PROGRAM ENDORSEMENT BRIEF

C·O·E
CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

CYBERSERCURITY
IN THE FAR NORTH

Far North

Center of Excellence

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SUMMARY

The Far North Center of Excellence for Labor Market Research prepared this report to provide a labor market analysis of educational supply and occupational demand for middle-skilled career pathways in the Far North subregion. This report aims to determine if demand in the local labor market is unmet by the supply from existing community college programs and other postsecondary training providers.

This report primarily focuses on training that leads to jobs in middle-skilled occupations - that is, occupations that typically require education beyond a high school diploma but less than a Bachelor's degree - but may include higher-skilled occupations for training pathways that lead to a bachelor's degree. Lowered skilled occupations are rarely considered in this type of analysis due to the lessened barriers for entry-level work, such as no formal education requirements and no requirements for on-the-job training.

Key findings include:

- The Far North subregion held 1,843 cybersecurity jobs in 2020. Cybersecurity jobs are projected to increase by 10% over the next five years, adding 192 new jobs to the subregion by 2025.

- Over the next five years, cybersecurity occupations are projected to have 186 annual openings in the Far North subregion.

- Wage data shows that cybersecurity occupations earn approximately $7 to $50 above the subregion's living wage of $12.74 per hour.

- Four of the Far North community colleges offered degrees or certificates in programs related to cybersecurity. Between 2017-18 and 2019-20, community colleges conferred an average of 83 awards in cybersecurity related programs over the last three years.

Recommendations include:

- Based on the limited number of cybersecurity related programs at Far North community colleges and non-community college providers and the projected yearly openings, the supply gap analysis shows that the region may have room for additional training.

- There appears to be a need for a cybersecurity training programs. The demand analysis estimates that there will be 186 projected annual openings in the broader region yet only 170 average annual awards, including both existing community college programs and non-community college training providers.

INTRODUCTION

The Far North Center of Excellence (COE) was asked to provide labor market information for a proposed program at a regional community college. This report focuses on the following Standard Occupational Classification (SOC) occupations and codes:

These middle-skill occupations require more education and training beyond a high school diploma but less than a four-year degree:

- Information Security Analysts (15-1212)
- Computer Network Support Specialists (15-1231)
- Computer User Support Specialists (15-1232)
- Network and Computer Systems Administrators (15-1244)
- Software Developers and Software Quality Assurance Analysts and Testers (15-1256)

A review of related programs revealed the following Taxonomy of Programs (TOP) title(s) and code(s) are appropriate for inclusion in this report:

- Information Technology, General (0701.00)
- Computer Information Systems (0702.00)
- Software Applications (0702.10)
- Computer Software Development (0707.00)
- Computer Programming (0707.10)
- Computer Systems Analysis (0707.30)
- Computer Infrastructure and Support (0708.00)
- Computer Networking (0708.10)
- Computer Support (0708.20)
- World Wide Web Administration (0709.00)
- Telecommunications Technology (0934.30)

The corresponding Classification of Instructional Program (CIP) title(s) and code(s) are:

- Computer and Information Sciences, General (11.0101)
- Information Technology (11.0103)
- Data Entry/Microcomputer Applications, General (11.0601)
- Computer Programming/Programmer, General (11.0201)
- Computer Systems Analysis/Analyst (11.0501)
- Computer and Information Systems Security/Information Assurance (11.1003)
- Computer Systems Networking and Telecommunications (11.0901)
- Computer Support Specialist (11.1006)
- Web/Multimedia Management and Webmaster (11.1004)
- Telecommunications Technology/Technician (15.0305)

OCCUPATIONAL DEMAND

Exhibit 1 summarizes the five-year projected job growth for middle-skill and high-skill occupations in the Far North, North/Far North, and California.

Exhibit 1. Employment and projected demand, 2020-2025

Occupation	2020 Jobs	2025 Jobs	2020-2025 Jobs Change	2020-2025 Jobs % Change	2020-2025 Annual Openings
Information Security Analysts	77	93	16	21%	11
Computer Network Support Specialists	228	236	8	4%	21
Computer User Support Specialists	647	675	28	4%	61
Network and Computer Systems Administrators	226	244	17	8%	21
Software Developers and Software Quality Assurance Analysts and Testers	665	788	123	18%	73
Far North	**1,843**	**2,035**	**192**	**10%**	**186**
Information Security Analysts	582	694	112	19%	69
Computer Network Support Specialists	1,141	1,217	75	7%	97
Computer User Support Specialists	12,887	13,186	300	2%	1,512
Network and Computer Systems Administrators	1,873	1,988	116	6%	141
Software Developers and Software Quality Assurance Analysts and Testers	8,715	9,762	1,047	12%	753
North/Far North	**25,198**	**26,848**	**1,650**	**7%**	**2,573**

Occupation	2020 Jobs	2025 Jobs	2020-2025 Jobs Change	2020-2025 Jobs % Change	2020-2025 Annual Openings
Information Security Analysts	11,397	14,098	2,701	24%	1,339
Computer Network Support Specialists	16,832	18,499	1,667	10%	1,463
Computer User Support Specialists	82,162	89,860	7,697	9%	7,861
Network and Computer Systems Administrators	33,707	36,324	2,617	8%	2,504
Software Developers and Software Quality Assurance Analysts and Testers	256,731	296,905	40,175	16%	24,228
California	**400,830**	**455,686**	**54,856**	**14%**	**37,395**

Exhibit 2 compares the percent change in jobs between 2015 through 2020 and the projected changes through 2025. The rate of change is indexed to the total number of jobs in 2015.
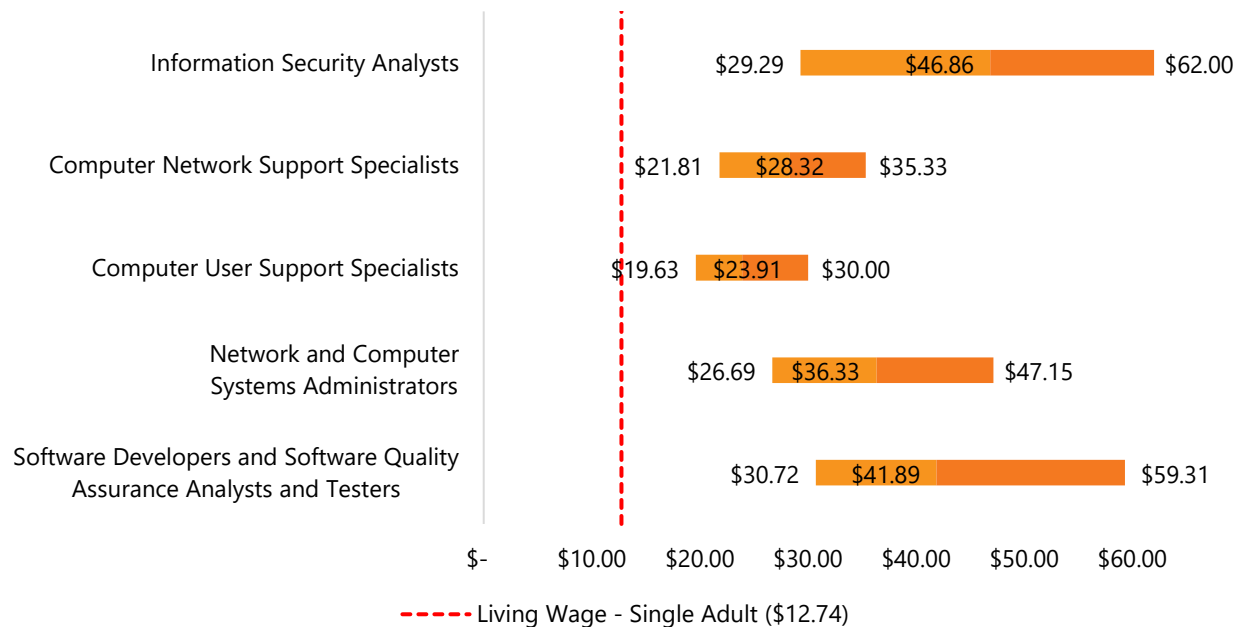
Exhibit 2. Changes in employment, 2015-2025
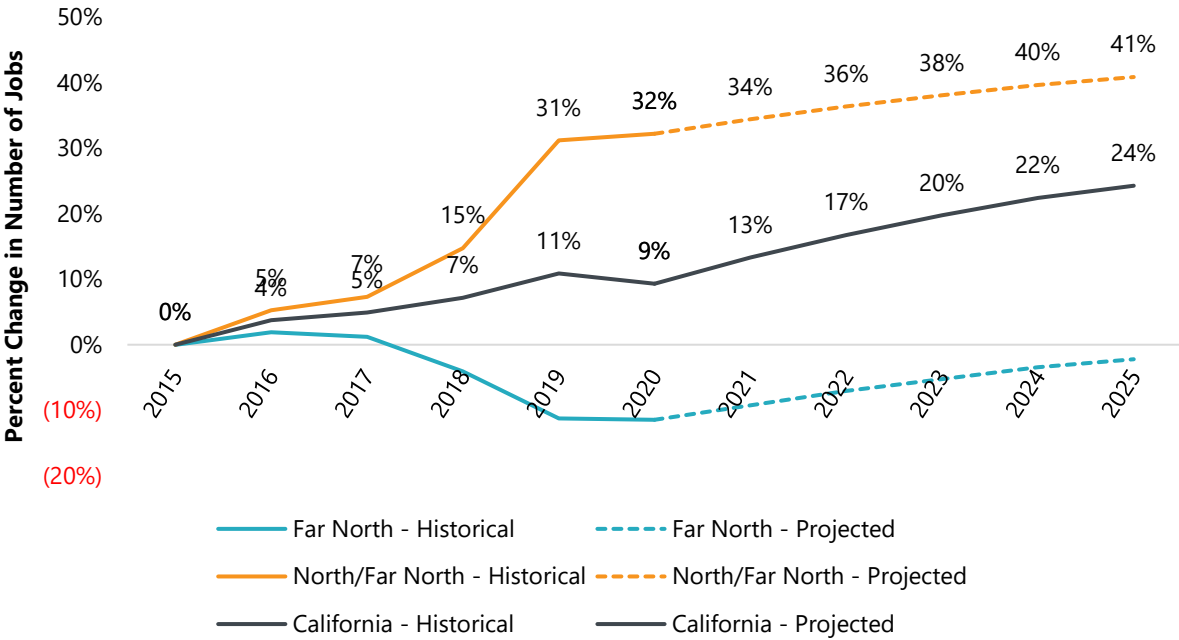
WAGES

Exhibit 3 compares the entry-level, median, and experienced wages for the selected occupations to the Far North living wage for a single adult - $12.74 per hour.[1]

Exhibit 3. Comparison of wages by occupation, 2020

JOB POSTINGS

This section of the report analyzes recent data from online job postings (real-time LMI)[2]. Online job postings may provide additional insight into recent changes in the labor market that are not captured by historical trends.

The Far North COE identified 524 online job postings for the selected occupations in the Far North subregion. Job postings data comes from Burning Glass Labor Insights and represents new listings posted online within the last year, from October 1, 2020, to September 30, 2021.

Occupations and Job Titles

Exhibit 4 details the number of online job postings for the selected occupations.

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[1] Living wage is defined as the level of income a single adult with no children must earn to meet basic needs, including food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs. The 25th-percentile and 75th-percentile hourly wages are used as proxy for entry-level and experienced-level wages.

[2] The Burning Glass information presented below was pulled using occupation titles.

Exhibit 4. Number of job postings by occupation

Occupation	Job Postings	Share of Job Postings
Software Developers, Applications (15-1132)	236	45%
Computer User Support Specialists (15-1151)	177	34%
Network and Computer Systems Administrators (15-1142)	42	8%
Information Security Analysts (15.1122)	39	7%
Software Quality Assurance Engineers and Testers (15-1199)	27	5%
Computer Network Support Specialists (15-1152)	3	1%
Total Job Postings	**524**	**100%**

Exhibit 5 shows the top 10 job titles with the most job postings and the share of job postings. All job postings included a job title.

Exhibit 5. Top jobs titles

Job Title	Job Postings	Share of Job Postings
Software Engineer	13	2%
Software Developer	11	2%
Application Developer	10	2%
Entry Level Software Engineer	10	2%
Junior Software Developer	10	2%
Senior Software Engineer	9	2%
Entry Level Software Developer	8	2%
Junior Css/Html Developer	8	2%
Junior Full Stack Developer	8	2%
Business Development & Delivery Specialist	6	1%

Employers

Exhibit 6 shows the top 10 employers with the most job postings for the selected occupations. Forty percent (n = 207) of job postings did not include an employer.

Exhibit 6. Employers with the most job postings

Employer	Job Postings	Share of Job Postings
California State University	14	4%
Frontera Strategies	10	3%
Lulus	9	3%
Enloe Medical Center	9	3%
Best Buy	9	3%
Sierra Pacific Industries	8	3%
Del Norte County Unified School District & Coe	8	3%
Crowdstrike	8	3%
Valeo Incorporated	6	2%
Tractor Supply Company	6	2%

Certifications, Skills, and Experience

Exhibit 7 shows the specialized skills most requested by employers for the selected occupations. Seventeen percent (n = 87) of job postings did not include a specialized skill.

Exhibit 7. Most in-demand specialized skills

Specialized Skill	Skill Postings	Share of Skill Postings
JavaScript	120	3%
Software Engineering	97	2%
Technical Support	96	2%
Software Development	78	2%
Customer Service	70	2%

Specialized Skill	Skill Postings	Share of Skill Postings
SQL	70	2%
Repair	69	2%
Information Systems	57	1%
Printers	43	1%
Scheduling	38	1%

Exhibit 8 shows the minimum level of education required by employers for job postings for the selected occupations. Forty-two percent (n = 222) of job postings did not include a preferred education level.

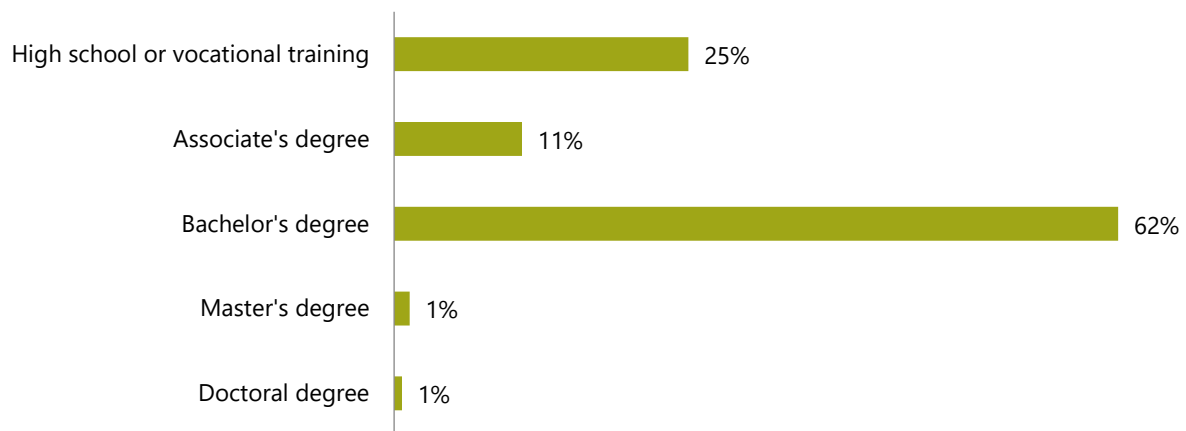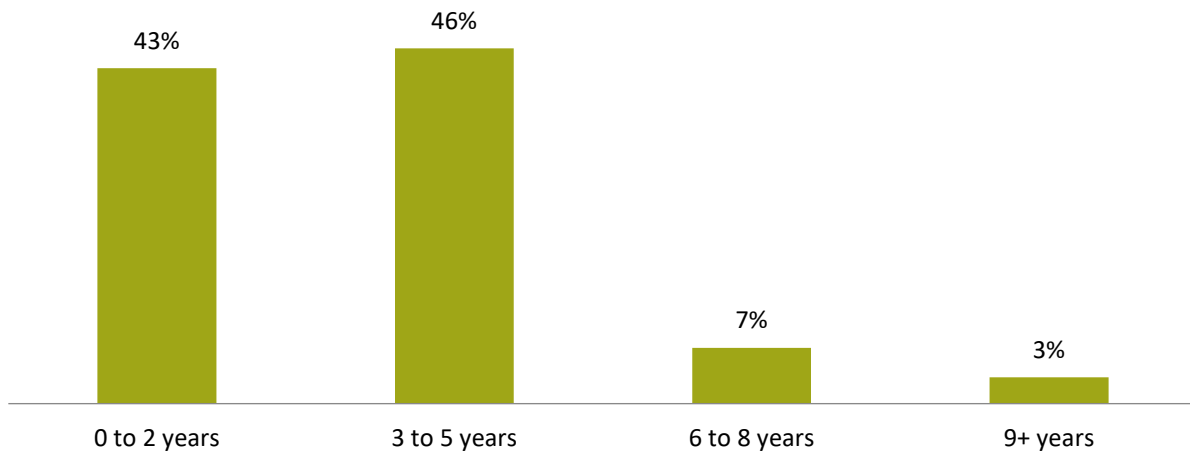**Exhibit 8. Employer-preferred minimum education levels**

Exhibit 9 shows the experience levels required by employers for job postings for the selected occupations. Fifty-five percent (n = 289) of job postings did not include a preferred experience level.

Exhibit 9. Employer-preferred experience levels

	0 to 2 years	3 to 5 years	6 to 8 years	9+ years
	43%	46%	7%	3%

EDUCATION AND TRAINING

The U.S. Census Bureau and Bureau of Labor Statistics collects data on education achieved by workers employed in occupations. Exhibit 10 shows the national-level educational attainment of the current workforce in the selected occupations.

Exhibit 10. National worker educational attainment for selected occupations, 2020
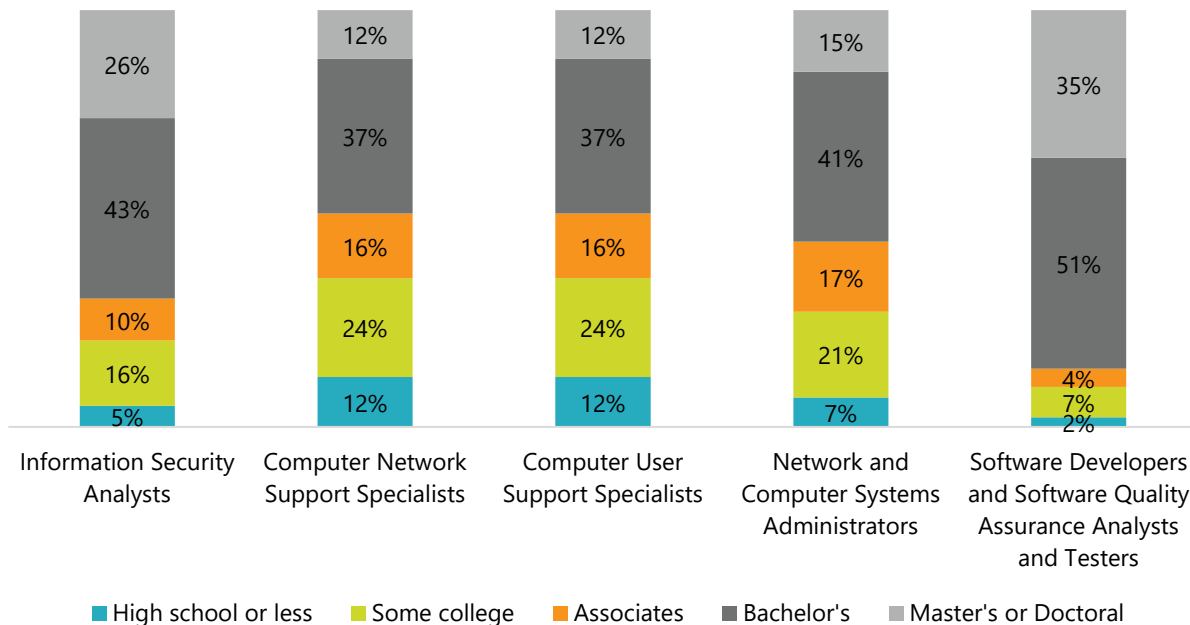
The Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education, work experience in a related occupation, and typical on-the-job training to each occupation for which the BLS publishes projections data. Exhibit 11 shows the skill level and entry-level job requirements for the selected occupations.

Exhibit 11. Typical education, work experience, and on-the-job training requirements

Occupation	Typical Entry-level Education	Work Experience Required	On-the-job Training Required
Information Security Analysts	Bachelor's degree	Less than 5 years	None
Computer Network Support Specialists	Associate's degree	None	None
Computer User Support Specialists	Some college, no degree	None	None
Network and Computer Systems Administrators	Bachelor's degree	None	None
Software Developers and Software Quality Assurance Analysts and Testers	Bachelor's degree	None	None

EDUCATIONAL SUPPLY

Educational supply for an occupation can be estimated by analyzing the number of awards issued in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes. Exhibit 12 shows the TOP and CIP codes for educational programs related to the selected occupations.

Exhibit 12. TOP and CIP codes for training programs related to the selected occupations

TOP Programs and Codes	Aligned CIP Programs and Codes
Information Technology, General (0701.00)	Computer and Information Sciences, General (11.0101)
Computer Information Systems (0702.00)	Information Technology (11.0103)
Software Applications (0702.10)	Data Entry/Microcomputer Applications, General (11.0601)
Computer Software Development (0707.00)	Computer Programming/Programmer, General (11.0201)
Computer Programming (0707.10)	Computer Systems Analysis/Analyst (11.0501)
Computer Systems Analysis (0707.30)	Computer and Information Systems Security/Information Assurance (11.1003)
Computer Infrastructure and Support (0708.00)	Computer Systems Networking and Telecommunications (11.0901)

| TOP Programs and Codes	Aligned CIP Programs and Codes
Computer Networking (0708.10)	Computer Support Specialist (11.1006)
Computer Support (0708.20)	Web/Multimedia Management and Webmaster (11.1004)
World Wide Web Administration (0709.00)	Telecommunications Technology/Technician (15.0305)
Telecommunications Technology (0934.30)	

Community College Supply

There were four active programs for the related TOP codes at Community Colleges in the Far North during the past three years. Exhibits 13 and 14 show the average number of certificates and degrees conferred in selected community college programs over the last three academic years.

Exhibit 13. Community college awards by program, 2017-18 through 2019-20

Program - TOP Code	College	Annual Awards 2017-18	Annual Awards 2018-19	Annual Awards 2019-20	3-Yr Annual Awards Average
Information Technology, General (0701.00)	Mendocino	3	0	3	2
	Subtotal	**3**	**0**	**3**	**2**
Computer Information Systems (0702.00)	Butte	26	55	21	34
	Mendocino	0	1	1	1
	Shasta	8	8	4	7
	Subtotal	**34**	**64**	**26**	**42**
Software Applications (0702.10)	Butte	8	1	0	3
	Subtotal	**8**	**1**	**0**	**3**
Computer Infrastructure and Support (0708.00)	Shasta	2	2	0	1
	Subtotal	**2**	**2**	**0**	**1**

Program - TOP Code	College	Annual Awards 2017-18	Annual Awards 2018-19	Annual Awards 2019-20	3-Yr Annual Awards Average
Computer Networking (0708.10)	Mendocino	0	3	1	1
	Redwoods	13	17	39	23
	Shasta	14	4	9	9
	Subtotal	**27**	**24**	**49**	**33**
World Wide Web Administration (0709.00)	Shasta	1	4	1	2
	Subtotal	**1**	**4**	**1**	**2**
	Grand Total	**75**	**95**	**79**	**83**

Exhibit 14. Annual average community college awards by type, 2017-18 through 2019-20
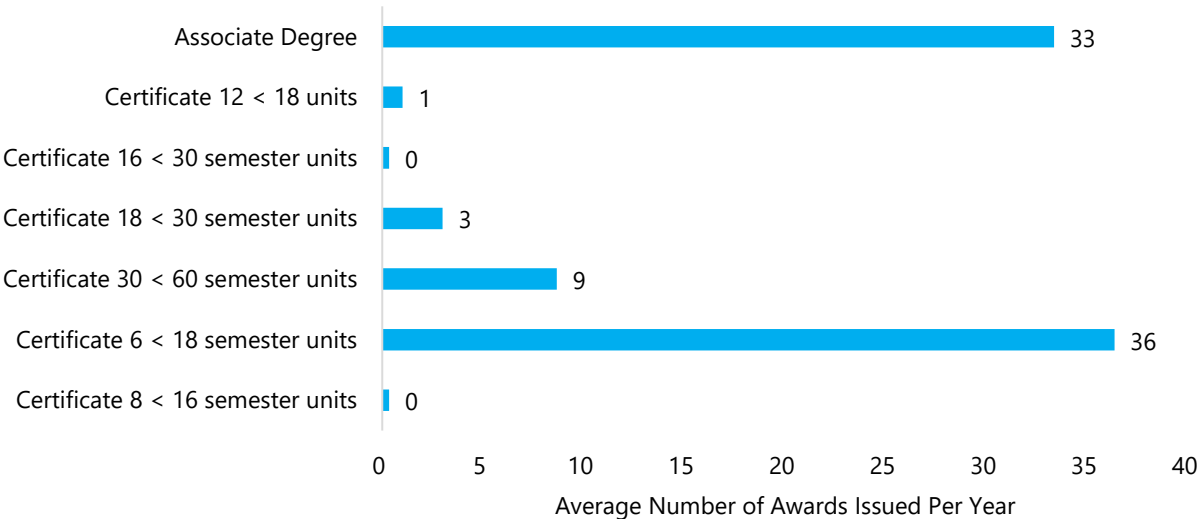
Other Postsecondary Supply

Exhibit 15 compares the average number of degrees conferred by non-community college training providers in the Far North over the last three academic years. Please note that non-community college data lags by one year.

Exhibit 15. **Other postsecondary awards by program, 2016-17 through 2018-19**

Program - CIP Code	College	Annual Awards 2016-17	Annual Awards 2017-18	Annual Awards 2018-19	3-Yr Annual Awards Average
Information Technology (11.0103)	California State University-Chico	70	95	96	87
	Humboldt State University	0	0	1	0
	Subtotal	**70**	**95**	**97**	**87**
	Grand Total	**70**	**95**	**97**	**87**

FINDINGS

This report focuses on occupations with relevant career pathways in cybersecurity jobs.

- The Far North subregion held 1,843 cybersecurity jobs in 2020. Cybersecurity jobs are projected to increase by 10% over the next five years, adding 192 new jobs to the subregion by 2025.

- Over the next five years, cybersecurity occupations are projected to have 186 annual openings in the Far North subregion. Cybersecurity jobs are projected to grow faster in the Far North than the broader North/Far North region over the next five years but at a slower rate than California overall.

- Wage data shows that cybersecurity occupations earn approximately $7 to $50 above the subregion's living wage of $12.74 per hour. Entry-level wages are highest for Software Developers and Software Quality Assurance Analysts and Testers at $30.72 per hour and lowest for Computer User Support Specialists at $19.63 per hour.

- According to real-time labor market information, there were 524 online job postings for cybersecurity occupations between Octboer 1, 2020, and September 30, 2021. The majority of job postings were for two occupations. Forty-five percent (n = 236) of job postings were for Software Developers, Applications and 34% of job postings (n = 177) were for Computer User Support Specialists.

- Required educational attainment of entry-level work requirements were generally aligned for the studied occupations. Between 11% and 40% of cybersecurity occupations have educational attainment levels consistent with community college offerings (some college or associate degrees). All occupations studied had a large percentage of workers

with a bachelor's degree or higher. This suggests that there is ability for continued educational advancement once in a cybersecurity career.

- Four of the Far North community colleges offered degrees or certificates in programs related to cybersecurity. There were two non-community college postsecondary training providers that offered training related to the studied occupations. Between 2017-18 and 2019-20, community colleges conferred an average of 83 awards in cybersecurity related programs over the last three years. Between 2016-17 and 2018-19, non-community college training providers conferred an average of 87 awards in cybersecurity related programs over the last three years. Please note that non-community college awards data lags by one year.

RECOMMENDATIONS

- Based on the limited number of cybersecurity related programs at Far North community colleges and non-community college providers and the projected yearly openings, the supply gap analysis shows that the region may have room for additional training.

- There appears to be a need for a cybersecurity training programs. The demand analysis estimates that there will be 186 projected annual openings in the broader region yet only 170 average annual awards, including both existing community college programs and non-community college training providers.

- The Far North Center of Excellence recommends moving forward with the proposed program.

COE Recommendation		
Move forward with the program	**Proceed with caution**	**Program is not recommended**
☒	☐	☐

APPENDIX A. METHODOLOGY AND SOURCES

Occupations in this report were identified using the Center of Excellence TOP-to-CIP-to-SOC crosswalk and O*Net OnLine. This report's findings were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi, and jobs posting data from Burning Glass.

Cal-PASS Plus LaunchBoard. California Community Colleges Chancellor's Office. https://www.calpassplus.org/LaunchBoard/Home.aspx.

Emsi. https://www.economicmodeling.com/. EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors).

Educational Attainment for Workers 25 Years and Older by Detailed Occupation, 2016-2017. Bureau of Labor Statistics. https://www.bls.gov/emp/tables/educational-attainment.htm#.

Integrated Postsecondary Education Data System (IPEDS). National Center for Education Statistics. U.S. Department of Education. https://nces.ed.gov/ipeds/.

"Labor Insight Real-Time Labor Market Information Tool." Burning Glass Technologies. http://www.burning-glass.com.

Labor Market Information Division. California Employment Development Department. https://labormarketinfo.edd.ca.gov/.

Management Information Systems (MIS) Data Mart. California Community Colleges Chancellor's Office. https://datamart.cccco.edu/.

Occupational Employment Statistics (OES). Bureau of Labor Statistics. https://www.bls.gov/oes/home.htm.

O*NET OnLine. U.S. Department of Labor/Employment and Training Administration (DOL ETA). https://www.onetonline.org/.

Self-Sufficiency Standard Tool for California. The University of Washington.

http://www.selfsufficiencystandard.org/

"Taxonomy of Programs." California Community Colleges Chancellor's Office. June 2012, 6th Edition. https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Educational-Services-and-Support/Academic-Affairs/What-we-do/Curriculum-and-Instruction-Unit/Files/TOPmanual6200909corrected12513pdf.ashx

"TOP-CIP-SOC Crosswalk." Centers of Excellence for Labor Market Research. November 2015 Edition. http://coeccc.net/

COVID-19 Statement: This report includes employment projection data by EMSI. EMSI's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

Important Disclaimer: All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

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