **Health and Safety Engineers, Except Mining Safety Engineers and Inspectors**	21	1	1	0	23
17-2112: **Industrial Engineers**	21	0	2	0	23
17-2121: **Marine Engineers and Naval Architects**	22	0	0	1	23
17-2141: **Mechanical Engineers**	15	2	4	2	23
17-2171: **Petroleum Engineers**	21	0	1	1	23
Other: **Any Engineering occupations not included in the categories provided.**	18	1	1	3	23

[35] Survey sent to 142 organizations listed in SAM.gov with primary NAICS = "541330" and physical location state = "HI"; other companies were added that had contract awards in NAICS 541330 that exceeded all other NAICS, although this NAICS was not listed as the organization's primary NAICS. 29 responses received for an estimated 20% response rate.

Overall, the survey revealed only slight and moderate gaps, indicating a relatively healthy industry sector in terms of needs versus the local skilled labor pool:

Moderate Gaps: 17-2071: Electrical Engineers; ***5*** responses.

Slight Gaps: 17-2051: Civil Engineers; ***5*** responses.

Similarly, even fewer gaps were noted in the technician and technologist trades, focused more on the Civil Engineering sector, a large component of defense spending.

Standard Occupational Classification (SOC) codes	Not applicable	Slight gap	Moderate gap	Large gap	Total Answered
17-3011: **Architectural and Civil Drafters**	7	5	2	2	16
17-3012: **Electrical and Electronics Drafters**	13	1	1	1	16
17-3013: **Mechanical Drafters**	12	2	1	1	16
17-3019: **Drafters, All Other**	11	2	1	2	16
17-3021: **Aerospace Engineering and Operations Technologists and Technicians**	16	0	0	0	16
17-3022: **Civil Engineering Technologists and Technicians**	5	6	4	1	16
17-3023: **Electrical and Electronic Engineering Technologists and Technicians**	11	1	2	2	16
17-3025: **Environmental Engineering Technologists and Technicians**	12	2	2	0	16
17-3031: **Surveying and Mapping Technicians**	12	1	3	0	16
17-3098: **Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other**	13	1	0	2	16
Other: **Any Technician/Technologist occupations not included in the categories provided.**	13	1	1	1	16

Slight Gaps:

- 17-3022: Civil Engineering Techs.; ***5*** responses.
- 17-3011: Architectural and Civil Drafters; ***5*** responses.

The gaps were noted most heavily in the *Moderately* to *Highly* experienced job levels, not entry level. Anecdotally, several respondents identified salary and rate restrictions in the public sector. ***62%*** of respondents indicated they would be interested in participating in a future partnership/alliance with stakeholders representing industry, government, and academia within Hawaii to build the labor force related to *NAICS 541330: Engineering Services*, slightly lower than for IT Services.

The following table provides the total employment, location quotient and median annual salary data for "*Engineer*" related occupations from the Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES).[36]

[36] May 2019 data from https://www.bls.gov/oes/

OCC	OCC Name	Location Quotient	Median Hawaii Salary	National Median Salary	Salary Index	Employment
17-2051	Civil	1.52	$83,270	$87,060	0.96	2050
17-2071	Electrical	1.23	$90,810	$98,530	0.92	990
17-2141	Mechanical	0.55	$78,310	$88,430	0.89	740
17-2199	All Other	0.91	$100,040	$99,040	1.01	600
17-2072	Electronics	0.81	$103,140	$105,570	0.98	450
17-2081	Environmental	0.88	$93,570	$88,860	1.05	200
17-2121	Marine and Naval Architects	1.91	$76,200	$92,400	0.82	90
17-2111	Health and Safety	0.75	$81,600	$91,410	0.89	80
17-2061	Computer Hardware	0.22	$116,430	$117,220	0.99	60
17-2112	Industrial	0.04	$93,160	$88,020	1.06	60
17-2011	Aerospace	0.12	$119,900	$116,500	1.03	30
17-2171	Petroleum	0.23	$119,580	$137,720	0.87	30

When sorted by total Hawaii employment (largest to smallest), the Top 3 occupations include 1) ***Civil***, 2) ***Electrical*** and 3) ***Mechanical Engineers***. The high employment and location quotient for Civil Engineers aligns well with the large defense construction spending in the state. All three have median average salaries that are lower than the median national salaries, as shown by a lower Salary Index. ***Marine and Naval Architects*** have a high location quotient or employment density in Hawaii; however, they have relatively low employment numbers (90) compared to other engineering occupations, as well as a lower median salary compared to the rest of the U.S.

The next table provides the total employment, location quotient and median annual salary data for "*Technologist and Technician*" related occupations.

OCC	OCC Name	Location Quotient	Median Hawaii Salary	National Median Salary	Salary Index	Employment
17-3023	Electrical/Electronic Engineering Techs.	1.22	$73,700	$65,260	1.13	650
17-3098	Calibration/Engineering Techs.	1.23	$75,420	$62,990	1.20	470
17-3011	Architectural and Civil Drafters	0.93	$53,610	$56,340	0.95	400
17-3022	Civil Engineering Techs.	0.56	$57,010	$53,410	1.07	170
17-3012	Electrical and Electronics Drafters	1.50	$59,940	$61,530	0.97	160
17-3031	Surveying and Mapping Techs.	0.54	$45,000	$45,010	1.00	120
17-3013	Mechanical Drafters	0.39	$63,530	$57,060	1.11	90
17-3021	Aerospace Engineering/Operations Techs.	1.39	$77,220	$66,020	1.17	70
17-3025	Environmental Engineering Techs.	0.87	$53,260	$50,620	1.05	70
17-3019	Drafters	0.53	$49,840	$52,830	0.94	30

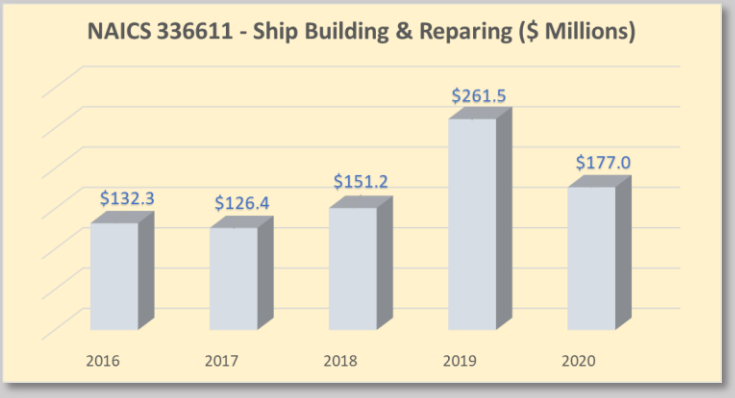
The Top 3 – 1) ***Electrical and Electronic Engineering Technicians***, 2) ***Calibration and Engineering Technicians***, and 3) ***Architectural and Civil Drafters*** – have the highest employment levels in the state. Compared to the "*Engineer*" occupations, these occupations have a higher median salary in Hawaii as compared to the rest of the U.S., as shown in the Salary Index. The data suggests that the demand and supply is relatively balanced within the engineering services sector.

An aerial view of ships moored at Joint Base Pearl Harbor-Hickam for Rim of the Pacific 2016. Twenty-six nations, more than 40 ships and submarines, more than 200 aircraft, and 25,000 personnel are participating in RIMPAC from June 30 to Aug. 4, in and around the Hawaiian Islands and Southern California. The world's largest international maritime exercise, RIMPAC provides a unique training opportunity that helps participants foster and sustain the cooperative relationships that are critical to ensuring the safety of sea lanes and security on the world's oceans. RIMPAC 2016 is the 25th exercise in the series that began in 1971. Photo By: Petty Officer 1st Class Ace Rheaume.

Section 6 – Ship Building/Repairing (NAICS 336611)

The HDE Phase I research and analysis process identified Ship Repair as a critical and opportunistic industry sector. This industry segment falls within *NAICS 336611: Ship Building and Repairing*. Defense-related net dollar flows in Hawaii have risen over the last 5 years, approaching **$177M** in 2020, down from the year before, which was substantially higher at $261.5M.

Net dollar flows entering Hawaii from contract awards support approximately **1,820** jobs, and contribute **$305.5M** in Economic Impact to the economy.[37] The sector has a 5-year growth rate of **33.9%**, factoring in relatively high spending in 2019.



[37] HDE Website (http://defenseeconomy.hawaii.gov/)

The Navy accounted for the largest spend in 2020 in NAICS 336611 at $172.7M, followed by the U.S. Army and Coast Guard at a much lower $2.6M and $1.6M respectively.

BAE Systems Hawaii Shipyards, Inc. had the highest net dollar flows at $41.9M, followed by Pacific Shipyards International, LLC at $39.9M.

Pearl Harbor shipyard jobs lost

The Associated Press, December 23rd, 2019

BAE Systems announced it will be departing the U.S. Navy's non-nuclear surface ship repair market in Pearl Harbor. The company has been serving as a prime contractor on a five-year multi-ship, multi-option contract since 2014 for modernization and maintenance on nine destroyers and cruisers at Pearl Harbor. Recently, the multi-ship, multi-option contracts using cost-reimbursement have been replaced nationally by a Navy strategy called "***multiple award contract-multi order***", which include firm-fixed-price contracts that do not allow adjustments for cost overruns. The change in contracting strategy is expected to increase awards to small businesses, while precluding large businesses from the smaller repair contracts. (article link)

Over the last 12 months, Hawaii has been a beneficiary of "*Leakage*" from other states, as approximately $1M in net contract awards flowed into Hawaii over the last 12 months for NAICS 336611.

The HDE project team developed and conducted a general workforce gap analysis survey of Hawaii-based companies with a primary NAICS listed in SAM.gov of 336611.[38] Due to the large number of occupational codes that relate to this industry sector, this survey only requested feedback in general on the perceived severity of any gaps between the organization's skilled labor needs and the availability of skilled Hawaii resident workers. 3 out of 7 (43%) noted no gaps, while the other 4 responses indicated moderate (2) and large gaps (2). For those that indicated moderate and large gaps, the experience level that had the biggest shortage were *Moderately Experienced* skilled workers. The following provides the comments offered to explain the noted gaps:

Large Gaps:

- *Shortage of skilled marine welders, pipefitters, blasters and painters.*
- *Need vocational training starting at the High School level.*

Moderate Gaps:

- *Though there are many insulators for commercial work there are very few that are competent for Marine insulation.*

86% of respondents (*6 out of 7*) indicated they would be interested in participating in a future partnership/alliance with stakeholders representing industry, government, and academia within Hawaii to build the labor force related to *NAICS 336611: Ship Repairing & Building*, higher than the other two sectors.

The following table provides the total employment, location quotient and median annual salary data for "*Ship Repair/Building*" related occupations from the Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES).[39] Some occupations, such as Electricians, are shared with construction trades and have been excluded.

[38] Survey sent to 21 organizations listed in SAM.gov with primary NAICS = "336611" or high spending within this NAICS, and physical location state = "HI". 7 responses received for an estimated 33% response rate. Note: Due to the limited population and response rate, the feedback is considered only to be informative, not statistically representative.

[39] May 2019 data from https://www.bls.gov/oes/

OCC	OCC Name	Location Quotient	Median Hawaii Salary	National Median Salary	Salary Index	Employment
47-2152	Plumbers, Pipefitters, and Steamfitters	1.07	$64,310	$55,160	1.17	2050
51-4121	Welders, Cutters, Solderers, and Brazers	0.30	$60,050	$42,490	1.41	530
51-2090	Miscellaneous Assemblers and Fabricators	0.08	$34,190	$32,350	1.06	450
51-4041	Machinists	0.17	$67,230	$44,420	1.51	280
51-9041	Extruding, Forming, Pressing, and Compacting Machine Operators	0.40	$26,060	$35,480	0.73	130
51-9124	Coating, Painting, and Spraying Machine Operators	0.21	$45,620	$38,150	1.20	130
51-4072	Molding, Coremaking, and Casting Machine Setters Operators	0.16	$63,790	$32,130	1.99	120
51-2041	Structural Metal Fabricators and Fitters	0.31	$47,090	$40,390	1.17	100

When sorted by total Hawaii employment (*largest to smallest*), the Top 3 occupations include 1) ***Plumbers, Pipefitters, and Steamfitters***, 2) ***Welders, Cutters, Solderers, and Brazers*** and 3) ***Misc. Assemblers and Fabricators***. All of the trades (except 51-9041) have relatively high median average salaries compared to the nation as a whole, as shown by a lower Salary Index. Except for 47-2152, all trades have very low location quotients (under-represented in the state economy compared to nationally). It is unclear if this is due to Hawaii's national ranking as a service-based economy as opposed to manufacturing, which would explain lower location quotients in these occupations, or if there is truly a skilled labor gap. Of particular interest is ***51-4121: Welders, Cutters, Solderers, and Brazers***, which has relatively high employment in the state, high median salary, but a very low location quotient. This occupation is typically associated with Ship Repair/Building within Hawaii. For comparison, other states, such as Wyoming and South Dakota, have high location quotients in this occupation, but this density is more likely related to the Oil and Gas industry.

Schofield Barracks, Hawaii - U.S. Army Soldiers from the 3rd Battalion, 7th Field Artillery Regiment, 3rd Brigade Combat Team, 25th Infantry Division, load into a Marine Corps V-22 Osprey during a joint artillery training mission at Makua Valley, Hawaii, Aug. 11, 2020. This was the first time Soldiers and Marines trained together in a joint field artillery exercise on Oahu. Photo By: Sgt. Effie Mahugh.

Section 7 – HDE SWOT Analysis Recommendations

In this section we provide the HDE project team's recommendations for DBEDT to consider for implementation in a Phase III Action Plan. Each recommendation requires additional input from Hawaii industry stakeholders and academia to improve each recommendation's viability and impact.

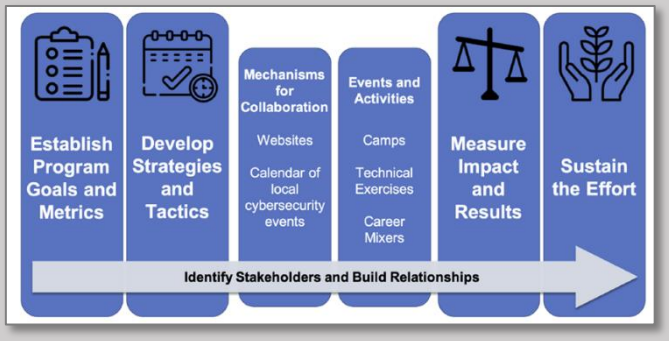
IT Services & Cybersecurity (NAICS 5415) Focus Area

R1: Partner with INNOVATE Hawaii (Manufacturing Extension Partnership) and support program to establish cybersecurity clinics and risk assessment reviews for DoD small businesses: Periodic clinics, e.g. monthly or quarterly, would provide a forum for small businesses to obtain guidance from experts on questions related to NIST SP 800-171 requirements. Risk assessment reviews are more intensive examinations of a small business's cybersecurity hygiene to improve compliance to standards, mitigating cyber risks and helping small businesses continue to compete in the DoD market. As a MEP Center, INNOVATE Hawaii has a cost-sharing model and resources available to support these assessments. Furthermore, they can seek assistance from local partnerships and experts in the local industry or academia to support these clinics and risk reviews.

R2: Lead or support efforts to build a cybersecurity ecosystem within the state: This recommendation follows best practices guidance published by NIST to build a cybersecurity workforce and supporting ecosystem within Hawaii.[40] The guidance provides a number of ideas to consider for getting started:

[40] NISTIR 8287, *Roadmap for Successful Regional Alliances and Multistakeholder Partnerships to Build the Cybersecurity Workforce (Link).*

- Identify a lead organization (*catalyst to lead/ keep the effort moving forward*). This would likely continue to be CyberHawaii, but additional resources may be required.
- Select a Program Manager (PM) and support team. The Program Management Office (PMO) resources could be funded through an OEA grant and led by DBEDT or another organization – CyberHawaii.
- Find anchor institutions and others already investing resources into similar efforts (e.g. NSA, DISA, Navy, University of Hawaii).



- Interview each stakeholder formally to determine needs/ wants, assets, concerns.
- Conduct environmental scan of existing efforts to minimize duplication of effort.

CyberHawaii may be well under way with implementing these steps. This initiative is more focused on expanding the ecosystem and ensuring it has all of the resources required to be successful and impactful.

R3: Develop a way forward to help local small businesses obtain sponsorship opportunities from DoD agencies or large primes to obtain facility clearances: This recommendation seeks to increase opportunities for local small businesses to compete for opportunities that are restricted to organizations with facility clearances. In addition, it allows these companies to pursue clearances for additional personnel to eventually increase the number of cleared personnel in the state. Government agencies and large contractors would have to be willing to sponsor local small businesses for work requiring clearances. Sponsored small businesses would in turn have to work towards obtaining and maintaining a facility clearance.

R4: Increase access to in-demand cybersecurity training certifications for the local workforce: This recommendation seeks to increase the number of in-demand cybersecurity or information assurance industry certifications in the state. This initiative would support both private and public industries in the Hawaii economy. In-demand certifications may include:

- CompTIA Security+
- IAT Level II Certification
- Certified Information Systems Security Professional

This recommendation could include cost-sharing to subsidize certification costs or additional training events for small businesses and/or individuals with IT Services jobs in IT services seeking advancement opportunities.

Engineering Services (NAICS 541330) Focus Area

The team recommends no action at this time for Engineering Services, given the relative health of this industry sector, as compared to the other two focus areas. In addition, industry indicated lower interest in participating in alliances or partnerships to grow the workforce. The team recommends continued monitoring of spending trends because it is a substantially large and important sector for the Hawaii economy.

Ship Building/Repairing (NAICS 336611) Focus Area

R5: Evaluate opportunities to expand the existing HCC apprenticeship program for contractors supporting defense-related ship repair or implementation of other alternative training programs: This recommendation requires engagement with the University of Hawaii Community College (HCC) to explore opportunities to expand the current apprenticeship program for ship repair trades. Consideration should be made to increase access for apprentices interested in supporting contractors or the private ship repair business, which could include businesses supporting both public (defense-related) and private sectors. Other programs beyond the existing HCC apprenticeship program could also be considered.

R6: Evaluate opportunities to offer vocational training at the High School level: This recommendation seeks to establish vocational training at the High School level to augment the existing HCC apprenticeship program. Consideration should be made to engage stakeholders in local school districts to better understand program requirements and resources required.

Data Methodology & Terminology

Defense Spending Methodology

All contract data are from USASpending.gov and include 1) prime contract and assistance awards the federal government made to private- and public-sector contractors and 2) prime contractor reported subcontract and subgrant awards that prime award recipients provided to sub-contractors/ sub-grantees. Contracts are the principle method through which the Department of Defense (DoD) and other federal agencies spend money. The phrase "contract spending" reflects federal agencies' use of contracts with suppliers to purchase all products and services over a legally specified micro-purchase threshold.

For prime contract and assistance awards, the data only includes "Hawaii" as the place of performance and awarding agency codes for DoD, General Services Administration (GSA), or awarding subagency United States Coast Guard (USGC), which is this website's scope of defense-related spending. Annual periods are created based on a refresh date that considers the 90-day blackout period for DoD contract awards for operational security reasons. Rolling 12-month periods are established using this refresh date. *For example, if the refresh date is 31 March 2020, then the 1st annual period would be 2 April 2019 thru 31 March 2020, and the 2nd annual period would be 2 April 2018 thru 1 April 2019 (Note: 2020 has 366 days)*. This approach decouples from fiscal year reporting, facilitating comparisons across annual periods with equal numbers of days.

The analysis apportions prime contract obligation and assistance amounts to these annual periods based on the lower of period of performance in days of the contract or 365 days. The period of performance is determined by the difference between the action date and the period of performance current end date. *For example, if the action data is 3 March 2019 and current end date is 1 July 2019, then the period of performance would be 120 days, and an obligation of $100,000 for the rolling annual periods for Year 2 (2 April 2018 thru 1 April 2019) and Year 1 (2 April 2019 thru 31 March 2020) would be apportioned 25% or $25,000 for Year 2 and 75% or $75,000 for Year 1*. De-obligations, indicated by a negative amount, are not apportioned across annual periods, but rather are taken in the period matching the action date.

For prime contractor reported subcontract and subgrant award data, the analysis only includes records with the reporting prime or the recipient subcontractor/ subgrantee having a place of performance as Hawaii. *For example, this would include a prime contractor with a place of performance outside of Hawaii reporting a subcontract with a place of performance inside of Hawaii. Similarly, the reporting prime contractor could have a place of performance inside of Hawaii and the recipient subcontractor could have a place of performance outside of Hawaii*. A different approach was used to allocate sub-award/ sub-grant awards to the rolling annual periods because, unlike prime award records, subawards do not list the beginning and end of a sub-award's period of performance.

Job & Economic Output Estimation Methodology

The analysis matches the U.S. Bureau of Economic Analysis (BEA)'s RIMS II Type II multipliers for Honolulu to the NAICS reported in the contract and subcontract data (this field is not available for assistance awards) at various NAICS levels due to incomplete industry multipliers at the 6-digit level. Type II Multipliers account for both the interindustry effects (direct and indirect) and household-spending effects (induced) of a final-demand change. Two Type II Multipliers are used in the analysis: 1) Final-demand Employment and 2) Final-demand Output.

- **Final-demand Employment**: Represents the total change in number of jobs that occurs in all industries for each additional 1 million dollars of output delivered to final demand by the industry corresponding to the entry.
- **Final-demand Output**: Represents the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

Key Terminology

- **Net Dollar Flows**: Sum of Prime Contract Obligations flowing into the state + Sum of Subcontract Awards flowing into the state from Out-of-State Primes - Sum of Subcontract Awards flowing out of the state from In-State Primes.
- **Net Jobs**: Sum of Estimated Jobs flowing into the state from Prime Contract Obligations + Sum of Estimated Jobs flowing into the state from Subcontract Awards from Out-of-State Primes - Sum of Estimated Jobs flowing out of the state from Subcontract Awards from In-State Primes. Job estimates are based on the Final-demand Employment multipliers.

- **Net Economic Output (Impact)**: Sum of Estimated Economic Output flowing into the state from Prime Contract Obligations + Sum of Economic Output flowing into the state from Subcontract Awards from Out-of-State Primes - Sum of Economic Output flowing out of the state from Subcontract Awards from In-State Primes. Economic Output estimates are based on the Final-demand Output multipliers.