Strong Workforce Program

Information & Communication Technologies (ICT)

Sector Regional Advisory Meeting Proceedings

Artificial Intelligence, and Machine Learning, and Data Science

November 17, 2022

Hybrid – Zoom and Sacramento County Office of Education

Introduction

The Los Rios Community College District, in partnership with Valley Vision, and in collaboration with Sierra, Yuba and Lake Tahoe Community College Districts, invests Strong Workforce funding to organize and convene Regional Advisories. The objectives of the Regional Advisories are to build strong relationships between employers, educators, and workforce that:

- Provide timely information on skills gaps and workforce needs, informing partners on major industry trend information;
- Improve the efficiency of the advisory process for educators and employers;
- Reflect a regional view of workforce needs and assets
- Provide opportunities for more systemic, ongoing engagement that includes workforce partners in key industry sectors.

Regional Advisory meetings help inform decisions on needed investments and enhancements for Career Education (CE) programs to help fill the growing demand for middle-skill positions. This meeting proceedings report includes key findings, best practices, and minutes from the Fall 2022 Information & Communication Technologies (ICT) Regional Advisory meeting focused specifically on careers in Artificial Intelligence (AI), Machine Learning (ML), and Data Science.

Valley Vision supports a robust talent pipeline through our multiple 21st Century Workforce initiatives. We prepare our regional workforce for the future by addressing skills gaps, advancing research, aligning efforts, and strengthening systems. Valley Vision's workforce efforts are supported by the Sacramento Employment and Training Agency (SETA), Golden Sierra Workforce Board, North Central Counties Consortium, Yolo County Workforce Investment Board, local community college districts, and others.

The Strong Workforce Program provides Career Education opportunities to increase social mobility and fuel regional economies with skilled workers.

Key Findings

- The demand for workers with AI skills is prevalent across a wide breadth of industry sectors including manufacturing, healthcare, and transportation. 63% of AI-related job postings between October 2021 through October 2022 in the Greater Sacramento region are concentrated in professional, scientific, and technical services (33%) and manufacturing (30%).

- Additional AI-related job postings data demonstrated a need for both high-level technical roles/skills as well as implementer roles/middle-skill occupations.

    - The top high-level technical roles needed in the region include: **software developers/quality assurance analysts, computer and information research scientists, database architects, and engineers**. The top skills found across AI related-job postings were predominantly technical skills including **machine learning (50%), Python (33%), and data science (25%)**.

    - The top middle-skill occupations identified include: general and operational managers, computer user support specialists, sales representatives, detectives and criminal investigators, and web developers/digital interface designers. Key implementer skills identified among AI-related job postings included project management, customer service, and data analysis. Industry panelists noted a preference for hiring candidates with a generalist skill set, indicating opportunities to upskill in the workplace.

- The biggest potential impact for the middle-skill and below middle-skill workforce will be AI integration, implementation, and translations. There is a small, but growing, middle-skill segment for “AI-specific skills” that are more focused on generalists and translators of this skill. These are especially pertinent to data analysis and project management positions.

- There are opportunities for community colleges to facilitate STEM transfer pathways in engineering and computer science; as well as collaborate with industry partners to further identify key target AI middle-skill occupations, job titles, and skills.

- Literature review pointed to a need for continuous upskilling in the field which could benefit from short-term, noncredit training that can be offered directly to industry and quickly adjusted to meet their demands in this rapidly evolving field.

- Diversity, equity, and inclusion initiatives are an important step to increase opportunities for students and prospective employees to gain experience in the field and prosper in the tech industry.

Welcome and Overview

The ICT Advisory Meeting opened up with Valley Vision's 21st Century Workforce project manager, Yzabelle Dela Cruz, who explained the meeting's focus on AI, ML, and Data Science. As a Greater Sacramento regional advisory, supported by Los Rios Community College District's Strong Workforce Program, Dela Cruz went on to further describe its objective to inform education and workforce partners on the changing needs of jobs within the sector, to ensure students and community members are well prepared for the workforce.

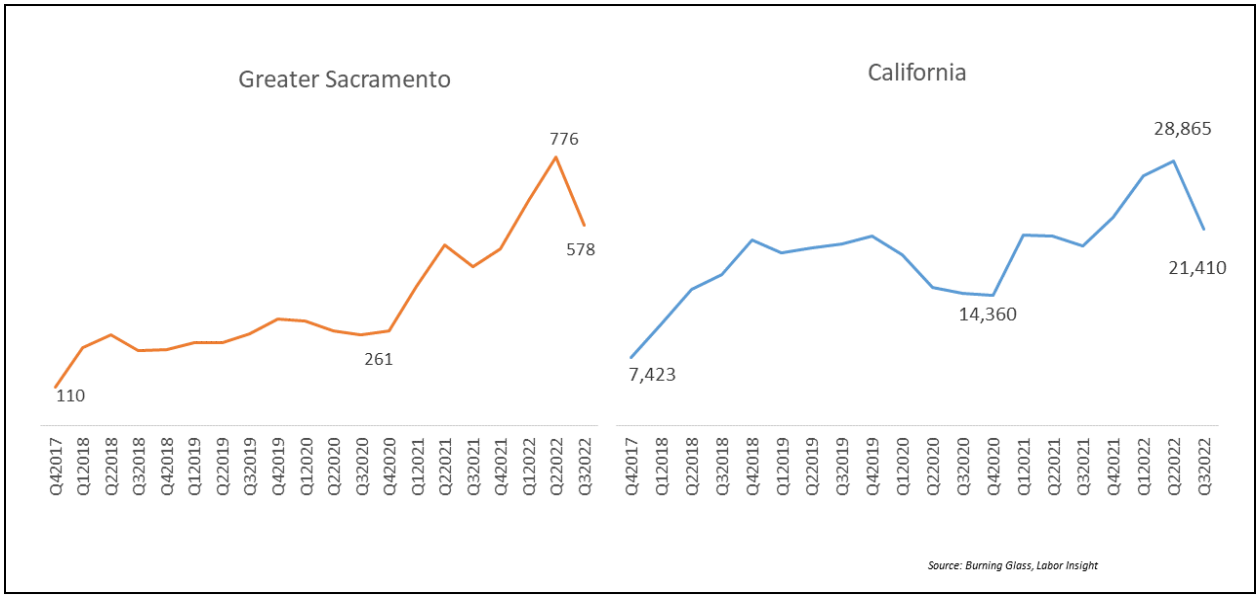
Labor Market Information Overview

Opening remarks were followed by Aaron Wilcher, Regional Director of the Greater Sacramento Region's Centers of Excellence, who presented updated labor market information on AI-related job postings utilizing Lightcast (formerly Emsi Burning Glass) data sources. These job postings were identified under four keyword searches: artificial intelligence, machine learning, natural language processing, and computer vision.

Industry Trends

Over the past five years, there has been an increase in AI-related job postings across the Greater Sacramento region and California writ large (Figure 1). The recent dip in job postings may be attributed to recent tech industry hiring freezes and layoff news.

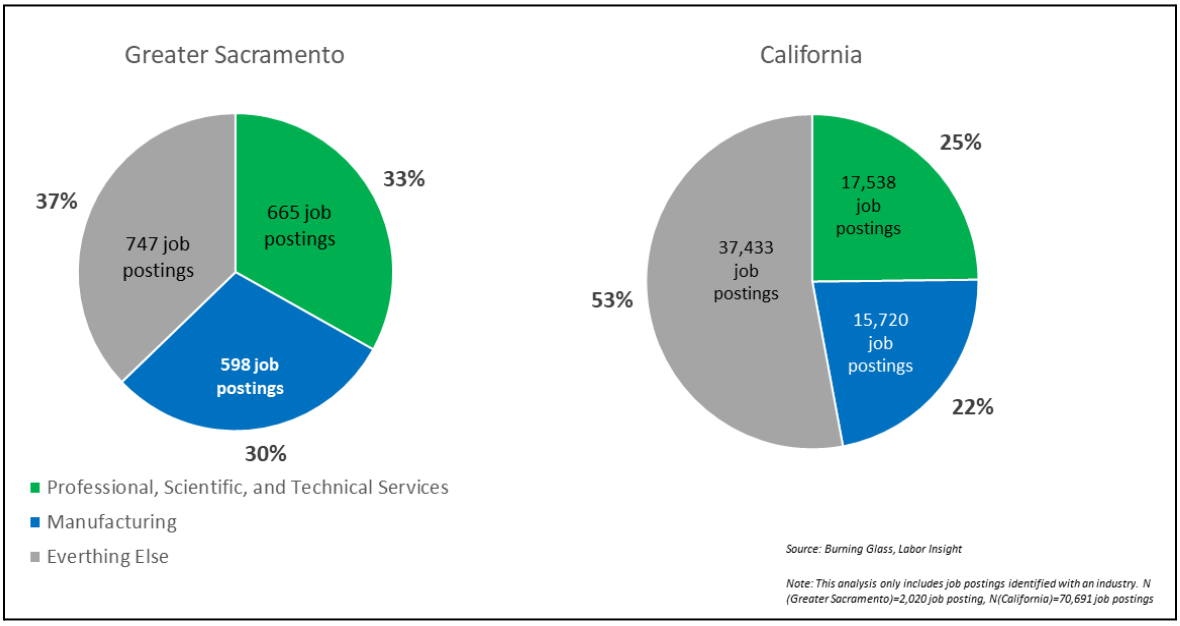
Figure 1: AI-related Job Postings 5-Year Quarterly Trends
Greater Sacramento and California



When Wilcher first analyzed this data in Spring 2021 the highest number of AI-related job postings were concentrated in the healthcare and manufacturing sector with computer science being the most commonly referenced academic requirement. Figure 2 shows that about 60% of

AI-related job postings are concentrated in professional, scientific, and technical services (33%) and manufacturing (30%) at present. The remaining AI-related opportunities (37%) are distributed across a wide breadth of industry sectors. It is important to note these occupations make up less than 3% of the overall total postings within each sector.

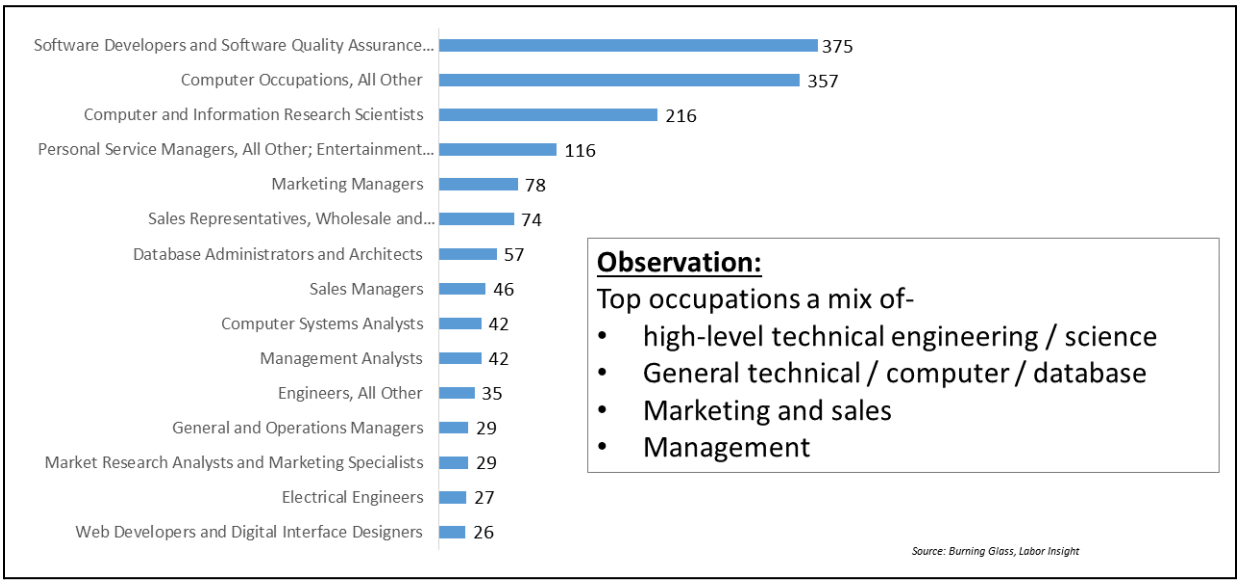
Figure 2: AI-related Job Postings Sector Breakdown, Percent of Total in the Greater Sacramento Region



Workforce Jobs Postings Findings – Occupations and Skills

Additional AI-related job postings data demonstrated a need for both high-level technical roles in software, computer science, data architecture, and engineering, as well as implementation roles in marketing, sales, and management (Figure 3).

Figure 3: Top AI-Related Occupations, Greater Sacramento Region



While many technical occupations often require bachelor's degrees, these findings highlight the opportunities for middle-skill occupations related to AI, ML, and Data Science. Specific middle-skill occupations identified include: general and operational managers, computer user support specialists, sales representatives, detectives and criminal investigators, and web developers/digital interface designers (Figure 4).

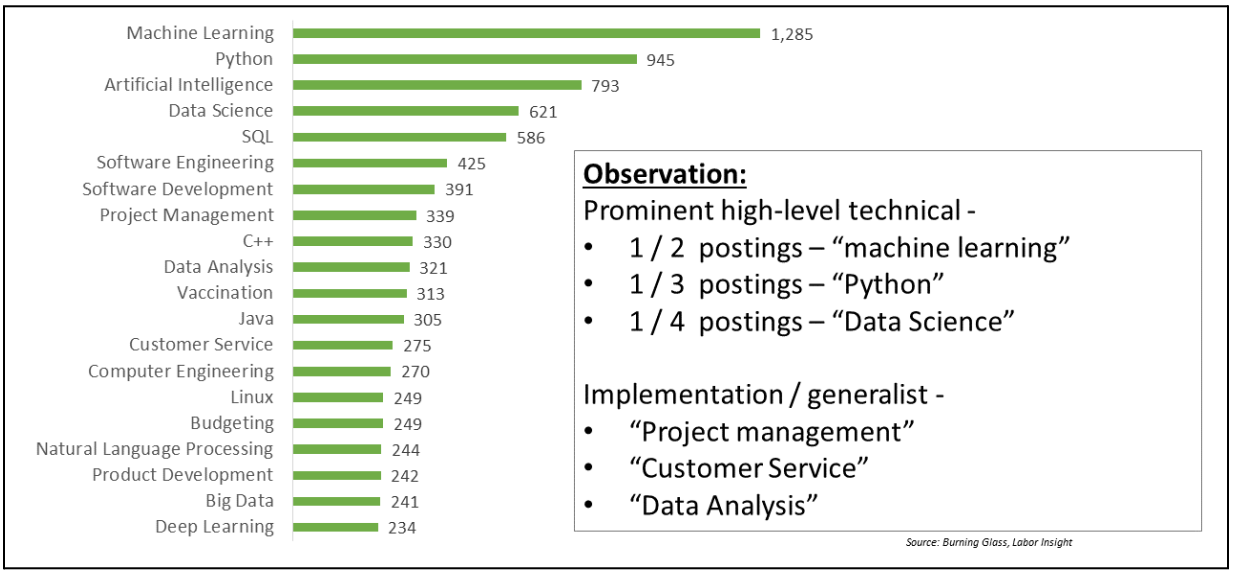
Figure 4: Top AI-related Middle Skill Occupations, Greater Sacramento

Middle Skill Occupations

SOC Code	Occupation	2021 Jobs	2016-2022 %Change	Avg. Annual Openings 2021-2026)	1-Year AI-related Job Postings	Median Hourly Earnings
11-1021	General and Operations Managers	18,008	15.1%	1,852	25	$49.04
15-1232	Computer User Support Specialists	12,671	126.2%	947	16	$47.96
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	6,453	-7.1%	710	40	$30.21
33-3021	Detectives and Criminal Investigators	1,546	26.4%	122	15	$48.28
15-1257	Web Developers and Digital Interface Designers	846	22.4%	68	20	$35.54

Figure 5 reveals that most AI-related job postings showed a demand for high-level technical skills like machine learning (50%), Python (33%), and data science (25%). Additionally, implementor/generalist skills such as project management, data analysis, and customer service were also identified.

Figure 5: Top AI-Related Skills, Greater Sacramento Region



Employer Panel Discussion

The panelist discussion honed in on the most sought-after skills in candidates, emphasized diversity, equity, and inclusion initiatives, and the opportunity for companies to offer more

internships to community college students. A list of participating industry panelists are as follows:

- **Ethan Eldridge**, Eyefinity, Solutions Architect
- **Alexander Le**, NASA Community College Aerospace Scholar & Intel Data Science Intern
- **Dylan Steele**, Databricks, Software Engineer
- **Helen Wu**, Appdynamics, Cisco, Product Designer
- **Anand Paranjpe**, Microsoft, Principal Software Engineering Manager

Essential and Emerging Skills

The panel discussion emphasized key technical skills that aligned with top occupational data provided by Wilcher. Panelists also shared **communication, time management, organization, and problem-solving as integral skills** to successfully navigate this dynamic field. The panelists also affirmed that there are an increasing number of jobs and skills that are sought after by employers, particularly in the middle-skills field. Dylan Steele, Software Engineer at Databricks, highlights this when discussing the role of "low code and no code" artificial intelligence applications. These applications require very little, if any, familiarity with coding languages, as they are geared more towards the translators of AI that Wilcher mentioned during the labor market analysis. The consensus from the panel was that AI is an emerging tool being used more frequently in ICT, as well as other industries, but is not a standalone discipline that is needed in the field, especially for middle-skill professionals.

Beyond middle-skill careers, the panel discussed what employers look for in recent graduates and what qualities would be most beneficial for students to focus on. Anand Paranjpe, Principal Software Engineering Manager at Microsoft, discussed his over twenty years of experience in the tech sector and emphasized that technical knowledge in ML and AI is part of an entire ecosystem. Prospective ICT candidates should not fixate themselves on building skills in a niche set of the tech sector. Rather, **students should focus on creating a solid and diverse foundation of skills. This includes knowledge of systems, applications, computer science, as well as mathematical and algorithmic thinking**. Additionally, Paranjpe and other panelists emphasized they would pick a generalist over a specialist when hiring potential candidates that have recently graduated because it is easier for the employers to provide additional inhouse training to move a generalist to specialist than vice versa.

Internships

Panelists encouraged students and educators to push for **increased internship opportunities for students to gain real-world, hands-on experience**. Many companies in the tech sector are

standardizing paid internships, which provides students the opportunity to gain an understanding of the demands and nature of these jobs first-hand, while not having to forego a wage. For community college students, panelists indicated that while many of these internships are taken by students at universities, some companies like Intel are partnering with community colleges to bridge this gap. Alexander Le, Intel Data Science Intern, explained how their experience at Intel taught them crucial soft and hard skills needed in the field. According to Le, being in an environment with like-minded individuals striving for a common goal was incredibly important towards developing problem-solving and interpersonal team dynamic skills. Other panelists agreed on the importance of students contextualizing skills through internships.

Diversity, Equity, and Inclusion Initiatives

Throughout the panelist portion, a diverse work environment was highlighted as being an important cornerstone to increase problem-solving and collaboration in teams. Each industry partner highlighted diversity, equity, and inclusion (DEI) initiatives in their workforce, providing many resources that are provided on the last page of this report. Paranjpe highlighted how Microsoft makes a concerted effort to take DEI seriously, explaining that potential candidates do not have preferential treatment based on where their education is from, as all candidates are screened through the same interview process. Additionally, interviewers are given rigorous training on how to limit biases as much as possible; interviewers at Microsoft are encouraged to take a critical lens at the interview process itself and question any of their practices that are cause for concern.

Helen Wu provided additional resources from Cisco, championing the Cisco certification training for people with nontraditional education backgrounds, and an apprenticeship initiative targeting minority populations. Dylan Steele highlighted Databricks' DEI portal and their work with Colorstack, a tech nonprofit that focuses on increasing minority representation in the tech sector. Steele shared, "Recruiting events [with ColorStack] have been really successful, we've definitely expanded the number of DEI candidates that we've been looking at because of this." Ethan Eldridge highlighted Eyefinity's efforts to increase diversity in the workforce by taking staff through training that is meant to increase the DEI efforts of the overall organization. Eyefinity also makes concerted efforts to provide opportunities for people from many walks of life, as Eldridge emphasizes that **everyone has a place in the tech industry**.

Community College Spotlight

This section of the advisory featured education representatives highlighting programs across the North region as follows:

- Meili Xu, Computer Information Science at Sacramento City College
- Suha Al Juboori, AI and ML Programs at Folsom Lake College

- Suzanne De Mey, Social Media Marketing Certifícate & Global Business Economics Certificate at Sacramento City College
- Buddy Spisak, Collaborative Online Cybersecurity Certificate Program at Cosumnes River College
- Daniel Gilbert-Valencia, Cybersecurity and Information Security Administration at American River College

Xu introduced the new Data Science A.S. Degree at Sacramento City College with a job growth profile and how this degree is designed for students who aspire to master the essential knowledge and skills required for data storage, discovery, analysis, visualization, and application. Al Juboori highlighted Folsom Lake College's AI and ML programs and their partnership with Intel, utilizing Intel's AI and ML curriculum. The programs offer a comprehensive course load of AI and ML fundamentals and the coding languages, algorithmic, and computer science requirements necessary to prepare students for a career in this industry. De Mey highlighted Sacramento City College's social media marketing certificate and their global business economics certificate, showcasing the skills necessary to leverage an authentic social media presence through building connection and community with users, as well as the macroeconomic lens that students undertake to develop a deeper understanding of the economics behind a global business.

Spisak featured Cosumnes River College's Collaborative Online Cybersecurity Certificate Program, where students have the opportunity to become a cybersecurity specialist in less than a year. This course is 8 weeks long and 100% online with zero textbook costs. Gilbert-Valencia showcased American River College's new Cybersecurity and Information Security Administration program. It is part of the state cybersecurity apprenticeship program and this certificate is determined by the Joint Apprenticeship Committee which includes various California state departments, International Business Machines (IBM), unions and human resources. The courses offer Cisco certifications and an onramp to cybersecurity occupations.

Conclusion

At the end of the advisory, faculty and employers were encouraged to continue to engage with one another to build stronger pipelines into AI, machine learning and data science occupations. Email contact information for the advisory planning team members was shared and is listed below:

- Aaron Wilcher, Greater Sacramento Regional Director, Center of Excellence - wilchea@losrios.edu
- Jared Amalong, Director of Computer Science & Digital Learning, Sacramento County Office of Education - jamalong@scoe.net
- Renee John, Project Leader, Valley Vision - renee.john@valleyvision.org
- Yzabelle, Project Manager, Valley Vision - yzabelle.delacruz@valleyvision.org
- Danielle Susa, Project Associate, Valley Vision - danielle.susa@valleyvision.org

Industry Panel Diversity, Equity, and Inclusion Resources

A list of resources provided by panelists to increase diversity, equity, and inclusion in the workforce are listed here:

Databricks DEI Portal

ColorStack

Cisco Employee Resource Organizations and Networks

Cisco certification training (nontraditional backgrounds)

National Society of Black Engineers

Society of Women Engineers

Society of Hispanic Professional Engineers