METHODOLOGY NOTE: BUSINESS SURVEY DATA TREATMENT

BACKGROUND

The San Diego Regional Economic Development Corporation (EDC) commissioned BW Research Partnership (BW Research) to conduct a survey of employers who are engaged in the Cyber Security industry in San Diego County. The survey research examined the depth of use and integration of AI and ML technologies within specific industries and employers in the region and is meant to support the broader research efforts being conducted by the EDC Research Bureau. More specifically, the research objectives for this project were as follows:

1. Quantify the number and size of firms involved in cyber security or information technology security and its development across San Diego County within specific industries.

2. Assess the current and expected workforce needs of employers and the value of relevant certificates for potential employees engaged in cyber security in San Diego County.

3. Evaluate the different technologies and components of cyber security that are being developed and/or used by San Diego County's information technology security firms.

4. Examine the role Artificial Intelligence (AI) and Machine Learning (ML) has on San Diego's cyber security industry and its workforce, both now and in the future.

RESEARCH DESIGN

As the foundation of this study, BW Research completed 38 online and telephone surveys with representatives from San Diego County businesses from March 22 to May 18, 2021. Firms were given the ability to participate in the survey based on a known database of nearly 160 core Cybersecurity firms ("known" universe) that has been curated by the San Diego Regional Economic Development Corporation (EDC) and the San Diego Cyber Center of Excellence (CCOE) over the last decade. **To determine secondary employment, nearly 2,100 firms (from an "unknown" universe of 7,700) were contacted to determine their involvement in Cyber Security**.

Industry sectors from the "unknown" or secondary sample included:

- Natural Gas Distribution
- Computer and Peripheral Equipment Manufacturing
- Communications Equipment Manufacturing
- Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
- Aerospace Product and Parts Manufacturing
- Professional and Commercial Equipment and Supplies Merchant Wholesalers
- Software Publishers
- Cable and Other Subscription Programming
- Wired and Wireless Telecommunications Carriers
- Other Telecommunications
- Data Processing, Hosting, and Related Services
- Other Information Services
- Depository Credit Intermediation
- Insurance Carriers
- Agencies, Brokerages, and Other Insurance Related Activities

- Architectural, Engineering, and Related Services
- Computer Systems Design and Related Services
- Management, Scientific, and Technical Consulting Services
- Scientific Research and Development Services
- Management of Companies and Enterprises
- Employment Services
- Education
- Healthcare
- Federal Government, Civilian
- Federal Government, Military
- Local Government, Excluding Education and Hospitals

These industries were sampled as they employ a high concentration of the following Cyber Security related occupations relative to other industries in San Diego County:

- Computer and Information Systems Managers
- Software Developers
- Computer Systems Analysts
- Information Security Analysts
- Computer Network Support Specialists
- Computer Network Architects
- Network and Computer Systems Administrators
- Penetration Testers
- Information Security Engineers
- Digital Forensics Analysts
- Blockchain Engineers

WHAT CHANGED

Readers of previous Cyber reports produced by EDC may have noticed that the direct Cyber employment figure cited in the 2021 study totals more than 12,400 whereas the 2019 report noted 8,450 jobs. Yet, this should not be interpreted as an organic 50 percent jump in Cyber cluster employment. Similarly, the Cyber cluster contributes about $3.5 billion to the regional economy each year, but the 2019 report cited $2.4 billion. Finally, the number of Cyber firms across the region totaled 874 in 2021, whereas the 2019 report cited “more than 150” Cyber companies.

A methodology change was incorporated into this report that better represents Cyber business activity in the region. As part of the business survey conducted for this study, firms were canvassed across a number of sectors. Firms were divided into two distinct categories:

1. “Known” Cyber firms: Reflects a list of more than 160 Cyber companies in San Diego County curated by CCOE and San Diego Regional EDC.
2. “Unknown” Cyber firms: Firms not previously known to have significant Cyber operations.

Prior versions of the report included Cyber workforce figures from NAVWAR (f/k/a SPAWAR) and private-sector employment figures from only the sample of 160 “known” core Cyber firms. **However, firms and organizations that are engaged in business pursuits very different than software development or cybersecurity services but that employ cybersecurity professionals because of how important dealing with cyber threats is to their functionality (i.e., the nearly 2,100 firms from the non-core Cyber, “unknown” universe noted before) were excluded from previous studies**. Measuring this aspect of a cybereconomy requires researchers to carry out surveys involving hundreds, if not thousands, of different companies, with the additional difficulty of reaching the

right manager within these firms to discuss specific issues related to cybersecurity. Because of these limitations, "embedded" cybersecurity workers in non-core Cyber industries were excluded from prior studies, and only employment at those firms that sell cybersecurity solutions to external customers was tabulated.

All that said, a key finding in the 2021 report is that Cyber employment growth has been most pronounced in non-core Cyber industries. This is because the need for Cyber has grown well beyond the traditional confines of the core, "known" universe of firms in the region. Just as the term "internet company" lost all meaning as every business created an online presence, there is a growing consensus that the idea of a "Cyber company" is also becoming obsolete as every company finds it has a need for Cybersecurity. Consequently, we found that it was important to incorporate these figures into the employment estimates, since it better reflects the true demand for Cyber professionals in the region and provides a benchmark by which we can measure the proliferation of Cyber throughout the broader economy.

The below tables show Cyber-specific employment, output, and number of firms using the original methodology compared with the refreshed approach so that apples-to-apples comparisons can be made. For instance, if the previous approach had been continued for this report, the reported number of Cyber professionals in the region would be 8,889 instead of 12,407.

About San Diego Regional EDC

EDC is an independently-funded economic development organization that mobilizes business, government, and civic leaders around an inclusive economic development strategy in order to connect data to decision making, maximize regional prosperity, enhance global competitiveness, and position San Diego effectively for investment and talent.

Employment

	Business segment	2019	2021	2019 - 2021 % growth
2021 (revised) approach	Private sector ("known" universe)	4,921	5,156	4.8%
	Private sector ("unknown" universe)	3,100	3,518	13.5%
	NAVWAR (f/k/a SPAWAR)	3,528	3,733	5.8%
	Total	*11,549*	*12,407*	*7.4%*

	Business segment	2019	2021	2019 - 2021 % growth
Prior approach	Private sector ("known" universe)	4,921	5,156	4.8%
	NAVWAR (f/k/a SPAWAR)	3,528	3,733	5.8%
	Total	*8,449*	*8,889*	*5.2%*

Contribution to GRP (billions of 2021 $)

	Business segment	2019	2021	2019 - 2021 % growth
2021 (revised) approach	Private sector ("known" universe)	$1.52	$1.55	1.8%
	Private sector ("unknown" universe)	$0.56	$0.93	65.1%
	NAVWAR (f/k/a SPAWAR)	$0.94	$1.00	6.2%
	Total GRP contribution	*$3.03*	*$3.48*	*14.9%*
	Total economic impact (includes labor income)	*$4.73*	*$5.41*	*14.4%*

	Business segment	2019	2021	2019 - 2021 % growth
Prior approach	Private sector ("known" universe)	$1.52	$1.55	1.8%
	NAVWAR (f/k/a SPAWAR)	$0.94	$1.00	6.2%
	Total GRP contribution	*$2.47*	*$2.55*	*3.4%*
	Total economic impact (includes labor income)	*$3.88*	*$3.93*	*1.3%*

Number of establishments

	Business segment	2019	2021	2019 - 2021 % growth
2021 (revised) approach	Private sector ("known" universe)	151	154	2.0%
	Private sector ("unknown" universe)	620	715	15.3%
	Total	*771*	*869*	*12.7%*

	Business segment	2019	2021	2019 - 2021 % growth
Prior approach	Private sector ("known" universe)	151	154	2.0%
	Total	*151*	*154*	*2.0%*