



BIXELEXCHANGE
CENTER FOR INNOVATION & TECHNOLOGY AT THE L.A. AREA CHAMBER



Building the Tech Talent Pipeline for Los Angeles

A SECTOR REPORT ON THE INFORMATION TECHNOLOGY INDUSTRY

AUTHORS

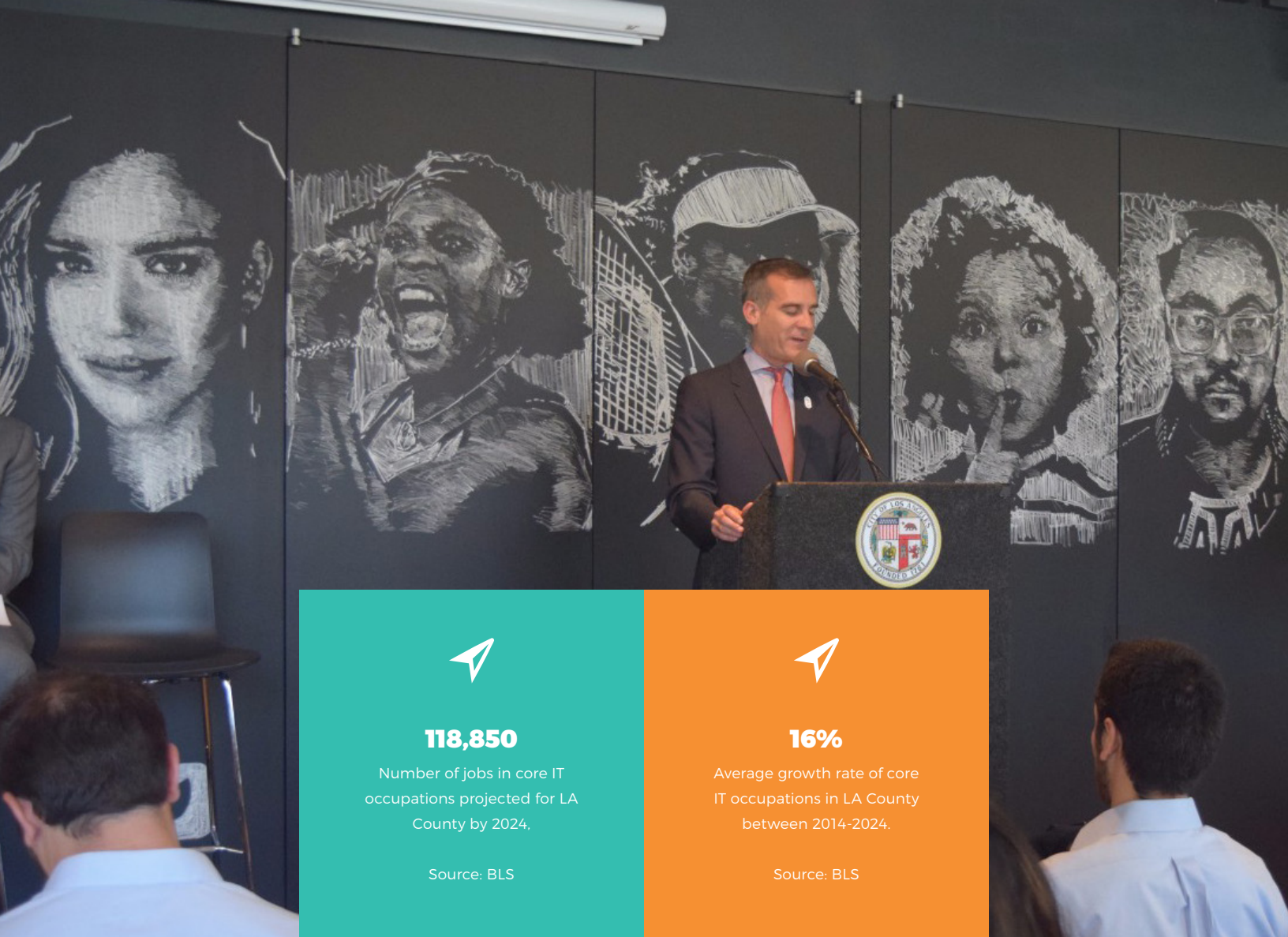
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118,850

Number of jobs in core IT occupations projected for LA County by 2024.

Source: BLS



16%

Average growth rate of core IT occupations in LA County between 2014-2024.

Source: BLS



\$100,306

Average of the mean annual wage for core IT occupations in LA County as of Q1 2017.

Source: BLS



7,500

New middle skills jobs projected for LA County between 2014-2024 (due to growth and replacement).

Source: BLS



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Welcome

It is with great pleasure that I introduce Bixel Exchange's 2017 Report on the IT Industry. In the last three years, we have been fortunate to work with the best technology companies in LA as the designated intermediary for the City of Los Angeles and for Los Angeles area community colleges. In this capacity, we have learned about their human capital needs and how we can best create a local pipeline of strong, diverse talent to enable their continued success. I wish to thank all the many industry partners who contributed to this report, and the City of Los Angeles Economic and Workforce Development Department, the Los Angeles Workforce Development Board, Mayor Eric Garcetti, the Mayor's Office of Economic Opportunity, and LinkedIn for their important support.

SEAN ARIAN

FOUNDER
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CHAMBER OF COMMERCE

Executive Summary

The information technology industry is growing in Los Angeles County. We can measure this growth by venture capital invested in local tech firms (\$6.9B between 2009 and 2014), by the number of local tech firms (14,753 firms with payroll in 2016), and by occupational data that project 16% average growth across core IT occupations between 2014 and 2024. In this period, the Bureau of Labor Statistics estimates that there will be 31,980 job openings in core IT occupations due to growth and replacement across LA County. It is critical that the region meet this need for skilled workers.

Building a pipeline of local tech talent is a win-win. It provides LA's tech companies with a diverse, skilled employee base who can substantially contribute to their competitive edge. It provides underserved youth, nontraditional talent, and STEM-oriented Angelenos with access to rewarding careers paying great salaries. Finally, it provides the LA region with increased opportunities for economic growth.

Aligning the increasing demand for talent with a supply of skilled local tech talent requires a strategic, multi-layered approach. This report presents three primary recommendations:

- At the systems level, to empower an intermediary who can serve as the driver for regional cooperation and knowledge sharing.
- At the program level, to foster a committed public workforce development system and education/training providers who respond nimbly to innovation in the IT industry.
- Finally, it requires a coordinated deployment of various resources—both public and private—to ensure a thriving ecosystem with engaged employers working to develop a skilled tech pipeline.

THE IT INDUSTRY

“FOR THE FIRST TIME EVER, IN 2017 THE FIVE MOST VALUABLE COMPANIES IN THE WORLD WERE ALL TECHNOLOGY COMPANIES”

-COMPTIA 2017 INDUSTRY OUTLOOK

The information technology (IT) industry continues to be among the fastest-growing industries in the world. By 2020, Chuck Robbins, CEO of Cisco, estimates that there will be over 26 billion internet-connected devices and over 4 billion global internet users. This will require a growing technology industry able to meet increasing demand for hardware and software, as well as skilled professionals to implement these technologies.

Today, the IT industry has global revenues of \$3.8 trillion, with 31% generated in North America. As the leading producer and consumer of technology-focused goods and services, the United States is home to approximately 500,000 technology business establishments, providing jobs to 6.9 million people overall (including non-technical jobs in technology companies).

US employment in core IT occupations (described below) reached 4.2 million people in 2014, and is projected to reach 4.8 million by 2024. As of 2016, the IT industry accounted for approximately 4.4% of the overall US workforce and 5.2% of the private sector workforce.

However, even as the IT industry grows in scope and reach, the skills gap continues to impact productivity and competitiveness. In a recent CompTIA survey, nearly half the respondents (46%) believe the skills gap is growing. They cite a lack of workers with advanced soft skills like problem solving or analysis; workers falling behind on technical skills, particularly as new technologies continue to be introduced; and college graduates without sufficient preparation for today's jobs (please refer to bibliography for citation).

The IT Industry

VARIOUS SECTORS COMPRISE THE IT INDUSTRY

HARDWARE

Computers, servers, storage, mobile devices, printers, network equipment, etc.

SOFTWARE

Applications for productivity, business, networks, systems, security, mobile apps.

SERVICES

Deployment, integration, custom development, break/fix, managed services.

INFRASTRUCTURE

Internet backbone, telecommunications networks, cloud data centers

INFORMATION

Data, documents, voice, video, images, social streams

DIGITAL BUSINESS

Commerce, communications, collaboration, automation, governance

Source: CompTIA Industry Outlook 2017

492,550

TECH BUSINESS ESTABLISHMENTS
ACROSS THE USA IN 2016, BY LOCATION

Source: BLS, CompTIA Cyberstates 2017

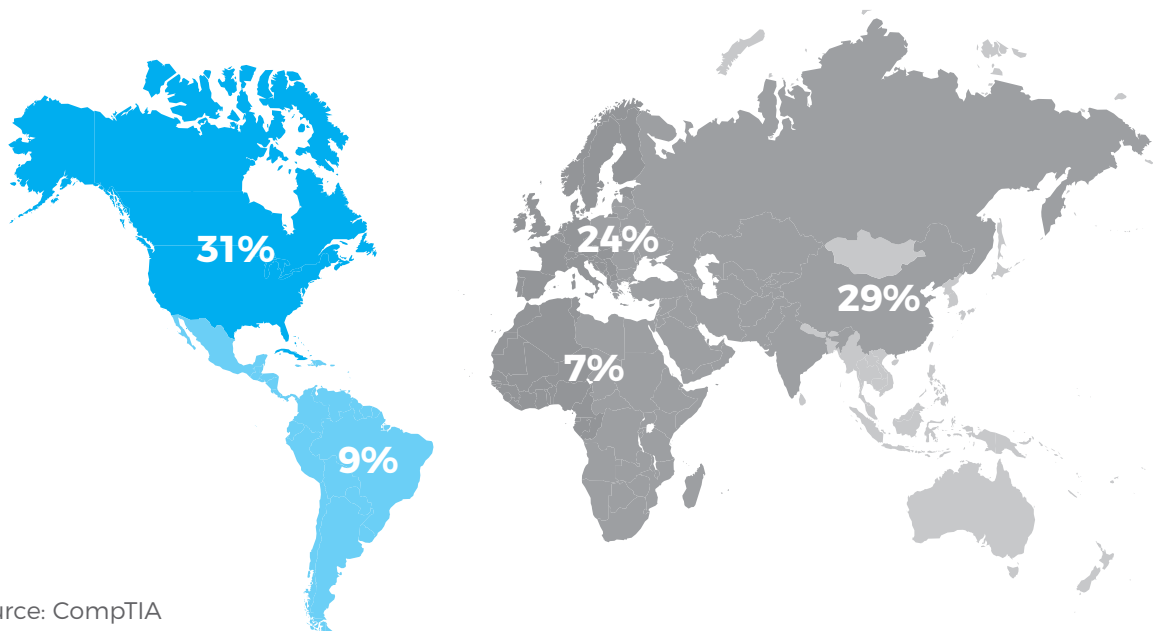
4.2 Million

PEOPLE IN CORE IT OCCUPATIONS
ACROSS THE USA

Source: BLS, CompTIA Cyberstates 2017

Global IT Industry: \$3.8 Trillion

ESTIMATED 2016 REVENUE AT CONSTANT CURRENCY. INCLUDES HARDWARE, SOFTWARE, SERVICES, AND TELECOMMUNICATIONS



Source: CompTIA



12%

Combined average growth rate
for all Core IT Occupations in the
United States

Source: BLS

CORE IT OCCUPATIONS

TECH TALENT IS A CRITICAL COMPONENT OF ALL COMPANIES' OPERATIONAL FRAMEWORK, NO MATTER THE INDUSTRY.

The IT industry is not just composed of technology companies and their employees. It also includes the workers in 14 core IT occupations that are employed across all major industries in the US. These occupations are key drivers of competitive advantage for firms in other industries, taking innovative products and services developed by technology firms and implementing them at firms across the economy. The Bureau of Labor Statistics currently identifies 14 core IT occupations (described below), which this report refers to as 'tech talent.'

CORE IT OCCUPATIONS AS DEFINED BY THE BUREAU OF LABOR STATISTICS (BLS)

| TITLE | SOC CODE | EDUCATION |
|--|----------|--------------|
| Computer and Information Systems Managers | 11-3021 | BACHELOR'S |
| Computer and Information Research Scientists | 15-1111 | PHD |
| Computer Systems Analyst | 15-1121 | BACHELOR'S |
| Information Security Analysts | 15-1122 | BACHELOR'S |
| Computer Programmers | 15-1131 | BACHELOR'S |
| Software Developers, Applications | 15-1132 | BACHELOR'S |
| Software Developers, Systems Software | 15-1133 | BACHELOR'S |
| Web Developers | 15-1134 | ASSOCIATE'S |
| Database Administrators | 15-1141 | BACHELOR'S |
| Network and Computer Systems Administrators | 15-1142 | BACHELOR'S |
| Computer Network Architects | 15-1143 | BACHELOR'S |
| Computer User Support Specialists | 15-1151 | SOME COLLEGE |
| Computer Network Support Specialists | 15-1152 | ASSOCIATE'S |
| Computer Occupations, All Other | 15-1199 | BACHELOR'S |

DESCRIPTION OF CORE IT OCCUPATIONS, BLS OCCUPATIONAL OUTLOOK 2017

COMPUTER & INFORMATION SYSTEMS MANAGERS

Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming.

COMPUTER & INFORMATION RESEARCH SCIENTISTS

Design new approaches to computing technology and find innovative uses for existing technology. They study and solve complex problems in computing for business, medicine, science, and other fields.

COMPUTER SYSTEMS ANALYSTS

Study an organization's current systems and new systems to help the organization operate more efficiently. They bring business and information technology (IT) together.

INFORMATION SECURITY ANALYSTS

Plan and carry out security measures to protect an organization's computer networks and systems. Their responsibilities are continually expanding as the number of cyberattacks increases.

COMPUTER PROGRAMMERS

Write and test code that allows computer applications and software programs to function properly. They turn the program designs created by software developers and engineers into instructions that a computer can follow.

SOFTWARE DEVELOPERS, APPLICATIONS

Develop, create, and modify general computer applications software or specialized utility programs. Analyze user needs and develop software solutions. Design software or customize software for client use.

SOFTWARE DEVELOPERS, SYSTEMS

Research, design, develop, and test operating systems-level software, compilers, and network distribution software for various applications. Set operational specifications and formulate and analyze software requirements.

WEB DEVELOPERS

Design and create websites. They are responsible for the site's technical aspects, such as its performance and capacity, which are measures of a website's speed and how much traffic the site can handle. In addition, web developers may create content for the site.

DATABASE ADMINISTRATORS

Use specialized software to store and organize data, such as financial information and customer shipping records. They make sure that data are available to users and are secure from unauthorized access.

NETWORK & SYSTEMS ADMINISTRATORS

Computer networks are critical parts of almost every organization. Network and computer systems administrators are responsible for the day-to-day operation of these networks.

COMPUTER NETWORK ARCHITECTS

Design and build data communication networks. These networks range from small connections between two offices to next-generation networking capabilities such as a cloud infrastructure that serves multiple customers.

USER SUPPORT SPECIALISTS

Provide help and advice to people and organizations using computer software or equipment. Some support information technology employees within their organization. Others assist non-IT users who are having computer problems.

DEFINING THE TECH INDUSTRY THROUGH OCCUPATIONAL DATA

In this study, we focus on tech occupational data rather than industry-focused data, taking occupations considered tech-driven or tech-focused as our primary unit of analysis. These are classified by the Bureau of Labor Statistics as core IT occupations. In accordance with a recent study undertaken in collaboration with LinkedIn (see appendices), we define these occupations as ‘tech occupations’ and the individuals at these jobs as ‘tech talent.’ This expansion allows for a much broader investigative scope and ensures that policy recommendations benefit the highest number of people.

For the sake of clarity, job titles were standardized under the BLS’ classification system. In practice, each occupation comprises several different titles as reported to the BLS. For the LinkedIn study, self-reported titles were standardized under the BLS’ classification system, with the exception of new occupations not yet incorporated, such as data analyst and user-experience (UX) designer.

This analysis does not account for self-employed workers focused on the IT industry or self-employed tech talent, which are estimated by CompTIA at two million individuals (1.1 million and 943,000 respectively, according to Cyberstates 2017). However, it is important to note that unlike in other industries, contract or other flexible work is often considered desirable by tech talent because of the higher pay and greater control of working conditions. For more information on independent work, see recent studies by the Committee on Information Technology, Automation, and the U.S. Workforce at the National Academies of Sciences, Engineering, and Medicine and McKinsey Global Institute (cited in the bibliography).

16%

Combined average growth rate
for all core IT occupations in
Los Angeles County

Source: BLS

THE IT INDUSTRY IN LOS ANGELES

A STRONG, DIVERSIFIED ECONOMIC BASE AND OUTSTANDING HUMAN CAPITAL CONTINUE TO DRIVE LA'S GROWTH AS A TECHNOLOGY HUB. GROWTH WILL CONTINUE AS OTHER INDUSTRIES—INCLUDING HEALTHCARE, MANUFACTURING, AND MEDIA—INCORPORATE NEW TECHNOLOGIES INTO THEIR WORKFLOWS.

In the last few years, Los Angeles has emerged as a major tech center. Global technology companies now headquartered in LA include Cornerstone OnDemand, Maker Studios, Snap Inc., SpaceX, and Tinder, with Snap's high-profile \$24 billion IPO in March 2017 effectively cementing LA's place as a global technology hub.

LOS ANGELES' GROWING IT INDUSTRY

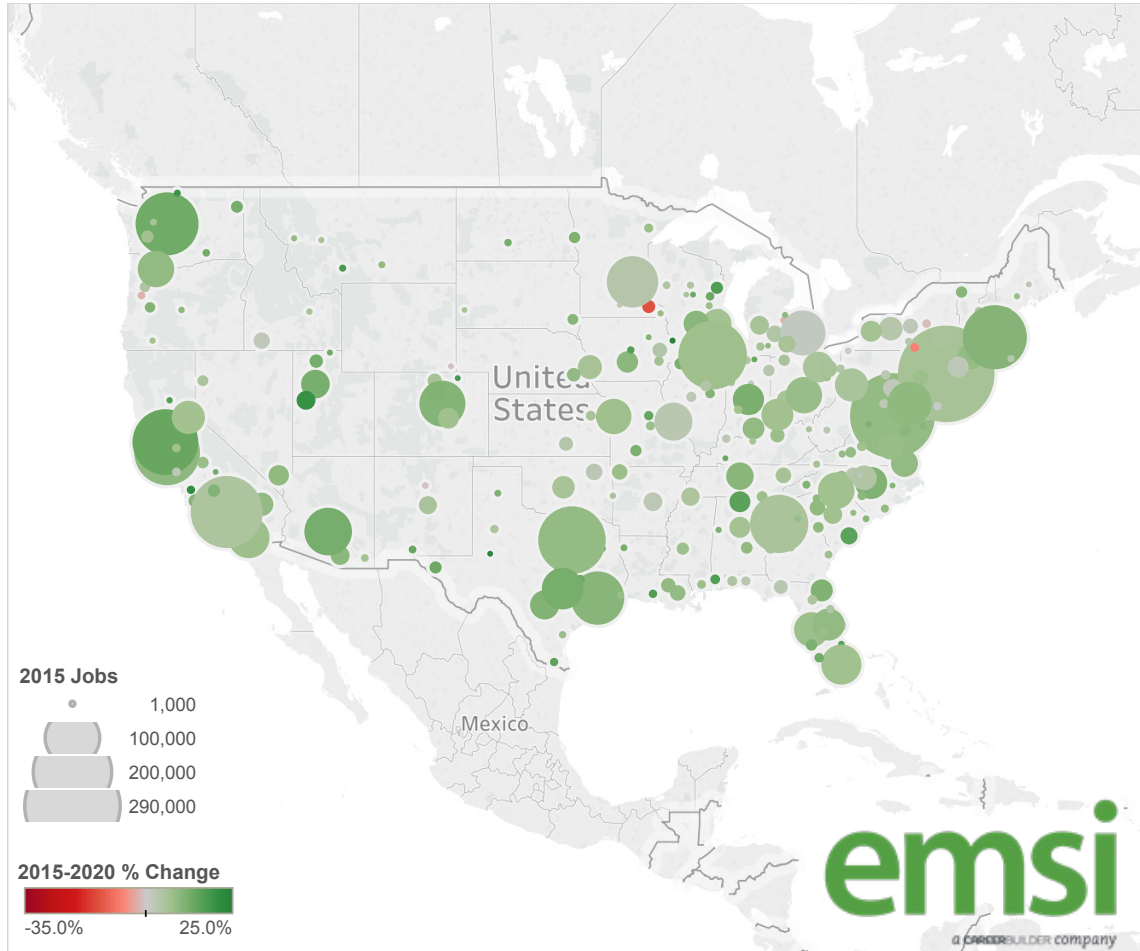
A number of indicators point to the growth of LA's IT industry. From 2009 to 2014, venture capital firms invested \$6.9 billion in 971 deals involving tech companies in LA and Orange Counties (CB Insights, "The LA Tech Venture Capital Report."). New companies continue to emerge, with the increasing flow of venture capital expanding opportunities for tech entrepreneurs. In 2016 there were 287,639 tech employees and 14,743 tech business establishments in LA County, amounting to 4.9% of the county's overall workforce (CompTIA, Cyberstates 2017). Average wages in core IT occupations were \$100,305, higher than the national average (\$93,397) but slightly lower than California's average (\$102,758—driven by Silicon Valley's very high wages).

LINKEDIN STUDY OF LA'S TECH INDUSTRY

In partnership with the Office of Mayor Garcetti and the City of LA's Economic and Workforce Development Department, LinkedIn and Bixel Exchange conducted a study on tech talent in Los Angeles (for geographic definition, please see appendices). Based on self-reported data, the study identified 244,000 LinkedIn members with technology jobs, 20,000 members who applied for technology jobs, and 46,000 companies employing tech talent (see appendices for tables).

The results show a low concentration of tech talent in the workforce (5% against 7% average for major tech hubs) despite a diminishing number of applications to jobs outside LA (63% of applications in 2016 compared to 69% in 2013). Talent migration to the Bay Area from LA has decreased from 25% of tech talent leaving LA in 2014 to 23% in 2016. Conversely, talent migration from the Bay Area to LA has increased slightly to 14% in 2016, up from 11% in 2014, while migration from other major US hubs remains steady. Immigration of tech talent from India and China has decreased from 55% of foreign tech talent coming to LA in 2014 to 44% in 2016.

Where Are IT Jobs Expected to Grow the Most by 2020?



This map details where information technology jobs are expected to grow and decline by 2020. Only metros with at least 1,000 IT jobs in 2015 were considered.

EMSI 2015.3 Beta Class of Worker (wage-and-salary employees)

PROJECTIONS

THE IT INDUSTRY IS EXPERIENCING GROWTH IN ALL OCCUPATIONS. THE TOP FIVE GROWING OCCUPATIONS IN LOS ANGELES COUNTY ARE EXPECTED TO ADD 20,730 NEW AND REPLACEMENT JOBS BY 2024, WITH AN AVERAGE GROWTH RATE OF 24%.

SOFTWARE DEVELOPERS WILL COMPRISE THE LARGEST SEGMENT OF LA'S IT INDUSTRY IN 2024.

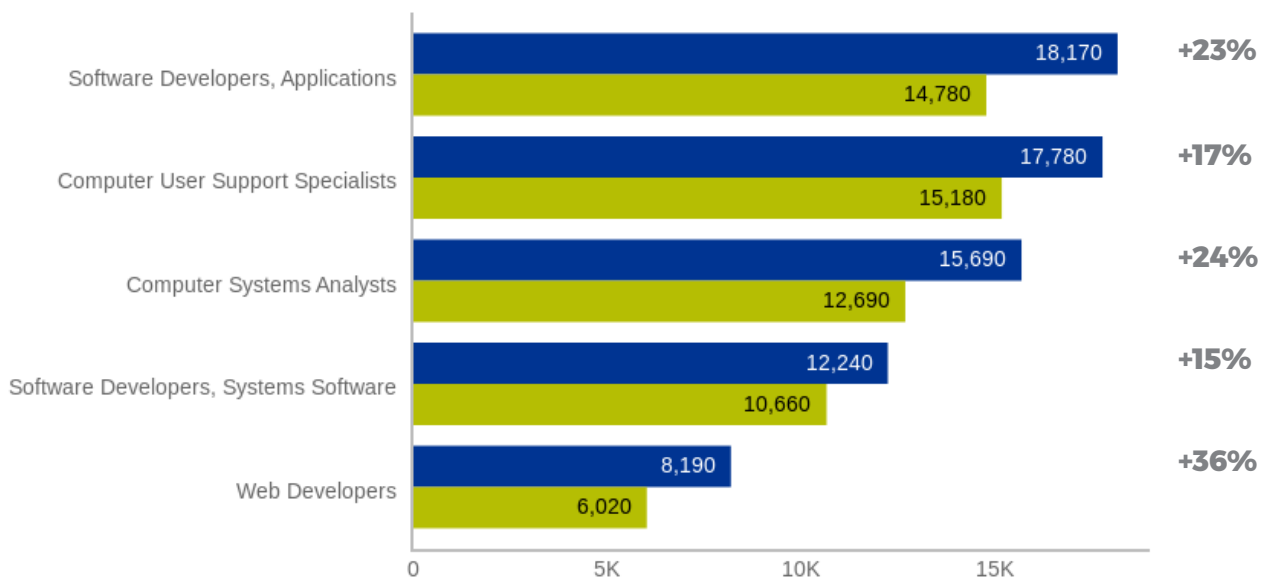
The most significant increase in LA County in terms of total jobs (defined as the total number of jobs per occupation in 2024) will be software developers focused on applications. They will comprise 18,170 jobs in LA County at a growth rate of 23% between 2014 and 2024. Approximately 5,500 new and replacement jobs for software developers in applications are projected. This is

above the national growth rate (19%) and in line with California's dramatic increase (43%). Following closely are IT support, computer systems analysts, and software developers focused on systems (17,780, 15,690, and 12,240 jobs respectively by 2024). These positions will require a pipeline of individuals with robust knowledge of basic coding and specialized programming experience.

WEB DEVELOPERS EXPERIENCE HIGH DEMAND AND FAST GROWTH.

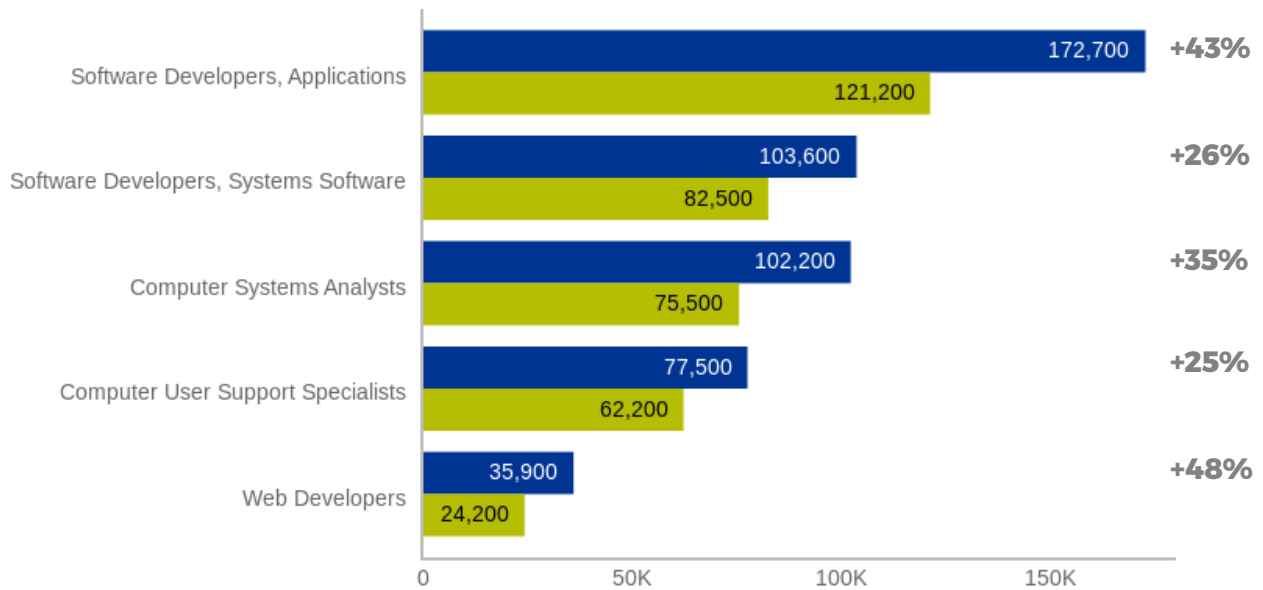
The core IT occupation growing at the fastest rate is web developers, with a growth rate of 36% from 2014 to 2024. LA is in lockstep with the national growth rate (27%) but below California's dramatic increase of 48%, driven by demand in the Bay Area.

TOP FIVE HIGH-GROWTH IT OCCUPATIONS | 2014-2024 | LOS ANGELES COUNTY



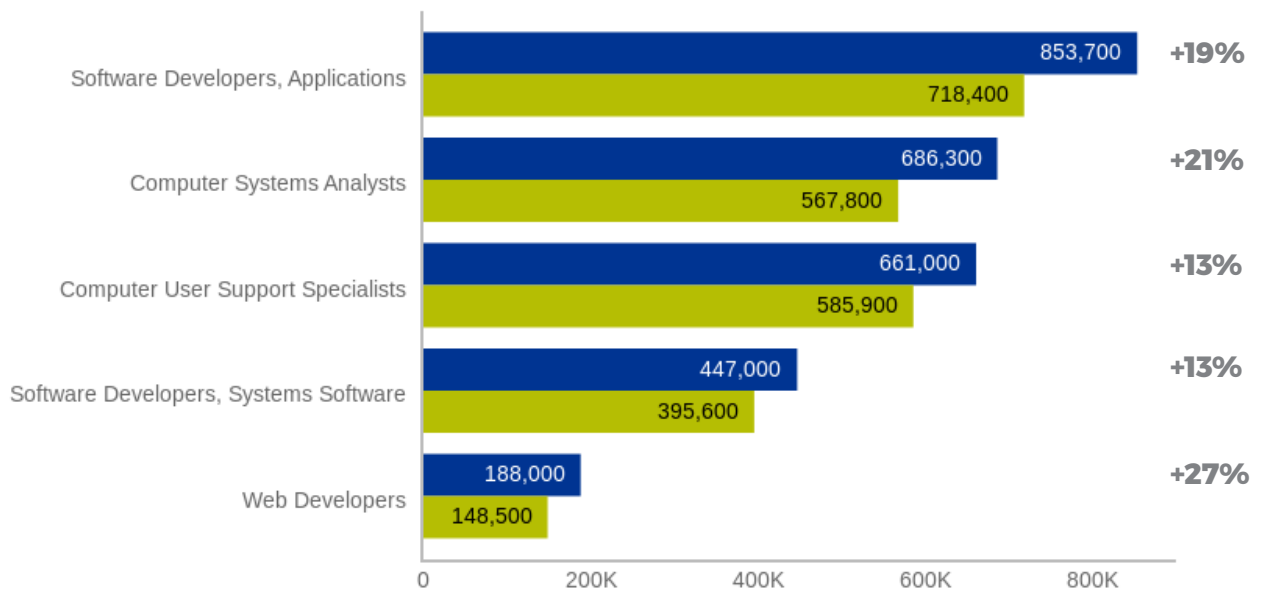
Source: BLS

TOP FIVE HIGH-GROWTH IT OCCUPATIONS | 2014-2024 | CALIFORNIA



Source: BLS

TOP FIVE HIGH-GROWTH IT OCCUPATIONS | 2014-2024 | UNITED STATES



Source: BLS

HIGH-NEED OCCUPATIONS

LA'S TECH INDUSTRY EXHIBITS SIMILAR NEEDS TO OTHER HIGH-TECH HUBS THROUGHOUT THE NATION, WITH A HIGH DEMAND FOR SOFTWARE DEVELOPERS.

THE TECH JOB MARKET IN LA IS COMPARABLE TO OTHER MAJOR TECH HUBS

Software developers rank as the top occupation hired in 2016 in every major tech hub in the US, according to LinkedIn; the other top occupations were IT consultant and IT support specialist. This creates a competitive job market with greater opportunities for mobility, as candidates are able to compare positions in different cities and make choices that take into account a variety of factors. This is a mixed blessing for LA; a high cost of living

and impacted public K-12 education system are cited by employers as the primary reasons why candidates accept a position elsewhere. Conversely, the climate and amenities are attractors for incoming talent, according to recruiters.

The LinkedIn data show that 20,000 job seekers in LA applied for 160,000 jobs in 2016. Only 37% of these jobs were local; the rest were concentrated in the Bay Area (26%) and New York City (11%).

Conversely, incoming talent to LA is largely from the Bay Area (14%), Orange County (11%), and New York City (7%). International candidates comprised only 18% of the incoming hires in 2016, well below New York City's 29% and the Bay Area's 26%.

TOP TITLES ON LINKEDIN FOR NEW HIRES IN TECH 2016-17, BY CITY

| AUSTIN | BOSTON | CHICAGO |
|---|-----------------------------|-----------------------------|
| 1. Software Developer | 1. Software Developer | 1. Software Developer |
| 2. IT Support Specialist | 2. IT Consultant | 2. IT Consultant |
| 3. IT Consultant | 3. IT Support Specialist | 3. IT Support Specialist |
| 4. Technology Manager | 4. Technology Manager | 4. Technology Manager |
| 5. IT Systems Administrator | 5. Intern/Student | 5. IT Systems Administrator |
| 6. Intern/Student | 6. IT Systems Administrator | 6. Intern/Student |
| 7. User Experience Designer | 7. Data Analyst | 7. Data Analyst |
| 8. Data Analyst | 8. User Experience Designer | 8. User Experience Designer |
| 9. Sales, Business Development, and Account Manager | 9. Research Fellow | 9. Database Developer |
| 10. Database Developer | 10. Database Developer | 10. Network Engineer |

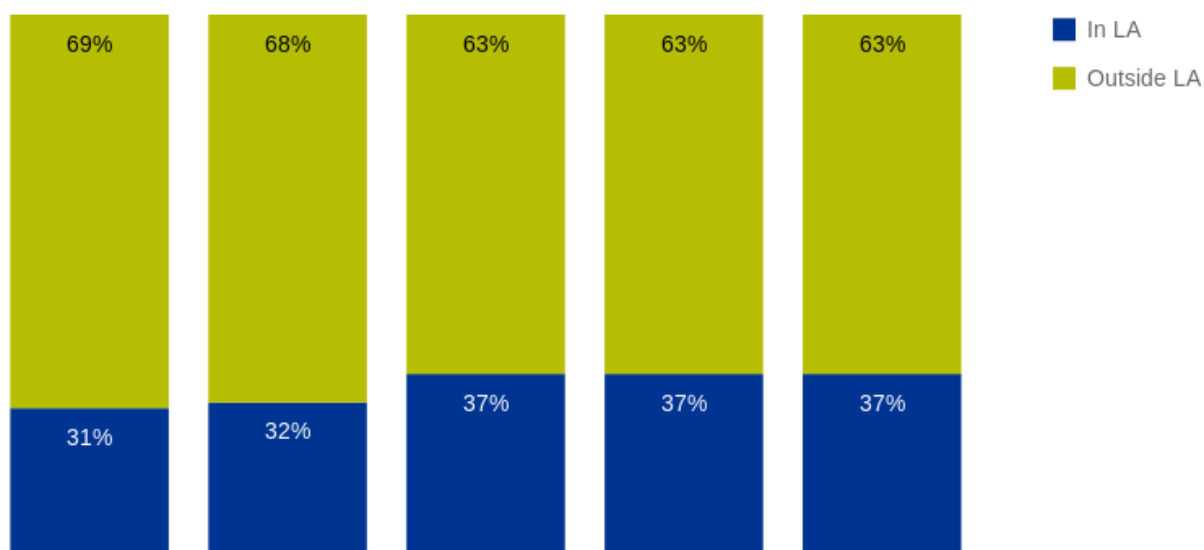
Source: LinkedIn

63%

Numer of LA-based applicants submitting applications for positions outside LA.

Source: LinkedIn

JOB APPLICATIONS BY REGION FOR LA-BASED TECH TALENT, 2016



Source: LinkedIn

TOP TITLES ON LINKEDIN FOR NEW HIRES IN TECH 2016-17, BY CITY

| NEW YORK | SAN FRANCISCO | LOS ANGELES |
|---|-----------------------------|---|
| 1. Software Developer | 1. Software Developer | 1. Software Developer |
| 2. IT Consultant | 2. Technology Manager | 2. IT Consultant |
| 3. IT Support Specialist | 3. IT Consultant | 3. IT Support Specialist |
| 4. Intern/Student | 4. IT Support Specialist | 4. IT Systems Administrator |
| 5. Technology Manager | 5. Intern/Student | 5. Technology Manager |
| 6. IT Systems Administrator | 6. User Experience Designer | 6. Intern/Student |
| 7. User Experience Designer | 7. IT Systems Administrator | 7. User Experience Designer |
| 8. Data Analyst | 8. Product Development | 8. Data Analyst |
| 9. Language and Localization Specialist | 9. Data Analyst | 9. Language and Localization Specialist |
| 10. Research Fellow | 10. Engineer | 10. Database Developer |

Source: LinkedIn

20%

Tech talent in LA working in software and IT companies.

Source: LinkedIn

TOP COMPANIES

MAJOR COMPANIES ACROSS VARIOUS INDUSTRIES HIRED TECH TALENT IN 2016. THESE INCLUDE MANUFACTURING, MEDIA AND ENTERTAINMENT, AND HEALTHCARE.

TECH JOBS IN LA ARE NOT LIMITED TO TECH COMPANIES BUT SPAN ACROSS INDUSTRIES

Only 20% of tech talent in LA worked in Software and IT Services in 2016. Other major industries employing tech talent include manufacturing (12%), healthcare (9%), education (8%), and entertainment (8%). These industries comprise large corporations not traditionally considered tech companies which, nonetheless, have large tech workforces, including Northrop Grumman in manufacturing and Kaiser Permanente in healthcare.

TOP INDUSTRIES HIRING TECH TALENT IN 2016, BY RANK

1. Software and IT Services
2. Manufacturing
3. Healthcare
4. Education
5. Entertainment
6. Finance
7. Hardware and Networking
8. Corporate Services
9. Consumer Goods
10. Media and Communications

Source: LinkedIn

TOP LA-BASED COMPANIES HIRING TECH TALENT IN 2016, BY RANK

1. Northrop Grumman
2. Kaiser Permanente
3. Amazon
4. University of Southern California
5. NASA Jet Propulsion Laboratory
6. Google
7. AT&T
8. Oracle
9. University of California, Los Angeles
10. HULU
11. Raytheon
12. Snap, Inc.
13. Walt Disney Company
14. Cornerstone OnDemand
15. Riot Games
16. General Assembly
17. NBCUniversal
18. Molina Healthcare
19. ESRI
20. Apple

Source: LinkedIn

Fields of Study

TECH TALENT IN LA COMES FROM VARIOUS FIELDS BESIDES COMPUTER SCIENCE

1. Business Management & Administration
2. Electrical and Electronic Engineering
3. Journalism, Media, & Communications
4. Language & Literature
5. Mechanical Engineering
6. Mathematics
7. Psychology
8. Education
9. Industrial Engineering & Management Science
10. Economics

Source: LinkedIn

66%

TECH TALENT IN LA WITH A DEGREE IN A FIELD BESIDES COMPUTER SCIENCE

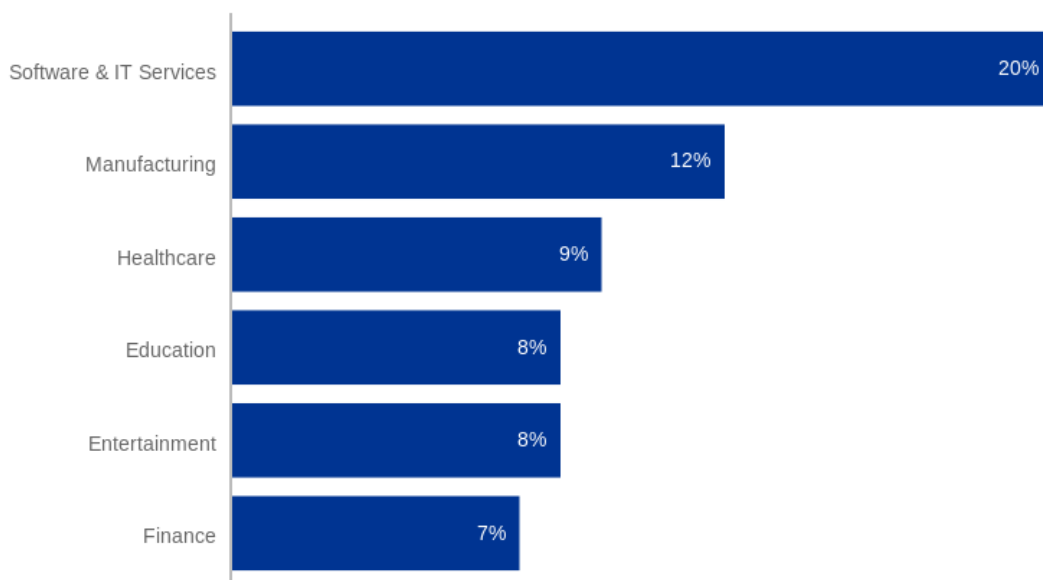
Source: LinkedIn

161,000

TECH TALENT IN LA WITH A DEGREE IN A FIELD OTHER THAN COMPUTER SCIENCE

Source: LinkedIn

DISTRIBUTION OF TECH TALENT IN LA ACROSS INDUSTRIES, 2016



Source: LinkedIn

LA HAS THE MOST INCLUSIVE TECH WORKFORCE AMONG US TECH HUBS

There are significant contrasts between the tech workforce in the Bay Area and LA. Overall, the Bay Area has the highest educated tech workforce, with 7% having PhDs, 34% having Master's Degrees, and 40% having a Bachelor's Degree. Only 20% of the tech workforce in the Bay Area does not report at least a four-year degree on LinkedIn. By contrast, LA has the most inclusive tech workforce, with 3% having PhDs, 22% having Master's Degrees, and 43% having a Bachelor's Degree. Of all the tech hubs, LA has the most tech talent without a four-year degree: 31%. This includes 6% with an Associate's Degree.

The University of California and the California State University systems produce the majority of LA's tech talent, with 8 of the 10 top producers of tech talent at the Bachelor's level and 7 of the top 10 at the Master's level. The only non-California university supplying tech talent to LA in large numbers was MIT, ranked ninth at the PhD level.

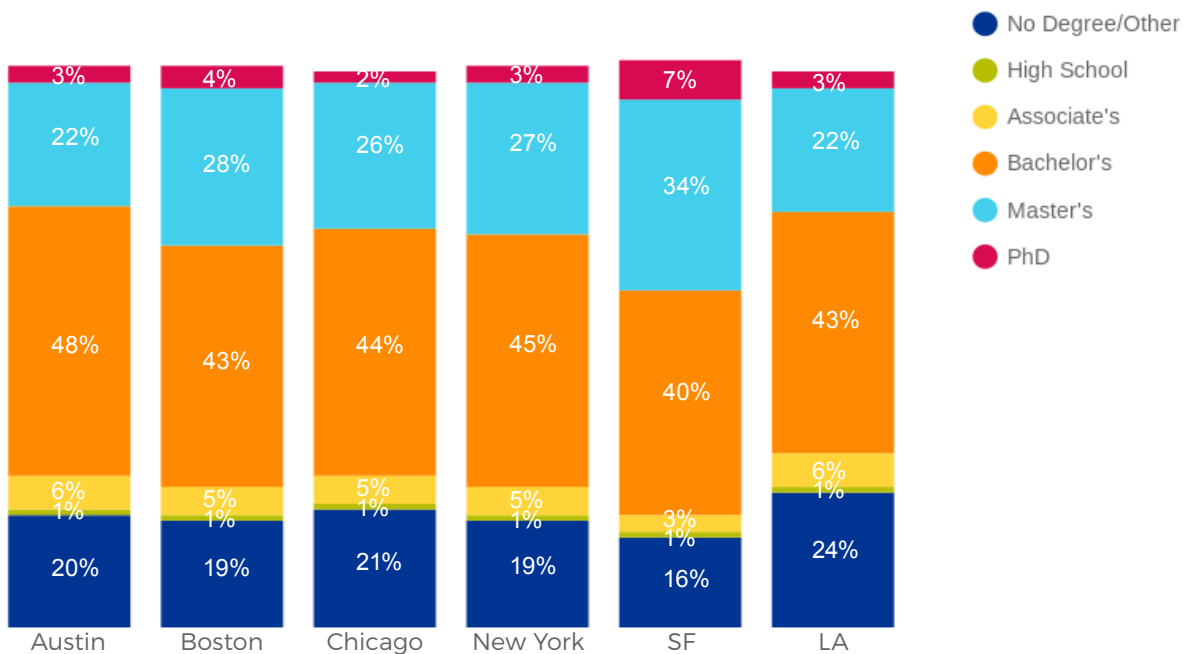
EDUCATIONAL TRENDS

CALIFORNIA'S UNIVERSITIES ARE PRODUCING EXCELLENT GRADUATES WHO COMPRISE THE MAJORITY OF TECH TALENT IN LOS ANGELES.

LA HAS THE HIGHEST PERCENTAGE OF TECH TALENT WITHOUT A DEGREE LISTED ON LINKEDIN

Approximately 24% of the tech workforce in LA does not list a degree; this is the highest proportion among the top tech hubs in the US. This is notable, given the similarity in occupations exhibited by all six cities (see pages 16-17). The next highest proportion of tech talent without a degree is Chicago with 21%. By contrast, the Bay Area has only 16% of tech talent without a degree and approximately double the proportion of PhDs.

HIGHEST LEVEL OF EDUCATION FOR TECH TALENT PER CITY, 2016



Source: LinkedIn

TOP 10 SCHOOLS PRODUCING TECH TALENT ASSOCIATE'S DEGREE

1. El Camino College
2. Santa Monica College
3. Mt. San Antonio College
4. Pasadena City College
5. Riverside City College
6. Moorpark College
7. Los Angeles Pierce College
8. ITT Technical Institute
9. UCLA Extension (certificates only)
10. Chaffey College

Source: LinkedIn

TOP 10 SCHOOLS PRODUCING TECH TALENT BACHELOR'S DEGREE

1. University of California, Los Angeles
2. California State, Northridge
3. California State Polytechnic, Pomona
4. University of Southern California
5. California State, Long Beach
6. University of California, Irvine
7. University of Phoenix
8. California State, Los Angeles
9. University of California, Riverside
10. California State, Fullerton

Source: LinkedIn

TOP 10 SCHOOLS PRODUCING TECH TALENT MASTER'S DEGREE

1. University of Southern California
2. University of California, Los Angeles
3. California State, Northridge
4. California State, Long Beach
5. University of Phoenix
6. California State, Los Angeles
7. California State, Fullerton
8. UCLA, Anderson School of Management
9. California State Polytechnic, Pomona
10. Pepperdine University

Source: LinkedIn

TOP 10 SCHOOLS PRODUCING TECH TALENT DOCTOR OF PHILOSOPHY DEGREE

1. University of California, Los Angeles
2. University of Southern California
3. California Institute of Technology
4. University of California, Irvine
5. University of California, Riverside
6. Claremont Graduate University
7. University of California, Santa Barbara
8. University of California, Berkeley
9. Massachusetts Institute of Technology
10. Stanford University

Source: LinkedIn

TOP SKILLS

TECH EMPLOYERS IN LA REQUIRED SPECIFIC HARD SKILLS FOR OPEN POSITIONS IN 2016, WITH JAVASCRIPT AS THE NUMBER ONE MOST REQUESTED SKILL. OTHER SKILLS REQUIRED INCLUDED WEB DEVELOPMENT, NETWORKING, AND AGILE METHODOLOGIES.

TOP 20 TECHNICAL SKILLS FOR TALENT HIRED IN 2016

1. JavaScript
2. Java
3. SQL
4. HTML
5. CSS
6. C++
7. Adobe Photoshop
8. Python
9. MySQL
10. Web Development
11. Networking
12. jQuery
13. Agile Methodologies
14. C
15. PHP
16. Microsoft SQL Server
17. C#
18. HTML5
19. Active Directory
20. XML

Source: LinkedIn

SKILLS REQUIREMENTS ARE CROSS-FUNCTIONAL

The skills required by tech companies in LA function across various core IT occupations; however, they are most weighted toward software development. This reflects the high need for software developers in LA. Other occupations aligned with high-demand skills include systems administrator, technology manager, IT consultant, and IT support specialist. The latter requires skills across the spectrum as well as specialization in 1-2 areas, depending on the needs of the company.

BOOTCAMPS AND ACCELERATED LEARNING

One of the employers surveyed recruits actively from bootcamps; other employers cite bootcamps as potential sources of talent for junior positions. General Assembly produces the highest number of graduates, with 827 individuals updating their LinkedIn profiles to list a bootcamp certification in 2016. Other bootcamps include Hack Reactor, Codesmith, Maker Square, and Sabio.

TOP 10 TECHNICAL SKILLS IN IT JOB POSTINGS, LOS ANGELES Q4 2016

1. SQL
2. Software Development
3. Java
4. JavaScript
5. Project Management
6. Software Engineering
7. Technical Support
8. Linux
9. Web Development
10. Microsoft Excel

Source: Burning Glass

Certifications

TOP 10 CERTIFICATIONS CITED IN LOS ANGELES IT JOB POSTINGS

1. PMP
2. CISSP
3. Cisco
4. Microsoft
5. CISA
6. CISM
7. ITIL
8. CompTIA A+ (5th)
9. CompTIA Network+ (12th)
10. CompTIA Security+ (15th)

Source: Burning Glass Labor Insights, February 2017

13%

TECH TALENT IN LOS ANGELES WITH CERTIFICATIONS LISTED ON THEIR LINKEDIN PROFILE

Source: LinkedIn

89%

IT JOB POSTINGS LISTING A BACHELOR'S DEGREE AS PREFERRED OR REQUIRED

Source: Burning Glass Labor Insights, February 2017

TOP 10 SKILL CLUSTERS IN IT JOB POSTINGS, LOS ANGELES Q4 2016

1. Software Development Principles
2. Systems Design and Implementation
3. SQL
4. Technical Support
5. Web Development
6. Microsoft Office and Productivity Tools
7. Operating Systems
8. JavaScript and jQuery
9. Project Management
10. Java

Source: Burning Glass

TOP IT SKILLS GAP AREAS

- Emerging technologies (ie IoT, AI, automation): 59%
- Integrating different apps, data sources, platforms, devices: 59%
- Cloud infrastructure / cloud apps: 57%
- Digital business transformation / modernizing legacy hardware or software: 57%
- Cybersecurity: 55%
- Software or app development: 55%
- Data management / data analytics: 53%

Source: CompTIA, "Assessing the IT Skills Gap," 2017. N=600.



14,743

Number of tech establishments
in LA County.

Source: CompTIA, Cyberstates
2017

INTERVIEWS & SURVEYS

BIXEL EXCHANGE CONDUCTED INTERVIEWS, SURVEYS, AND CONVENINGS IN 2016-17 TO GATHER DATA ON LABOR MARKET NEEDS AND PRIORITIES.

In-depth interviews were conducted with in-house recruiting and management staff at five tech companies. These included one small private company in software, one medium private company in hardware, and three large global public companies in software.

An online survey sent to tech employer partners received 14 respondents with 685 expected hires in 2017-18. Combined, they hired 577 employees in 2016, the majority in Los Angeles and the Bay Area.

WHAT SKILLS DO RESPONDENTS CONSIDER VERY IMPORTANT?

75%

TESTING & TROUBLESHOOTING

69%

CODING

69%

ENGINEERING DESIGN

69%

PLATFORM INTEGRATION

56%

DATA ANALYSIS

56%

END-USER SUPPORT

50%

DOCUMENTATION

38%

HARDWARE-SOFTWARE INTEGRATION

Source: Bixel Exchange Survey

* Percentage of respondents who consider this skill very important.

WHAT SOFT SKILLS DO RESPONDENTS CONSIDER VERY IMPORTANT?

| | | | |
|--------------------------|-----|---------------------------|-----|
| Logical Thinking ▶ | 94% | Written Communication ▶ | 69% |
| Problem Solving ▶ | 88% | Collaboration ▶ | 63% |
| Self Motivation ▶ | 88% | Leadership ▶ | 56% |
| Time Management ▶ | 88% | Agile Methodologies ▶ | 50% |
| Creativity ▶ | 69% | Mentoring ▶ | 31% |
| End-User Communication ▶ | 69% | Oral Presentation ▶ | 31% |
| Flexibility ▶ | 69% | Professional Networking ▶ | 6% |
| Patience ▶ | 69% | Negotiation ▶ | 0% |

Source: Bixel Exchange Survey

* Percentage of respondents who consider this skill very important.

DEGREE REQUIREMENTS FOR **CYBERSECURITY SPECIALISTS** AT YOUR COMPANY

| | |
|----------------------|-----|
| Master's Degree ▶ | 8% |
| Bachelor's Degree ▶ | 71% |
| Certification ▶ | 14% |
| Associate's Degree ▶ | 7% |

DEGREE REQUIREMENTS FOR **DATA SCIENTISTS** AT YOUR COMPANY

| | |
|---------------------|-----|
| PhD ▶ | 7% |
| Master's Degree ▶ | 26% |
| Bachelor's Degree ▶ | 53% |
| Certification ▶ | 14% |

DEGREE REQUIREMENTS FOR **ENGINEERS** AT YOUR COMPANY

| | |
|---------------------|-----|
| Master's Degree ▶ | 25% |
| Bachelor's Degree ▶ | 75% |

DEGREE REQUIREMENTS FOR **IT USER SUPPORT SPECIALISTS** AT YOUR COMPANY

| | |
|----------------------|-----|
| Master's Degree ▶ | 7% |
| Bachelor's Degree ▶ | 50% |
| Certification ▶ | 35% |
| Associate's Degree ▶ | 8% |

DEGREE REQUIREMENTS FOR **SOFTWARE OR WEB DEVELOPERS** AT YOUR COMPANY

| | |
|----------------------|-----|
| Master's Degree ▶ | 14% |
| Bachelor's Degree ▶ | 64% |
| Certification ▶ | 8% |
| Associate's Degree ▶ | 14% |

TECH EMPLOYERS IN THEIR OWN WORDS

A SERIES OF INTERVIEWS AND CONVENINGS WITH TECH EMPLOYERS REVEALED SEVERAL PRIORITIES TO IMPROVE THE PIPELINE OF TECH TALENT IN LA COUNTY. KEY AMONG THESE ARE ALIGNING EDUCATION WITH LABOR MARKET DEMAND AND ADDRESSING THE GROWING SKILLS GAP WITH INNOVATIVE PROGRAMS.

SPECIAL COMMITTEE ON TECH TALENT & TRAINING

As part of LA's Tech Talent Pipeline Initiative, Mayor Eric Garcetti created a Special Committee on Tech Talent & Training early in 2017 comprising major tech industry leaders in LA. The Special Committee is chaired by Sean Arian, a member of the Mayor's Tech Council and founder of Bixel Exchange.

INAUGURAL MEETING OF THE SPECIAL COMMITTEE ON TECH TALENT & TRAINING

The Tech Council's Special Committee on Tech Talent & Training held its inaugural meeting on July 2, 2017. A group of tech executives, educators, and partners were tasked with developing strategies to prepare the local workforce to meet the demands of tech jobs across various sectors. At the roundtable discussion, members discussed the preliminary findings of a data-sharing partnership with LinkedIn, Bixel Exchange, and the Mayor's Office in order to identify tech hiring trends and needs in Los Angeles. Participating employers included Boingo Wireless, Data360, mitú, NBC Universal, Northrop Grumman, and Snap Inc.

IN-DEPTH INTERVIEWS

Bixel Exchange held five in-depth interviews with industry partners throughout 2017. These consisted of a series of prepared questions focused on identifying local labor market needs, strengths, and weaknesses. Following this discussion, employers were given a forum to express thoughts, ideas, and suggestions on developing LA's tech talent pipeline.

All interviewees expressed a high need for software developers. Other critical occupations include project managers, sales engineers, IT user support specialists, and business intelligence analysts.

None of the interviewees had formal recruitment programs at local universities. Instead, they rely on external recruiters and their own networks to source strong candidates. All interviewees expressed willingness to partner with a highly knowledgeable workforce intermediary in order to develop new networks of qualified candidates.

Few of the interviewees expressed confidence in industry-recognized certifications. Instead, they focus on the candidate's entire profile to determine their suitability for each position.



Interviewees all expressed a critical need for software developers. “It’s tough competition out there for software developers; companies throughout the country are offering big salaries to entice available talent in the market.”



Tech companies rely heavily on personal networks and existing staff. “The majority of our hires come from internal recommendations.”



Industry leaders and interviewees all expressed a commitment to developing diversity in their workforce “We value creativity and collaboration. This requires staff with diversity of experience, background, and opinion.”



Interviewees did not place heavy emphasis on degrees. “No department manager has ever demanded a degree when it comes to technical roles. If it’s a strong candidate who’s a good fit for the organization, that’s all they care about.”



Industry leaders and interviewees place a high level of importance on cultural fit with the company. “We have had many great candidates with all the necessary skills to do a great job, but we do not offer them the position if they’re not a cultural fit.”



All interviewees commented on the importance of soft skills. “To succeed in our company, you need drive, you need to be team-oriented, and you need an agile mind. These are the success factors we have identified, and these are what we look for in new hires.”



Interviewees showed a willingness to work with the workforce development system provided it did not carry additional burdens. “I would consider working with the public sector if they help us meet our talent needs efficiently. We are project-driven so we can’t adjust our timelines based on bureaucratic requirements.”

FOCUS ON MIDDLE SKILLS

THE GROWING DEMAND FOR MIDDLE-SKILLS JOBS WILL REQUIRE TARGETED STRATEGIES TO ALIGN EMPLOYERS WITH NONTRADITIONAL TECH TALENT.

INNOVATION CONTINUES TO DRIVE GROWTH

Additional market forces will contribute to the growth of the IT Industry: Schwab's Market Outlook for IT identifies a need for companies to upgrade equipment in order to remain competitive in a global environment. Consumer confidence (now at its highest level since 2001, according to the Conference Board) will drive higher spending on technology products and services. Thus, both business and consumers will drive demand for IT products and services.

According to Deloitte's 2017 Technology Industry Outlook, technology continues to be a critical advantage for businesses, with the growth of 'exponentials' changing the competitive landscape: These include robotics, virtual and augmented reality, 3-D printing, and artificial intelligence. In the labor market, this will continue to drive demand for highly-skilled tech talent in the IT Industry in order to continue development and innovation. However, this will also create increasing demand for middle-skills positions at companies that require tech talent to implement and oversee these new technologies.

WORK-BASED LEARNING

Despite their growth, middle-skills opportunities present a number of challenges. For example, although middle-skills positions do not require a Bachelor's degree, they are likely to be advertised as requiring one. In practice, however, individuals with degrees might have different expectations of a middle-skills job. As stated by an interviewee managing an IT department, "people with a college degree don't want to do the job. They take it to get into the company and either transfer out or leave."

By contrast, work-based learning is a proven strategy to bring nontraditional talent to tech companies. It grants them access despite advertised requirements. It allows them to prove their skills, build a portfolio, and develop the networks to pursue a career in tech. It also reduces churn within the company.

Hiring decisions for middle-skills jobs are made based on experience, a portfolio of relevant work, and/or networks. This will require training opportunities focused on in-demand technical skills, real-world experience, portfolio-building exercises, and strong industry connections.



23,370

Total middle-skills jobs projected for LA's tech industry by 2024 (IT user support specialists and web developers).

Source: BLS

MIDDLE-SKILLS OPPORTUNITIES

BASED ON GROWTH, DEMAND, AND ENTRY-REQUIREMENTS, TWO OCCUPATIONS PRESENT IMPORTANT OPPORTUNITIES TO DEVELOP LA'S TECH TALENT PIPELINE.

IT user support specialists and web developers are expected to grow by 17% and 36% respectively, representing 7,500 new jobs in LA County by 2024 (job openings due to growth and replacement). Neither of these occupations require a Bachelor's degree, making them the most attractive middle-skills job in the IT Industry. With the appropriate training, career pathways, and workforce intermediary aligning stakeholders, these occupations are poised to serve as launchpads for careers in the tech industry.

IT Tech Support Specialist

Provide help and advice to people and organizations using computer software or equipment. Some support information technology employees within their organization. Others assist non-IT users who are having computer problems.

Source: BLS

SALARY ESTIMATES*

- \$25,000+ (529)
- \$35,000+ (428)
- \$50,000+ (317)
- \$65,000+ (212)
- \$90,000+ (108)

Source: Indeed

* Self-reported from 7/20/16-7/20/17

LOCATION**

- Los Angeles, CA (141)
- Irvine, CA (44)
- Anaheim, CA (20)
- El Segundo, CA (17)
- Valencia, CA (15)
- Glendale, CA (13)
- Pasadena, CA (13)
- Santa Monica, CA (12)

Source: Indeed

** Active postings on 7/20/17

\$57,080

AVERAGE YEARLY SALARY FOR TECH SUPPORT SPECIALISTS IN LOS ANGELES COUNTY

Source: BLS

17%

GROWTH RATE FOR LOS ANGELES COUNTY, 2014-24

Source: BLS

17,780

TOTAL PROJECTED JOBS FOR LOS ANGELES COUNTY, 2024

Source: BLS

TOP PAYING METROPOLITAN AREAS FOR THIS OCCUPATION*

| 1. | 2. | 3. | 4. | 5. |
|------------------------------------|--|-----------------------------|------------|----------------------------|
| San Jose-Sunnyvale-Santa Clara, CA | San Francisco-Redwood City-South San Francisco, CA | Boston-Cambridge-Newton, MA | Newark, NJ | Denver-Aurora-Lakewood, CO |
| \$74,990 | \$72,470 | \$65,690 | \$64,290 | \$62,590 |

Source: BLS

* Only metropolitan areas with employment over 4,000 are listed.

Web Developer

Design and create websites. They are responsible for the site's technical aspects, such as its performance and capacity, which are measures of a website's speed and how much traffic the site can handle. In addition, web developers may create content for the site.

Source: BLS

SALARY ESTIMATES*

\$70,000+ (1626)
 \$85,000+ (1309)
 \$95,000+ (957)
 \$100,000+ (770)
 \$115,000+ (320)

Source: Indeed

* Self-reported from 7/20/16-7/20/17

LOCATION**

Los Angeles, CA (587)
 Irvine, CA (309)
 Santa Monica, CA (94)
 Pasadena, CA (90)
 Torrance, CA (51)
 Burbank, CA (48)
 Glendale, CA (44)
 El Segundo, CA (40)

Source: Indeed

** Active postings on 7/20/17

\$75,560

AVERAGE YEARLY SALARY FOR WEB DEVELOPERS IN LOS ANGELES COUNTY

Source: BLS

36%

GROWTH RATE FOR LOS ANGELES COUNTY, 2014-24

Source: BLS

8,190

TOTAL PROJECTED JOBS FOR LOS ANGELES COUNTY, 2024

Source: BLS

TOP PAYING METROPOLITAN AREAS FOR THIS OCCUPATION*

| 1. | 2. | 3. | 4. | 5. |
|--|------------------------------------|------------------------------|--|---|
| San Francisco-Redwood City-South San Francisco, CA | San Jose-Sunnyvale-Santa Clara, CA | Seattle-Bellevue-Everett, WA | Washington-Arlington-Alexandria, DC-VA-MD-WV | New York-Jersey City-White Plain, NY-NJ |
| \$107,350 | \$102,080 | \$95,660 | \$87,830 | \$85,420 |

Source: BLS

* Only metropolitan areas with employment over 2,000 are listed.

Q&A: IT SUPPORT SPECIALIST

CAREERS AS TECH SUPPORT SPECIALISTS OFFER UNIQUE OPPORTUNITIES FOR ADVANCEMENT. TO ILLUSTRATE THESE PATHWAYS, WE INTERVIEW AN INDIVIDUAL WHO BEGAN AS A TECH SUPPORT SPECIALIST AND IS NOW DIRECTOR OF IT AT A LARGE GLOBAL TECH COMPANY.

HOW DID YOU GET INTO TECH SUPPORT?

My degree was in the arts, and I had a lot of college debt. I had to take a job that came easy to me. I got a temp job where they had me do data entry, then database administration, then networking. These all came easy to me so I kept at it.

WHAT WAS YOUR FIRST IT TECH SUPPORT JOB?

It was a property management company. I was the only one in the team. It was a small office in Chicago, with 50 or maybe 100 users. Basically, I learned on the job.

WHAT'S YOUR POSITION NOW?

Director of Corporate Technology Services. I interface between managers and executive IT staff. I lead the strategic and tactical projects for the entire corporate IT team; that means all the folks who support the users (not product development, we have technologists focused on that). I interface with project managers to ensure projects are moving smoothly and we don't get overwhelmed.

HOW DID YOU ADVANCE INTO A DIRECTOR POSITION?

Working hard, always taking on new challenges, trying to do my best at every challenge that's been thrown at me. Nobody gave it to me, I worked for it.

WHAT ARE THE SKILLS MOST IMPORTANT FOR YOUR POSITION?

The ability to negotiate, the ability to remain calm during times of high stress and when technology fails. The ability to replicate a vision in tactical steps.

On a basic level, you have to know business writing really well, know how to do budgets, know how to follow budgets, be keen on reporting your team's metrics. You basically can't be lazy about that stuff. You always have to hit your mark.

WHAT ABOUT TECHNICAL SKILLS?

People in my position usually come up through Help Desk or through the networking team or the database administration team, so they already have specific IT skillsets. They move into management because they have the technical skills down and they know how to speak at a technical level yet they can also translate 'tech speak' to executives.

WHAT ARE THE MOST VALUABLE TECHNICAL SKILLS TODAY?

There's a shortage of good people in all areas. The most lucrative if someone wants to move into high-paying jobs are server administration, information security, cloud computing, and database engineering.

ANY ADVICE FOR YOUTH WHO WANT TO START CAREERS IN TECH?

You have to be passionate about it, you should want to do it even on your free time. There are tons of resources online, do the reading. There are also free practical labs to learn anything you want to learn for free. I think everyone starts at the ground level, no matter how smart.

I didn't have any recommendations, I didn't know anyone in tech. I got started in a temp job and did it myself. I don't think there's a handicap for anyone who really wants it. Pick a technology. Focus on it. Once you have enough familiarity, then start applying for jobs. Look for entry-level positions to get your foot in the door. After your first job, recruiters will start knocking on the door, so you won't need to look anymore.

WHO ARE WEB DEVELOPERS?

JOBS FOR WEB DEVELOPERS ARE DIVIDED BETWEEN FRONT-END AND BACK-END SKILL CLUSTERS. BOTH ARE COMBINED IN FULL-STACK DEVELOPERS. TRAINING PROGRAMS FOR WEB DEVELOPERS MUST PAY CLOSE ATTENTION TO DEMAND FOR EACH TRACK.

Udacity* defines the different tracks as follows:

FRONT-END WEB DEVELOPER

Front-end developers are responsible for a website's user-facing code and the architecture of its immersive user experiences. In order to execute those objectives, front-end developers must be adept at three main languages: HTML, CSS, and JavaScript programming. In addition to fluency in these languages, front-end developers need to be familiar with frameworks like Bootstrap, Foundation, Backbone, AngularJS, and EmberJS, which ensure responsiveness across devices, and libraries like jQuery and LESS, which package code into more usable form. Front-end developers might also need experience with Ajax, a widely used technique for using JavaScript that lets pages dynamically load by downloading server data in the background.

BACK-END WEB DEVELOPER

Back-end developers are responsible for a website's server-facing code. In order to make the server,

application, and database communicate with each other, back-end developers use server-side languages like PHP, Ruby, Python, Java, and .Net to build an application, and tools like MySQL, Oracle, and SQL Server to find, save, or change data and return it to the user. Back-end developers often need experience with PHP frameworks like Zend, Symfony, and CakePHP; experience with version control software like SVN, CVS, or Git; and experience with Linux as a development and deployment system.

FULL-STACK WEB DEVELOPER

Full-stack developers combine knowledge of both front-end and back-end programming languages.

* See udacity.com for full definition.



30,410

Total jobs projected for software developers in LA by 2024.

Source: BLS

CAREER PATHWAYS OPPORTUNITIES

BASED ON LABOR MARKET AND INDUSTRY DEMAND, IT IS CRITICAL TO DEVELOP PATHWAYS INTO SOFTWARE DEVELOPER JOBS FOR LA'S TECH TALENT.

Software developers (both applications and systems) are expected to grow by 23% and 15% respectively, representing 8,600 new jobs in LA County by 2024 (job openings due to growth and replacement). High demand and low supply across the country will continue to impact LA's tech companies, who compete with other tech hubs to bring talent into Los Angeles. A bachelor's degree is required by most employers, so educational and career pathways must focus on inclusive trajectories leading from middle-skills opportunities that combine educational outcomes with work-based learning.

Software Developer

Software developers write the applications that allow people to do specific tasks on a computer or another device. Others develop the underlying systems that run the devices or that control networks.

Source: BLS

SALARY ESTIMATES*

- \$75,000+ (2965)
- \$85,000+ (2585)
- \$95,000+ (1937)
- \$105,000+ (1254)
- \$115,000+ (687)

Source: Indeed

* Self-reported from 7/20/16-7/20/17

LOCATION**

- Los Angeles, CA (929)
- Irvine, CA (608)
- Santa Monica, CA (183)
- Pasadena, CA (153)
- El Segundo, CA (150)
- Glendale, CA (97)
- Burbank, CA (74)
- Torrance, CA (70)

Source: Indeed

** Active postings on 7/20/17

\$112,310**

AVERAGE YEARLY SALARY FOR SOFTWARE DEVELOPERS (APPLICATIONS AND SYSTEMS) IN LOS ANGELES COUNTY

Source: BLS

16%**

GROWTH RATE FOR LOS ANGELES COUNTY, 2014-24

Source: BLS

30,410**

TOTAL PROJECTED JOBS FOR LOS ANGELES COUNTY, 2024

Source: BLS

TOP PAYING METROPOLITAN AREAS FOR THIS OCCUPATION*

| 1. | 2. | 3. | 4. | 5. |
|------------------------------------|------------------------------|------------------------------|--|------------------------------|
| San Jose-Sunnyvale-Santa Clara, CA | Seattle-Bellevue-Everett, WA | Oakland-Hayward-Berkeley, CA | San Francisco-Redwood City-South San Francisco, CA | Anaheim-Santa Ana-Irvine, CA |
| \$139,820** | \$132,080 | \$130,035** | \$129,205** | \$118,670 |

Source: BLS

* Only metropolitan areas with employment over 10,000 are listed.

** Combines software developers in applications and systems



STATEWIDE CAREER PATHWAYS INITIATIVES

In 2014, State Superintendent Torlakson announced a \$15 million grant from the State of California to LA HI-TECH, the Los Angeles High Impact Information Technology, Entertainment, Entrepreneurship, and Communication Hubs. The program is led by Los Angeles City College, Pasadena City College, and Santa Monica College. LA HI-TECH identified the highest need for three pathways: IT support specialist, web developer, and software developer. Below we provide employer feedback on the building blocks of each pathway.

PATHWAY: IT SUPPORT SPECIALIST

Must provide foundational skills in business services, specialized software packages, the support of multimedia products, the creation of documents, management of information, and proficiency in various communications systems. Requires strong customer service skills and the ability to manage multiple projects concurrently.

PATHWAY: WEB DEVELOPER

Must provide foundational skills in visual arts and composition, typography, web-based applications, and online programming languages (front-end and back-end). Requires strong listening, problem-solving, and communication skills, as well as self-motivation and follow-through. Visual composition required for front-end developers.

PATHWAY: SOFTWARE DEVELOPER

Must provide foundational skills in design, programming, development, implementation, and management of software systems. Requires strong problem-solving skills, attention to detail, focus on deadlines, and communication skills. Software developers must be able to work effectively both alone and in cross-functional teams.

Los Angeles is the entertainment capital of the world, with a thriving creative economy estimated at \$190 billion in output (Otis Report on the Creative Economy in LA 2017). This presents unique opportunities for local tech talent to intersect the creative economy, whether employed at entertainment companies or as content producers combining creativity with tech skills. New programs and pathways in Design and Visual Media Arts will therefore bolster LA's creative economy and prepare local talent to contribute to LA's most famous industry.

SUMMARY

Jobs in the information technology (IT) industry are growing globally and are projected to continue for the foreseeable future.

The IT industry in Los Angeles has jobs with middle to high wages and opportunities for advancement.

Two of the fastest-growing occupations are middle-skills jobs that do not require a Bachelor's degree: IT support specialists and web developers.

The workforce system, community colleges, and training providers need to be more responsive to employer and labor market needs when training for middle-skills opportunities.

Tech employers require training and educational providers to respond quickly and efficiently to new advances in the field.

LA's IT industry is a relatively new, fast-growing sector that has not yet developed the willingness or capacity to engage the public workforce system.

Work-based learning is still a developing area for tech employers, but is one of the most promising strategies to align tech employers with the workforce system, particularly for middle-skills opportunities.

CHALLENGES & RECOMMENDATIONS

DEMAND FOR IT OCCUPATIONS REMAINS HIGH, SALARIES IN LA COUNTY ARE ABOVE THE NATIONAL AVERAGE, AND EDUCATIONAL REQUIREMENTS ALLOW FOR INCLUSIVE HIRING POLICIES. HOW CAN THE LOCAL TALENT PIPELINE BE ALIGNED TO INDUSTRY DEMANDS?

CHALLENGE:

THE PUBLIC WORKFORCE SYSTEM CURRENTLY LACKS A COMPREHENSIVE REGIONAL STRATEGY TO TRAIN INDIVIDUALS FOR JOBS IN THE IT INDUSTRY.

- There is a lack of labor market research on local demand, growth projections, and the specific skills and competencies required for these positions.
- Tech grows quickly and innovates constantly, which requires a targeted strategy to address skills gaps in the local labor pool.
- There is a need for more coordination of the public workforce system, educational institutions, and training providers with tech employers to align supply and demand.

RECOMMENDATIONS:

COORDINATE WITH REGIONAL STAKEHOLDERS TO DESIGN INITIATIVES THAT ALIGN TRAINING PROGRAMS WITH IT INDUSTRY NEEDS.

- Develop the infrastructure to convene key stakeholders, including employers, educational institutions and training providers.
- Identify and disseminate IT industry needs in real time.
- Empower stakeholders to design and implement pilots that address current and projected need.
- Share results and best practices throughout the system.
- Scale successful policies and programs regionally.

CHALLENGE:**TECH CAREER PATHWAYS ARE NOT CLEARLY DEFINED IN PROGRAMS OFFERED BY EDUCATIONAL INSTITUTIONS AND TRAINING PROVIDERS.**

- There is a perception of a mismatch between the skills currently taught to students and the skills needed by employers.
- Training institutions are not fully leveraging accelerated learning and online learning.
- Educational institutions incorporate private industry late in the design process for career pathways, hindering opportunities for effective collaboration and making it less likely employers will participate.
- Career pathways in the IT Industry have not been fully designed or implemented.

RECOMMENDATIONS:**DESIGN AND IMPLEMENT CAREER PATHWAYS ALIGNED TO LABOR MARKET NEEDS, FULLY INCORPORATING INPUT FROM TECH EMPLOYERS.**

- Leverage newly-created regional infrastructure to convene key stakeholders in order to design career pathways.
- Enable educational institutions to provide students with career pathways with clearly defined goals and outcomes.
- Empower workforce intermediary to facilitate work-based learning activities hosted by IT employers.
- Incorporate employer feedback into continuous program development to ensure alignment of skills with local labor market demand.

CHALLENGE:**TECH EMPLOYERS ARE NOT CURRENTLY WELL-POSITIONED TO WORK WITH THE PUBLIC WORKFORCE SYSTEM OR THE PUBLIC EDUCATIONAL SYSTEM.**

- The IT Industry does not draw candidates from traditionally-underserved, low-income communities.
- The public workforce system is largely unknown to tech employers in Los Angeles.
- Tech companies rely on external recruiters and agencies to source talent.
- Recruiters and agencies prioritize return on investment for outreach efforts. For this reason, they focus on elite universities and professional networks with proven results.
- Credential inflation creates gateway requirements that exclude non-traditional talent.
- The majority of new hires come from internal recommendations, further restricting new and nontraditional sources of talent.

RECOMMENDATIONS:**DEVELOP RELATIONSHIPS WITH TECH EMPLOYERS THAT RESPOND TO THEIR NEEDS WHILE ADDING MEASURABLE VALUE TO THEIR COMPANIES.**

- Utilize work-based learning activities as a first step to engage tech employers, focusing on volunteer experiences. Volunteers become advocates. Internal advocates change the narrative about non-traditional talent sources.
- Provide tech employers with simple, accessible opportunities to engage non-traditional talent.
- Develop vetting and matching systems that meet employer needs so they view the public sector as a reliable source of talent.
- Empower an intermediary responsible for frequent and trust-based engagement with tech employers.
- Develop shared goals and measurement instruments to quantify the value added to tech companies by engaging non-traditional talent.

TABLES AND APPENDICES

LOS ANGELES COUNTY

SOURCE: CALIFORNIA EMPLOYMENT DEVELOPMENT DEPARTMENT, LABOR MARKET INFORMATION | NOVEMBER, 2016

| SOC CODE | TITLE | 2014 JOBS | 2024 JOBS | NUMERIC CHANGE | GROWTH RATE | NEW+ REPLACEMENT JOBS | AVERAGE ANNUAL WAGES (Q1-2016) |
|----------|--|-----------|-----------|----------------|-------------|-----------------------|--------------------------------|
| 11-3021 | Computer and Information Systems Manager | 8,690 | 10,120 | 1,430 | 16.5% | 2,450 | \$146,595 |
| 15-1111 | Computer and Information Research Scientists | 360 | 430 | 70 | 19.4% | 120 | \$116,991 |
| 15-1121 | Computer Systems Analyst | 12,690 | 15,690 | 3,000 | 23.6% | 4,630 | \$94,500 |
| 15-1122 | Information Security Analysts | 1,990 | 2,150 | 160 | 8% | 420 | \$104,939 |
| 15-1131 | Computer Programmers | 7,300 | 6,870 | -430 | -5.9% | 1,800 | \$95,159 |
| 15-1132 | Software Developers, Applications | 14,780 | 18,170 | 3,390 | 22.9% | 5,500 | \$111,128 |
| 15-1133 | Software Developers, Systems Software | 10,660 | 12,240 | 1,580 | 14.8% | 3,100 | \$118,594 |
| 15-1134 | Web Developers | 6,020 | 8,190 | 2,170 | 36% | 2,950 | \$65,759 |
| 15-1141 | Database Administrators | 2,540 | 2,900 | 360 | 14.2% | 910 | \$99,065 |
| 15-1142 | Network and Computer Systems Administrators | 10,170 | 11,370 | 1,200 | 11.8% | 2,510 | \$83,899 |
| 15-1143 | Computer Network Architects | 2,580 | 3,030 | 450 | 17.4% | 780 | \$121,719 |
| 15-1151 | Computer Support Specialists | 15,180 | 17,780 | 2,600 | 17.1% | 4,550 | \$56,030 |
| 15-1152 | Computer Network Support Specialists | 4,510 | 4,980 | 470 | 10.4% | 1,040 | \$72,293 |
| 15-1199 | Computer Occupations, All Other | 4,260 | 4,930 | 670 | 15.7% | 1,220 | \$76,209 |
| | TOTALS / AVERAGES = | 101,730 | 118,850 | 17,120 | 15.9% AVG | 31,980 | \$100,305.79 AVG |

CALIFORNIA

SOURCE: CALIFORNIA EMPLOYMENT DEVELOPMENT DEPARTMENT, LABOR MARKET INFORMATION | MAY, 2017

| SOC CODE | TITLE | 2014 JOBS | 2024 JOBS | NUMERIC CHANGE | GROWTH RATE | NEW+ REPLACEMENT JOBS | ANNUAL WAGE |
|----------|--|-----------|-----------|----------------|--------------|-----------------------|-------------|
| 11-3021 | Computer and Information Systems Manager | 50,100 | 65,300 | 15,200 | 30.3% | 21,100 | \$157,401 |
| 15-1111 | Computer and Information Research Scientists | 5,400 | 6,700 | 1,300 | 24.1% | 2,100 | \$119,771 |
| 15-1121 | Computer Systems Analyst | 75,500 | 102,200 | 26,700 | 35.4% | 36,400 | \$96,042 |
| 15-1122 | Information Security Analysts | 8,000 | 10,100 | 2,100 | 26.3% | 3,200 | \$108,784 |
| 15-1131 | Computer Programmers | 39,700 | 40,600 | 900 | 2.3% | 10,700 | \$90,655 |
| 15-1132 | Software Developers, Applications | 121,200 | 172,700 | 51,500 | 42.5% | 68,800 | \$121,475 |
| 15-1133 | Software Developers, Systems Software | 82,500 | 103,600 | 21,100 | 25.6% | 32,900 | \$125,949 |
| 15-1134 | Web Developers | 24,200 | 35,900 | 11,700 | 48.3% | 14,800 | \$77,568 |
| 15-1141 | Database Administrators | 12,100 | 15,000 | 2,900 | 24% | 5,600 | \$95,413 |
| 15-1142 | Network and Computer Systems Administrators | 43,100 | 52,000 | 8,900 | 20.6% | 14,500 | \$90,117 |
| 15-1143 | Computer Network Architects | 14,200 | 17,900 | 3,700 | 26.1% | 5,500 | \$128,242 |
| 15-1151 | Computer Support Specialists | 62,200 | 77,500 | 15,300 | 24.6% | 23,300 | \$58,557 |
| 15-1152 | Computer Network Support Specialists | 19,700 | 23,600 | 3,900 | 19.8% | 6,400 | \$75,681 |
| 15-1199 | Computer Occupations, All Other | 25,000 | 30,000 | 5,000 | 20% | 8,200 | \$92,958 |
| | TOTALS / AVERAGES = | 582,900 | 753,100 | 170,200 | 26.4% AVG | 253,600 | \$102,758 |

UNITED STATES

SOURCE: EMPLOYMENT PROJECTIONS PROGRAM, BUREAU OF LABOR STATISTICS

| SOC CODE | TITLE | 2014 JOBS | 2024 JOBS | NUMERIC CHANGE | GROWTH RATE | NEW+ REPLACEMENT JOBS | ANNUAL WAGE |
|----------|--|-----------|-----------|----------------|-------------|-----------------------|-------------|
| 11-3021 | Computer and Information Systems Manager | 348,500 | 402,200 | 53,700 | 15.4% | 94,800 | \$145,740 |
| 15-1111 | Computer and Information Research Scientists | 25,600 | 28,300 | 2,700 | 10.7% | 6,000 | \$116,320 |
| 15-1121 | Computer Systems Analyst | 567,800 | 686,300 | 118,600 | 20.9% | 191,600 | \$91,620 |
| 15-1122 | Information Security Analysts | 82,900 | 97,700 | 14,800 | 17.9% | 25,500 | \$96,040 |
| 15-1131 | Computer Programmers | 328,600 | 302,200 | -26,400 | -8% | 81,000 | \$85,180 |
| 15-1132 | Software Developers, Applications | 718,400 | 853,700 | 135,300 | 18.8% | 238,000 | \$104,300 |
| 15-1133 | Software Developers, Systems Software | 395,600 | 447,000 | 51,300 | 13% | 107,900 | \$110,590 |
| 15-1134 | Web Developers | 148,500 | 188,000 | 39,500 | 26.6% | 58,600 | \$72,150 |
| 15-1141 | Database Administrators | 120,000 | 133,400 | 13,400 | 11.1% | 39,200 | \$87,130 |
| 15-1142 | Network and Computer Systems Administrators | 382,600 | 412,800 | 30,200 | 7.9% | 79,400 | \$84,500 |
| 15-1143 | Computer Network Architects | 146,200 | 158,900 | 12,700 | 8.7% | 31,500 | \$104,240 |
| 15-1151 | Computer Support Specialists | 585,900 | 661,000 | 75,100 | 12.8% | 150,500 | \$53,100 |
| 15-1152 | Computer Network Support Specialists | 181,000 | 194,600 | 13,600 | 7.5% | 36,900 | \$67,770 |
| 15-1199 | Computer Occupations, All Other | 233,000 | 240,800 | 7,700 | 3.3% | 37,700 | \$88,880 |
| | TOTALS / AVERAGES = | 4,264,600 | 4,806,900 | 542,300 | 11.9% AVG | 1,176,600 | \$93,397 |

GREATER LOS ANGELES AREA

SOURCE: LINKEDIN, ECONOMIC GRAPH TEAM (DOES NOT INCLUDE ORANGE COUNTY)

| | |
|---|-----------|
| Total Members on LinkedIn in Greater Los Angeles | 5,200,000 |
| Total Members with Technology Jobs in LA | 244,000 |
| Members with Technology Jobs in LA who Applied for a Job in the first half of 2017 (1/1/17 - 5/15/17) | 8% |
| Total Companies on LinkedIn Listed as Employers in LA | 456,000 |
| Total Companies on LinkedIn Listed as Employers by Members with Technology Jobs in LA | 46,000 |
| Total Companies on LinkedIn who Hired Tech Talent in 2016-17 (1/1/16 - 5/5/17 excluding transfers) | 15,000 |

* LinkedIn regions in the US are defined based on Nielsen's DMA. DMA (Designated Market Area) regions are the geographic areas in the United States in which local television viewing is measured by The Nielsen Company.

* Tech talent is defined by looking at members' profiles and their current active positions. LinkedIn only includes members working in an information technology related job/function regardless of the employer's industry. This excludes members with tech skills who are not working in a tech function.

* Members indicate their employer in the experience section of their profile. Members who added a new position in the past 12 months, where the current employer is different than the employer in the position preceding it, are considered new hires.

* When the Economic Graph Team detects a new position with a different location than the one preceding it, the signals are aggregated to determine migration trends.

* Members indicate their educational background in the education section of their profile, including their academic institution and degree type.

* Members add their certifications in the certifications section of their profile, indicating the certifying authority.

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Cover: Students participate in a workshop at Snap headquarters in Venice.

Pg. 2: Los Angeles Mayor Eric Garcetti launches the LA Tech Talent Pipeline at General Assembly's downtown campus.

Pg. 4: Sean Arian (Founder and President), Lindsey Heisser (current Director of Tech Ed Partnerships), and Sergio Rosas (founding Director of Tech Ed Partnerships) at event hosted by Snap.

Pg. 8: Community college students interviewing for internships at local tech companies.

Pg. 24: Community college students interviewing for internships at Snap.

Pg. 31: Inaugural class of fellows at mitú accelerator program, co-sponsored by the Annenberg Foundation, Bixel Exchange, and the City of Los Angeles.

Pg. 36: Community college students at professional development workshop at Headspace headquarters in Santa Monica.

Pg. 38: Community college faculty attend professional development workshop at Snap headquarters in Venice. The program featured HR managers and recruiters from Google, Headspace, LinkedIn, and Snap discussing labor market needs and skills-development opportunities.

ABOUT BIXEL EXCHANGE

Bixel Exchange is the Center for Innovation and Technology at the Los Angeles Area Chamber of Commerce. We strive for a thriving and inclusive economy that enables Angelenos to pursue their ambitions and prosper. To that end, we work with over 60 local tech and media companies to create career pathways to tech jobs for low-income students in Los Angeles, primarily from local community colleges and the local workforce training system. Bixel is currently the IT industry intermediary for the Los Angeles Community College District and the City of Los Angeles' Economic and Workforce Development Department.



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