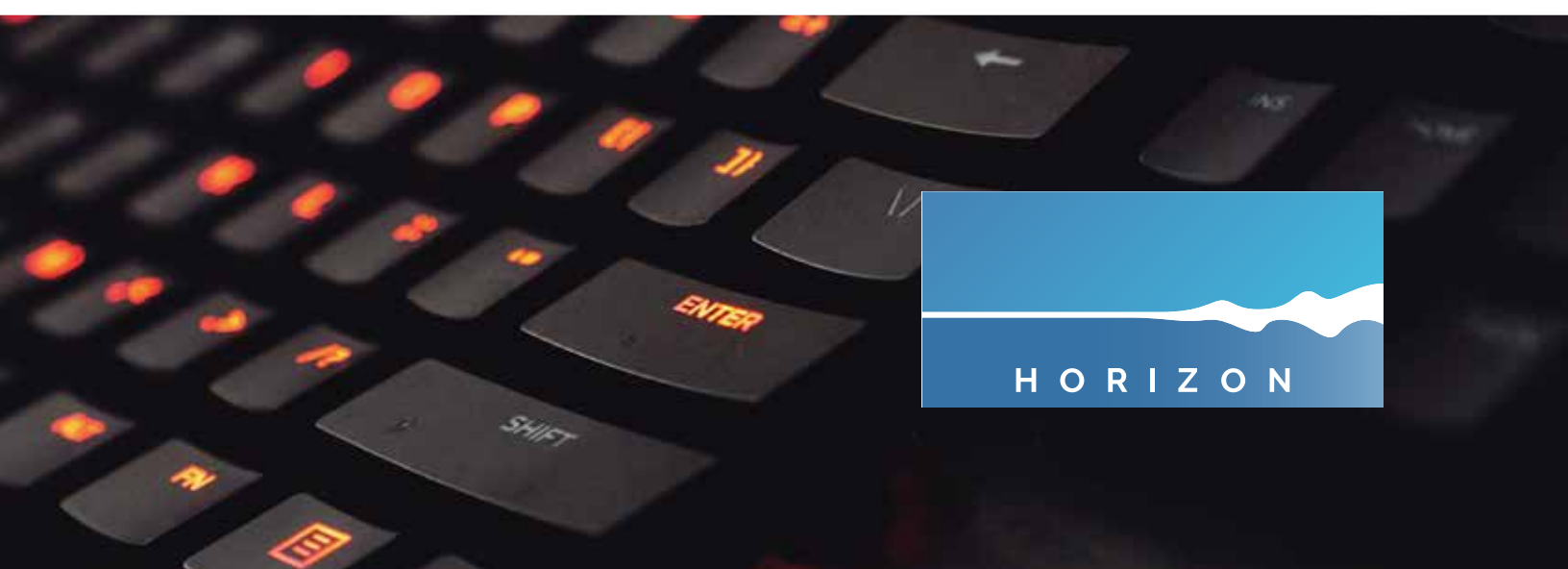




# THE FUTURE OF JOBS

## PERSPECTIVE PAPER

MAY 2019





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### MAY 2019



ASSOCIATION OF BAY AREA GOVERNMENTS  
METROPOLITAN TRANSPORTATION COMMISSION

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## EXECUTIVE SUMMARY

The Bay Area is known throughout the world as an economic powerhouse, continually at the leading edge of innovation. While highly productive and diverse, our economy is also quite volatile, creating significant strains on housing and infrastructure, especially during economic booms. This Horizon Perspective Paper, entitled **The Future of Jobs**, explores how emerging economic changes, ranging from automation and organizational adjustments to new locational dynamics, might affect the region's economy in coming decades.

**The Future of Jobs** Perspective Paper is intended to:

- **Review** key trends affecting the regional labor market and job prospects of Bay Area residents, including automation of jobs, the emergence of the "gig economy," and an aging labor force.
- **Consider** impacts on jobs, wages, location dynamics and job sorting within the region.
- **Identify** strategies on the state, regional and local levels to address planning and economic development challenges associated with a changing regional economy.
- **Continue** the conversation related to the emerging economic development role of the regional agencies following the adoption of the Comprehensive Economic Development Strategy.

Intended as a report to inform the wider regional planning effort called Horizon being undertaken by the the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC), this Perspective Paper explores four interrelated facets of change related to the future of jobs: **technological** changes, **organizational** changes, **compensational** changes and **locational** changes. It concludes with a list of strategies to move the Bay Area forward.



Photo - Peter Beeler

## KEY FINDINGS

### TECHNOLOGICAL CHANGES

Automation has long improved the productivity and fortunes of the Bay Area economy. A new wave of automation driven by Artificial Intelligence (AI) is expected by many to fundamentally alter the scope of tasks subject to automation, ranging from financial analysis and legal discovery to news report writing. Automation will lead some occupations to become obsolete and new ones to be created, but more generally a more complex division of labor between humans and machines would exist. Applying a dataset on occupational risk to the Bay Area, we find that 36 percent of workers are in the high-risk category of automation and 45 percent in the low-risk category, with just 19 percent in the middle-risk category. Examining demographics, the most at-risk groups include workers in routine jobs, workers with a high school diploma or less than a college education, and Hispanic / Latino workers. The most at-risk subregions generally include North Bay counties, while San Francisco, the South Bay and some parts of the East Bay currently contain a larger share of occupations more likely to be complemented by automation, such as Science, Technology, Engineering and Math (STEM) and design-related fields. The region must prepare for a new wave of technological transformation and ensure that the different subregions and their communities can transition with minimal disruption.

### ORGANIZATIONAL CHANGES

While "Wage and Salary" jobs remain prevalent in the region, they are increasingly complemented by a range of alternative forms of employment, such independent contracting, freelancing, app-based gig working, temporary placement and other forms of contracting. These genres of work have been increasing in the Bay Area, driven by outsourcing and new technology. Marin and Sonoma counties have the largest proportions of workers in alternative arrangements, although with significant differences in earnings and industry between the two counties. The Bay Area, as home to several industry leaders in the gig economy, not surprisingly has a larger share of proprietors engaged in gig work within the Taxi and Limousine Service industry than the rest of California and the rest of the country.

Some workers seek alternate forms of work for reasons of flexibility, while others would prefer more stable

employment. As ways of working changes, we should work to update our labor market and benefits structure to ensure more portability with more frequent role changes for the current and future labor force.

### COMPENSATION CHANGES

Income gains have been growing unevenly, with high gains going to the highest earning deciles while incomes are stagnating at the lowest earning levels, as technology has generally favored degree holders. To respond to inequality, we often look to increasing access to higher education. However, not all four-year degree holders are well off, with the lowest 25 percent of four-year college-educated workers earning less than the highest 25 percent of those with only a high school degree or less. Approaches must look at more nimble forms of training and re-skilling; new partnerships should be forged between labor market groups, educational institutions, businesses and governments to find common cause in the ongoing preparation of the workforce of the future.

### LOCATIONAL CHANGES

While the very technologies of dispersal, such as telecommunications, invented in Silicon Valley have allowed unprecedented collaboration across great distances, this has not led to jobs leaving the core economic centers of the Bay Area. Conversely, the majority of jobs added have taken place in a handful of subareas of the region. The information-based economy has paradoxically shown a preference for clustering in core areas while more population-serving sectors are more widely distributed. As the economy has grown its manufacturing output but with far fewer workers, manufacturing has given way to tech and office uses more generally, with often bigger buildings and more workers, presenting challenges and opportunities for transportation services and housing provisions in the vicinity. At the same time, suburban office parks are upgrading their facilities to appeal to amenity-conscious employers. As amenities are added in the suburbs, the key distinction between urban and suburban job sites will be in the relative accessibility of the two to different forms of transportation. The region should tackle the challenges associated with concentrated employment growth in key hot spots, often out of sync with commensurate housing development, leading to congested roads and overheated housing markets.

## PRIORITY STRATEGIES

To address the challenges listed above for each area of change, priority strategies have been identified as potential solutions for future consideration. Priority strategies are intended to be long-range planning concepts to move the Bay Area in a more sustainable direction; they are not intended to be specific short-term legislative proposals but rather a list of strategies for further study in the next phase of Horizon.

## THE PATH AHEAD

The next step of the Horizon process, Futures, will test the strategies introduced in this and other Perspective Papers against a variety of potential political, technological, economic and environmental challenges that would impact the lives of Bay Area residents. Ultimately, it will require the coordinated effort of many stakeholders to ensure the Bay Area remains a great place to live in the future – both in booms and busts.

CHANGES RELATED TO:	PERSPECTIVE PAPER STRATEGY	IMPLEMENTING AGENCY
 <p>TECHNOLOGY</p>	<b>T1. Priority Production Areas to Protect Key Industrial Lands:</b> Identify critical areas to the regional industrial land base and establish a program to protect such areas, thus helping to stabilize land markets.	Local governments
	<b>T2. State-Level Training Fund for Workers Displaced by Automation:</b> Establish a state-level transition fund for automation-induced displacement and distribute grants to regional programs working in partnership with county workforce development boards.	State government
 <p>ORGANIZATION</p>	<b>O1. Lifelong Learning and Training Accounts (LLTAs):</b> Establish LLTAs to address the decline of traditional single-employer jobs, resulting in a better trained workforce with greater flexibility to change careers.	State or federal government
	<b>O2. Portable Benefits:</b> Uncouple benefits from employment and address the rise of part-time employment by advancing a portable benefits system and creating a safety net for workers in alternative arrangements.	State or federal government
 <p>COMPENSATION</p>	<b>C1. Increased Child Care Support for Low-Income Families:</b> Provide low-cost and accessible child care for low-income communities to remove barriers to working for young families and reduce the transportation impacts associated with driving to distant child care centers.	Local, regional or state government
	<b>C2. Wage Insurance:</b> Develop a wage insurance program to reduce the wage losses experienced by most re-employed displaced workers while encouraging them to continue participating in the workforce.	State or federal government
	<b>C3. Universal Basic Income:</b> Provide households with guaranteed cash transfers, commonly referred to as a "universal basic income," should jobs be disrupted at a scale well beyond individual control. This could disrupt existing cycles of poverty and improve financial security, health and wellness.	State or federal government
 <p>LOCATION</p>	<b>L1. Incubator Programs in Economically Distressed Communities:</b> Create incubator programs in economically distressed areas to create business and employment opportunities for low- and moderate-income individuals.	Local governments
	<b>L2. Means-Based Transit Pricing:</b> Develop regional means-based pricing for public transit to help low-income workers overcome cost-based travel barriers to access economic opportunities in the region and provide for their families.	Regional government
	<b>L3. Office Development Limits in Jobs-Rich Communities With Little Housing Development:</b> Implement annual caps of commercial development to better align growth in commercial space and housing. Alternatively, expand impact fees instead of introducing caps, internalizing costs to infrastructure and providing a funding stream for improvements.	Local or regional governments
	<b>L4. Employment Incentives in Transit-Rich Areas:</b> Prioritize employment densification in PDAs and TPAs, with an emphasis on locations close to transit that currently have very low employment densities, through changes in development capacity or through new funding incentives.	Local or regional governments

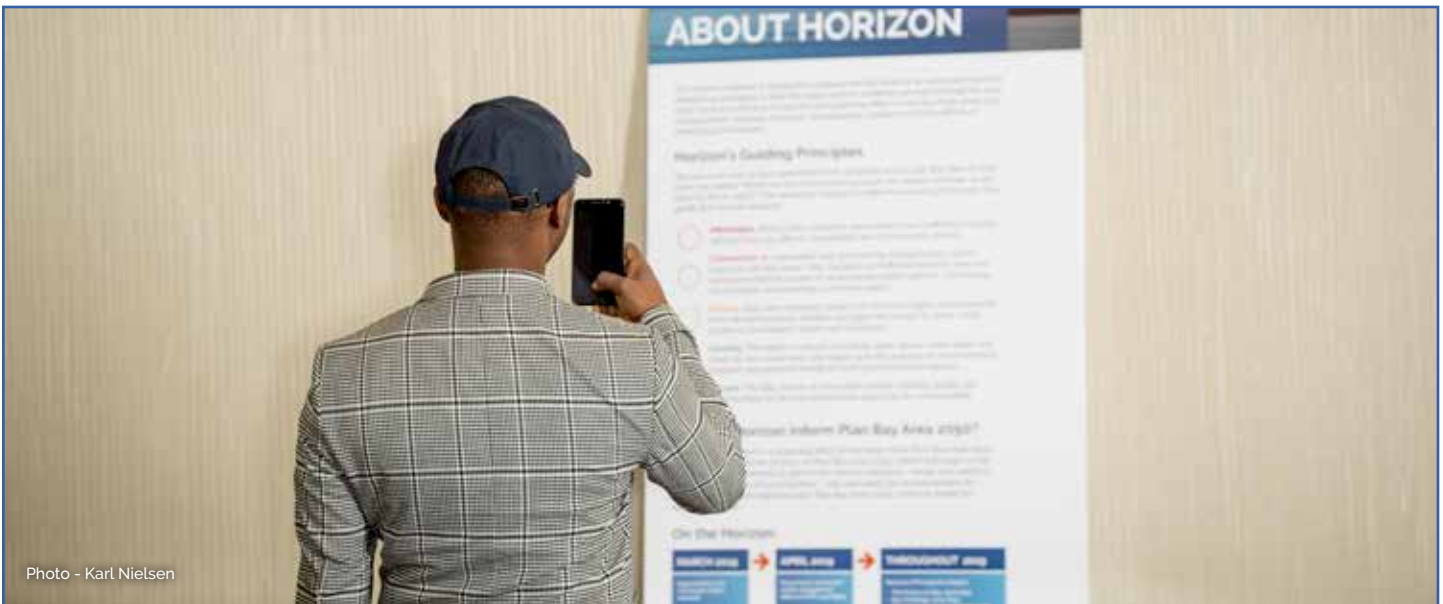


Photo - Karl Nielsen

## THE HORIZON INITIATIVE

When we plan for the future, what sort of future are we planning for?

Disruptive technologies, rising sea levels, economic booms and busts, political volatility and a range of other external forces may fundamentally alter the trajectory of the Bay Area. To explore a range of challenging questions that traditionally have been outside the regional planning process, MTC and ABAG developed a new initiative, called Horizon, to explore pressing issues and possible challenges Bay Area residents may face through 2050.

Horizon leverages new techniques in exploratory scenario planning, embracing uncertainty as a central element of the planning process. Horizon will culminate in fall 2019 by highlighting key insights on effective strategies and investments that prove resilient to a wide range of external forces. These findings will inform decision-making on transportation, land use, economic development and resilience, establishing the foundation of Plan Bay Area 2050, a state-mandated, integrated long-range transportation and land use plan slated for adoption in summer 2021.

Horizon is comprised of four core elements:

- A series of white papers, known as Perspective Papers, that are exploring strategies and solutions

for issue areas previously outside the scope of past long-range planning processes. Each paper culminates in a set of priority strategies for further exploration in the Futures element of Horizon.

- Central to Horizon is the development and study of three divergent what-if "Futures." Futures Planning is a way of looking at long-range planning, exploring divergent scenarios to identify how a range of forces could potentially shape the region. It opens up previous scenario planning efforts to a greater variety of political, technological, economic and environmental challenges that impact the lives of Bay Area residents.
- Similar to prior planning cycles, Horizon includes a robust Project Performance Assessment for major transportation investments. The assessment will identify costs and benefits of different transportation projects in each of the three Futures. The Project Performance Assessment is designed to help policymakers and stakeholders make data-driven decisions about future transportation investments in an era of uncertainty.
- Finally, public and stakeholder engagement weaves together all the components of Horizon, providing an opportunity for community members to give their input on the most effective strategies and investments to address current and future regional challenges.

Throughout the Horizon process, MTC and ABAG are exploring both challenges and opportunities that lie ahead for the region. **The Future of Jobs** Perspective Paper examines changes to jobs as part of the wider set of issues impacting the region during the coming decades. It is hoped that Horizon will help guide the public, stakeholders and elected officials in considering the best strategies to improve regional outcomes. Ultimately, these strategies should help ensure the advancement of the **Horizon Guiding Principles**—making the region more **AFFORDABLE, CONNECTED, DIVERSE, HEALTHY** and **VIBRANT** in the years ahead. These five Guiding Principles were developed through public outreach in spring 2018, and they represent the organizing framework for Horizon.



Photo - Karl Nielsen

## THE HORIZON GUIDING PRINCIPLES



**AFFORDABLE**



**CONNECTED**



**DIVERSE**



**HEALTHY**



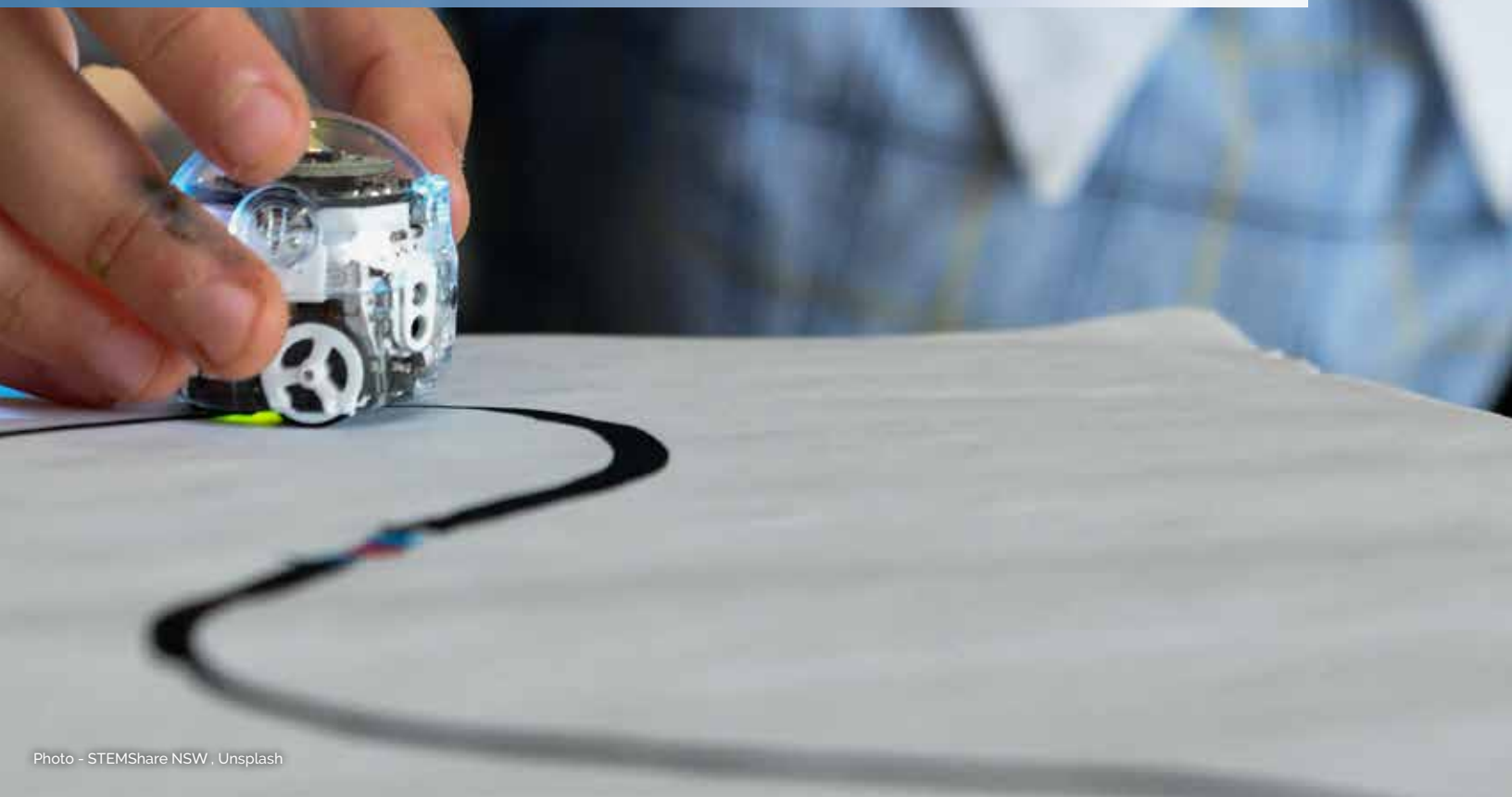
**VIBRANT**

The **Horizon Guiding Principles** reflect the breadth of regional concerns and aspirations, calling for a Bay Area that is: **AFFORDABLE** to people of all income levels; **CONNECTED** by an expanded, reliable transportation network; made up of a **DIVERSE** population; **HEALTHY**, with natural resources and a reduced environmental footprint; and economically **VIBRANT**, with opportunities for all communities.



# CHAPTER 1

## INTRODUCTION





# INTRODUCTION

The future of jobs is a tantalizing topic; it is never here and yet it is all around us. Burgers are prepared by robots in San Francisco; Teslas—or computers with wheels—are assembled in Fremont by relatively few workers in a highly efficient and automated facility where GM and Toyota workers produced the sedans of earlier eras. Software and app companies export their products to the world without a single truck leaving their worksites as the internet serves as the physical and virtual conduit for the new economy. At the same time, many workers have leveraged these very digital technologies to work for themselves, with shifting clients and relationships. Other workers, unable to afford the Bay Area's high cost of housing, commute long distances for relatively modest pay, increasing the economic catchment area of the region.

Ultimately, big changes raise big questions. What does it mean to the region that the very technologies invented here can change everything from the organization of work and the type of workers needed to whether the work is done here or thousands of miles away, along with the relative value of, and compensation for, different types of work? What will it mean for the region's diverse communities, with distinctive occupational mixes and industry strengths? This paper is organized around such questions.

## PURPOSE AND CONTEXT OF THE PERSPECTIVE PAPER

**The Future of Jobs** is the fourth in a series of Perspective Papers that propose innovative strategies to address challenges and trends with the potential to alter the Bay Area's trajectory. The first two papers—**Autonomous Vehicles** and **Toward a Shared Future**—explore fundamental changes to the way people move around the Bay Area. The third paper, **Regional Growth Strategies**, focuses on the successes and shortcomings of the Bay Area's current regional growth framework and sets the stage for a framework update in 2019, in advance of Plan Bay Area 2050. This fourth paper will

be followed by two more papers, which will investigate strategies for improving travel across the San Francisco Bay and adapting to sea level rise.

The solutions pursued in this and other Perspective Papers are designed to shape Plan Bay Area 2050 and achieve the Guiding Principles of the Horizon initiative, an effort led by the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC) to engage Bay Area residents in a conversation about the region's future. Five principles emerged from more than 10,000 comments received at Horizon pop-up events throughout the region, an online forum and engagement with elected officials:

**AFFORDABLE** - All Bay Area residents and workers have sufficient housing options they can afford – households are economically secure.

**CONNECTED** - An expanded, well-functioning transportation system connects the Bay Area – fast, frequent and efficient intercity trips are complemented by a suite of local transportation options, connecting communities and creating a cohesive region.

**DIVERSE** - Bay Area residents support an inclusive region where people from all backgrounds, abilities and ages can remain in place—with access to the region's assets and resources.

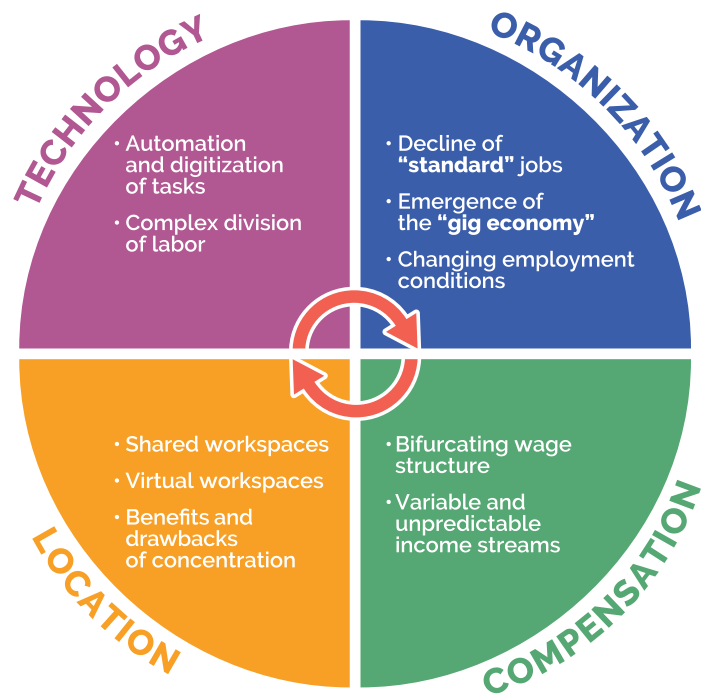
**HEALTHY** - The region's natural resources, open space, clean water and clean air are conserved – the region actively reduces its environmental footprint and protects residents from environmental impacts.

**VIBRANT** - The Bay Area is an innovation leader, creating quality job opportunities for all and ample fiscal resources for communities.

To identify strategies capable of moving the Bay Area closer to achieving these principles, the Horizon process is evaluating how well the strategies perform in different "futures": "what if" scenarios with varying political, technological, economic and environmental challenges, such as sea level rise and use of autonomous vehicles. Working with Bay Area residents, MTC and ABAG will identify a suite of transportation, land use, economic development and resilience strategies to "win the future," regardless of what happens in the decades ahead. These strategies will become a part of Plan Bay Area 2050.

**The Future of Jobs** Perspective Paper reports on important trends in the Bay Area economy. To make this wide-ranging topic tractable, we discuss changes from the perspective of four domains:

1. **Changes in technology.** New tools mean new challenges and possibilities.
2. **Changes in organization of jobs.** Work relationships other than the full-time wage and salary job are increasingly present, while work relationships within companies also are changing.
3. **Changes in compensation.** Long-term bifurcation in the wage structure poses unique challenges for the region. Some of the wage protections of traditional employer and labor relations have eroded, while the possibility of high returns remains for successful individuals.
4. **Changes in location.** Work is simultaneously centralizing and decentralizing; “winning” locations may transform to dense, transit-rich centers while other locations may experience a hollowing out of jobs in sectors once dependent on middle-wage workers or on face-to-face transactions. Success may lead to challenges in winning locations and for the region as a whole.



The paper finishes by identifying a number of priority strategies for the Bay Area to seize opportunities and address risks posed by important shifts in the regional economy. This Perspective Paper takes a deeper look beyond the problems of today to those that may emerge from transformations in the future.

The strategies advanced in this paper are being tested across a series of divergent “Futures,” planning scenarios with a range of assumptions regarding shifts in the economy. The results of the evaluation will inform a series of regional policy recommendations and investments for consideration in the next regional plan, Plan Bay Area 2050, building upon the action plan from Plan Bay Area 2040.

## BACKGROUND: A CHANGING ECONOMY

The Bay Area economy is different than it was 20 years ago, with income, types of opportunities, and location of work shifting as the regional economy has transformed in relation to global markets, changes in technology and shifting centers of economic activity. There is a deeper integration into global supply chains and markets, and strong global competition for many products and increasingly services. Manufacturing jobs have declined by a third since 2000, and the regional economy has instead added jobs in education and health, leisure, and tech-related products and services.

### Revamped Manufacturing

Manufacturing jobs have been victims of the industry's success. At about two-thirds of the workers and twice the output, the Bay Area's manufacturing industries are highly productive. As skilled workers are hard to find,<sup>1</sup> pressures for automation-induced productivity gains have become more of a managerial concern. Labor shortages have long been addressed with outsourcing of the more standardized part of the business, while skilled workers are recruited through programs like H1B. Automation has improved efficiencies and predictability across many manufacturing industries, though with signs that there are diminishing returns to automation, with many processes requiring a “human touch” and flexibility.<sup>2</sup>

### From Hardware to Cloudware

Other visible manifestations of the shift is the evolution (or revolution) of the role of the computers. While the region and, in particular Silicon Valley, has long been

associated with producing generations of computers, sustaining a cottage industry of chip designers, user interface researchers, and peripherals manufacturers, much of today's value-added work is found in software and applications. Instead of building computers, companies leverage them to write software to solve compelling business problems. Programming computers in distant datacenters, engineers deliver Software as a Service to power core business functions, from Human Resources to helpdesk ticketing and enterprise-level resource planning functions for companies around the planet.

As computers have become ubiquitous, new and more analytically focused work has appeared to take advantage of their capabilities offered, with the region holding a strong competitive advantage for this work. Automation has boosted productivity in a number of manufacturing industries for more than a half-century. The emergence of artificial intelligence (AI) as a tool to identify patterns in large troves of increasingly comprehensive and big datasets holds the promise of a new realignment of work between people and machines, allowing doctors to diagnose diseases better and lawyers to focus on legal strategies while leaving more routine case discovery to computers. This is part of a wider digitalization of the economy, with growing requirements for digital literacy for the region's workers. As value is tied more and more to the world of data and the software that facilitates its collection, storage and analysis, many workers trained for yesterday's economy must transition into a new one much more focused on all things digital.

### **Toward Alternate Forms of Work**

New technologies have contributed to organizational changes long underway toward more independent work, alternate employment arrangements, and the "gig economy," with apps lowering the search cost for a number of services, from driving, hosting, and web design to assembly of furniture. This shift holds promise and risks for the Bay Area's workers, with some well positioned to offer their skills to markets well beyond the local region. Others will find being their own bosses in an economy of short-term gigs of different stripes to be the least bad career pathway forward as stable careers with health care and retirement benefits as well as growing wages have become less matter-of-fact than

was the case for earlier generations. Many companies have moved to filling staffing needs with temp agencies and other shorter-term arrangements. While highly skilled workers have new markets for their talents, those with fewer marketable skills are more likely to be in precarious positions with unstable jobs and without benefits, with the potential for regional inequality to increase further, and lower income communities to be disproportionately affected.

### **The Changing Places of Work**

Changes in technology, work arrangements, and types of services offered have affected the economic geography of the Bay Area by refocusing tech and manufacturing to places other than Silicon Valley. As manufacturing shed jobs in Santa Clara County over the past 15 years, the sector has in turn grown in Alameda County, resulting in an overall more complex economic landscape. While both tech and manufacturing industries have strong economic multipliers, high land costs mean many jobs that used to be in the center of the region have moved farther away in search for economic efficiencies. Tech companies somewhat ironically place a premium on face-to-face interactions and increasingly look to urban locations for their medium- to long-term real estate needs. San Francisco has become Silicon Valley North with its distinct set of software-focused tech industries. In the South Bay, the San Jose office market has become sought after as tech firms vie for its transit-accessible real estate soon to be accessible to workers from both sides of the bay as the Bay Area Rapid Transit (BART) system is slated to introduce service on the Fremont line later in 2019.

The Bay Area is large and diverse, with each of its different communities facing a transforming economy from a different starting position and with different resources to address the challenges. As the region continues its shift to services, with its highly productive industries shedding some functions to lower cost areas, we expect the trend of concentrating knowledge sector jobs in core parts of the region to continue, with other industries decentralizing, including retail and personal services. This concentration in turn puts pressure on other sectors less able to pay the premiums of being in the economic centers of the region, complicating the provision of distribution and services.



# CHAPTER 2

## THE BAY AREA ECONOMY TODAY



## ECONOMIC FOUNDATIONS

Changes in technology have always affected how we live, how we work and how we move between the two. In 1900, some 41 percent of the U.S. workforce worked in agriculture. One hundred years later, labor-saving technologies have upended that way of living and working, leaving just 2 percent working on farmlands.<sup>3</sup> Mechanical marvels meant more food could be produced by a fraction of the workers needed a few decades earlier, and the changing industrial and occupational structure profoundly shaped the national geography into an increasingly urban pattern. The growth of the nation's cities in turn led to an extraordinary creation of wealth as well as upward mobility for workers of all skill levels for nearly a century. As new industries were established, cities grew with them, and trading relationships were forged. While globalization and distributed supply chains have made such relationships more complex in recent decades, trade remains central to the economic health and prospects of regions and their residents.

In the Bay Area, economic cycles have been keenly felt, with dramatic booms and equally precipitous busts. Yet the region has nonetheless recovered each time, often charting new technological frontiers and with them the national economic map. The region houses a highly innovative economy characterized by churn: People are creating new ideas, new markets, new industries (e.g., social media, green tech), new occupations (e.g., data ninja, user experience professional), renewed ways of working, and, more recently, a different relationship between company and personal property (e.g., the sharing economy).<sup>4</sup>

### AN ECONOMY FREQUENTLY REINVENTED

The draw of the Bay Area has not just been the natural landscape. The region has long been renowned for its half century of leadership in technology sectors across

a number of industries. It is difficult to overestimate the role of the Bay Area in developing several successive waves of innovation—the proverbial lightning has struck the same place countless times. It has a number of well-recognized components:<sup>5</sup>

- the nurturing of a critical mass of highly specialized skills;
- openness to immigration;
- strong public and private research and development;
- a tried and tested venture capital model and startup grooming industry; and
- a relatively informal sense of hierarchy, and favorable views of job hopping within and often between industries.

Together, these components have contributed to a succession of fortuitous cycles, redefining the economy and the possible each time. The Bay Area has had a remarkable run in its ability not only to compete in existing, often technology focused markets over a sustained period of time in a very volatile set of industries but also to fundamentally re-map the landscape of industries in the first place, setting standards for others to follow. This happened in the wake of the integrated circuit in the 1960s, with microcomputers in the 1970s, personal computers in the 1980s, with biotech and software in the 1990s, phones and search engines in the 2000s, and social media and the app economy in the 2010s. This innovative ferment has fostered a remarkable long-term economic resiliency despite industry lifecycle transitions that have spawned new industries while reshaping existing ones, and sometimes rendering others obsolete.

As industries mature and products become standardized commodities, parts of the value chain typically head to lower cost areas, and occupations realign accordingly. While Santa Clara and San Mateo counties used to be hotbeds for the manufacturing of both microchips and computers, such work is increasingly being done overseas, with the focus for the computer industry now falling more on the design of new devices, software and apps. In a valley once synonymous with semiconductor manufacturing, the world's largest producer of the product, Intel, symbolically closed its last local factory in 2008. At the same time, several counties have seen

stronger growth in manufacturing than in jobs overall; adding 19,000 jobs since 2010, Alameda County has seen the largest absolute growth in manufacturing jobs since the recession of the Bay Area's nine counties.<sup>6</sup>

## SCALING THE LOCAL ECONOMY

The local economy has a number of highly productive industries. Many manufacturing firms rely on automated machinery for assembly of cars and computers, tended to by skilled but relatively few workers often working alongside sensor-enriched collaborative robots or co-bots doing tedious and sometimes dangerous tasks.<sup>7</sup>

In the digital world, the internet has in many ways provided a profound vehicle for changing economies. By sharing information across the planet, it helps source ideas, identify markets and coordinate the work. The internet also represents a new scaling model for businesses as markets for digital, intangible goods are subject to a very different cost structure than those for conventional products, with marginal costs near zero for each additional customer.

This unique scaling of many software and apps-based companies further means large digital markets can be reached with relatively few employees. While this is not unique to the Bay Area, the region has had its fair share of companies with a dozen employees reaching billion-dollar buyouts. This raises the stakes of being near the venture capital kingmakers in Silicon Valley, and land markets in the core reflect the opportunity to connect, coordinate, and collaborate with the industry leaders, partners and rainmakers. Startups come from around the planet seeking to scale their businesses here, close to funders, customers, and a critical mass of skilled labor to do so.<sup>8</sup> The technology ecosystem has also proven to be a bridgehead into established industries.

## AI WILL CHANGE HOW WE WORK

While "Internet Scaling 1.0" was in many ways consumer facing, "Internet Scaling 2.0" will be more about business processes and business intelligence. Companies, not just in tech, are seeking to become digitally enabled enterprises. Manufacturing firms are relying on data from the production process itself to improve efficiencies. The "industrial internet" connects data on the production process and helps identify efficiencies and risks.<sup>9</sup>

An emerging scaling catalyst could come in the guise of artificial intelligence (AI), as a new computing frontier seems to hold the key to a new foray of machine-enabled work and expanding troves of data. AI, increasingly cognitively capable, is already complementing—and at times competing with—not the hand but the mind, with considerable scope for re-making the business and occupational structure for the region and beyond. Researchers from Oxford estimate that as many as 47 percent of occupations are potentially automatable. While those figures do not take into account what will replace those jobs and thus do not estimate the new work to follow, the numbers suggest a major technological transition is at our doorstep.

## HIGH COSTS CHALLENGE EXISTING BUSINESS MODELS

With these shifts taking place in what already is a high-cost economy to begin with, they likely will accelerate the local automation process as a way to manage high costs and skilled worker scarcity in the region. Businesses and residents of all stripes are compelled to face the reality of the long-standing high cost of doing business, the increasing lack of affordable housing and the general growing pains of a region often profoundly uncomfortable with growth. As the cost of living rises

The world has moved over the last 5 or 10 years to a well-developed technology ecosystem in the Bay Area, and an emerging group of transformational legacy companies in other markets. Every industry now has an "Amazon" leading disruption and a "Walmart" with a transformation agenda. For disruptors in other sectors, think of Tesla in automotive and Square in payments. The disruptors which are highly concentrated in the Bay Area are now playing head-to-head against very large established companies. They're not just upstarts.

— Personal Interview, Managing Director, Executive Search Firm

further, even established firms are having difficulties getting job offers accepted, as candidates weigh the offers against expected expenses.

While robots can assemble burgers, not all challenges to work come from technology. The high cost of living means it is more difficult to hire workers generally, especially the relatively modestly paid service workers in the most expensive parts of the region. Some restaurants in San Francisco have responded to lack of staff availability by forgoing the employment of service staff, instead opting for patrons doing more self-service.<sup>10</sup> As hiring gets more difficult, firms may automate or change the business model to have customers do more of the work, with implications for the work available in different parts of the region.

The Bay Area remains a leader in tech, but it may not be so indefinitely, for external or internal reasons. The outlook is hampered by challenges of cost and availability of skilled labor from a business standpoint, and cost of living from a worker standpoint. Indeed, high costs are leading many firms to explore heading to other regions once the business model is established and the availability of talent is ascertained.<sup>11</sup> Many will keep strategic functions here but grow their businesses in lower cost regions either from the ground up or through acquisitions.

A lot of my clients are local to Silicon Valley, but we are doing development work for them outside of the Bay Area, where there is both more affordable housing and access to talent. In another case a Bay Area company acquired an out-of-state company and will relocate Bay Area staff to that site.

— Personal Interview, Managing Director,  
Architectural Services Firm

In addition, China has emerged as a formidable player on the global tech map. Buoyed by accommodating national policy support, limited privacy protections, massive datasets, and rapid experimentation with business models and technologies, including AI,<sup>12</sup> China appears to offer further challenges to the de facto status quo of Bay Area tech dominance.

## LABOR MARKETS UNDER PRESSURE

From a worker perspective, the challenge is one of being prepared for an increasingly automated economy, self-responsibility for health and retirement benefits, high costs of housing where the job base is rich, and the search for high-quality services, such as schools and care for their children.

The region is at risk not just in strictly technological terms, but the fabric in which the economy is inserted: the housing market, the social contract between firm and employee, and the pathways to prosperity for the many. In a recent poll from the Bay Area Council, more than 40 percent of respondents stated they had considered leaving the region,<sup>13</sup> with costs and quality of life concerns looming large. The region's population has grown in recent decades mainly because of international in-migration, while there is a net loss in domestic migration to the rest of the country.

Overall, the region's challenges include long-standing ones of high cost of living and doing business, and access to skilled labor and training, while fostering a range of opportunities in all the region's communities. Technological innovations adds new challenges to the mix, improving the productivity of some occupations while challenging the economic rationale of others. As the wage and salary job model is being challenged and workers look to build careers in a more fluid economy, the region is an inflection point where the choices policymakers make today will shape the success of the regional economy of tomorrow, and the communities that sustain it.



# THE BAY AREA ECONOMY TODAY

## THE BAY AREA ECONOMY – RESILIENT AND EXPENSIVE, YET PRODUCTIVE

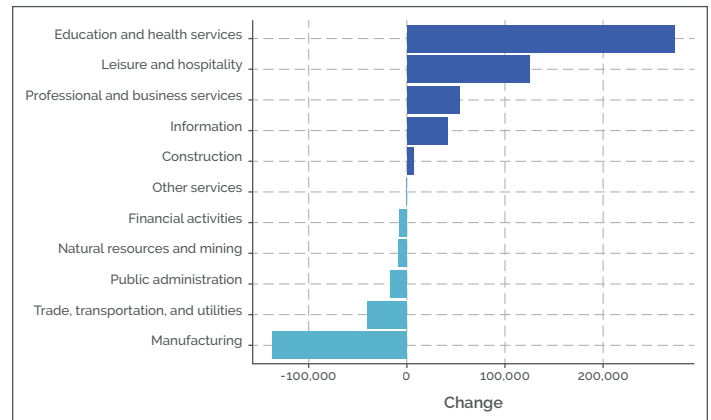
The regional economy has long been dominated by several high-profile industries. The region's picturesque hills with world-class vineyards are recognized internationally, as are its research institutions, which are training tomorrow's labor force and generating ideas for new industries. More than a third of the region's labor force is foreign born, and the inflow of new skilled workers is considerable when the region is growing. The Bay Area is frequently listed as a "superstar city" by economists, referring to the sorting of high-wage industries and labor to a select number of cities while many regions in the country lag in economic opportunity. Internally, such otherwise good fortune leads to over-inflated housing markets and transportation challenges, as often pointed out by local leaders.

### An Economy of Tech, But Also Services, Wine and Leisure

While there is much talk of tech when discussing Bay Area employment, today's economy is nonetheless in general terms dominated by growth in Education and health services; Professional and business services; and

Trade, transportation and utilities. Those three sectors account for nearly six out of 10 jobs in the region in 2017.

Figure 1. Bay Area Job Change by Industry, 2000-2017.



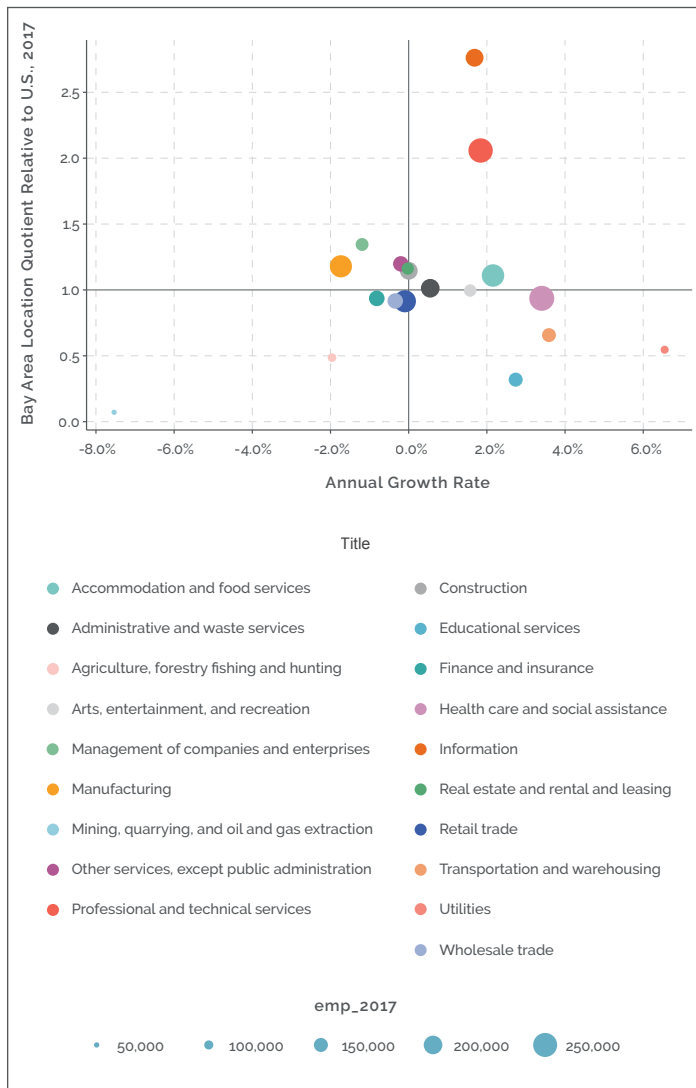
SOURCE: BLS QCEW

The Bay Area is competitive in a number of industries. The "bubble chart" in **Figure 2** relates growth in a sector to its local share, relative to the U.S. share (location quotients).<sup>14</sup> Overall, the Bay Area has several sectors with strong "location quotients." Notably, the Information sector has more than twice the employment than would be expected given the sector's role in the national economy. Professional and business services employment is twice the national share. This concentration mirrors these sectors' generally competitive position in the region—both have had above-average rates of job growth.



Photo - Luis Gomes on Pexels.com

**Figure 2. Bay Area Location Quotient vs. Annual Growth Rate, 2000-2017.**



**SOURCE:** ABAG / MTC from Bureau of Labor Statistics, QCEW Data

In absolute terms, the biggest job growth at the slightly more detailed NAICS-3 level (not shown in chart) were in the tech-focused other information services (+79,000) and professional and technical services (+112,000) industry, but overall, non-tech sectors accounted for the lion's share of growth: social assistance (+116,000), food services and drinking places (+101,000), and ambulatory health care services (+63,000). The most concentrated industries, in turn, were publishing industries, except internet (2.6); data processing, hosting and related services (3.0); beverage and tobacco product manufacturing (3.4); computer and electronic product manufacturing (5.0); and other information services (10.0). The strong showing in

the information sector may be explained by the relatively unique economies of scale at work there—once an app or a piece of software is produced, the marginal cost of an extra customer is effectively zero.<sup>15</sup>

### Recent Developments

The changes of the past few decades reflect a re-organization of the industry mix in the region related to changes in technology and standardization, as well as commoditization of much of the electronics manufacturing that made the region a tech powerhouse in prior decades.

### GDP Growth Has Become Uncoupled From Job Growth

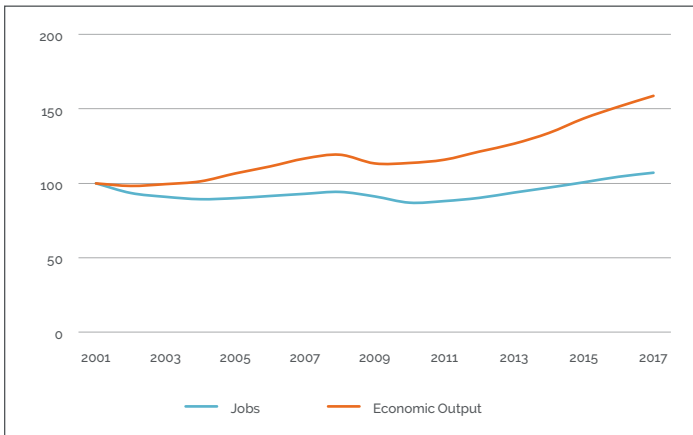
The cost-induced sorting of the most productive industries means the Bay Area economy boasts commanding Gross Domestic Product (GDP) growth levels. Recent economic growth in the Bay Area has outpaced the U.S., with the region's annual output growing well over 4 percent, peaking at 7.3 percent in 2015. This is a regional average, with Silicon Valley GDP growth reaching double digit levels, also in 2015. These GDP growth numbers are quite extraordinary by any measure; the region has accordingly seen its share of the national GDP increase from 3.8 in 2001 to 4.4 percent in 2017.

While job creation has also been strong, there has been a partial uncoupling of job growth and productivity growth in recent years, with overall more output per worker, or a more productive economy. Part of the explanation for this rise relates to the digitally mediated, internet-based economy with many flagship firms headquartered here. In 2017, the number of Bay Area jobs were 7 percent above its 2001 levels, while real Gross Regional Product was up nearly 60 percent during the same timeframe. Can productivity carry job growth in the future?

The city is a living laboratory which I think is critical to the operations of a lot of the small to midsize tech firms that I work with; whether it's a delivery service or something fashion based ... they thrive off the energy of the city and it offers the ability to implement beta versions of whatever it is they're doing within mere blocks of where they operate.

— Personal Interview, Industry Leader, Architectural Services Firm

**Figure 3. Jobs and Economic Output Trends – Bay Area (Indexed to 2001 Levels = 100).**

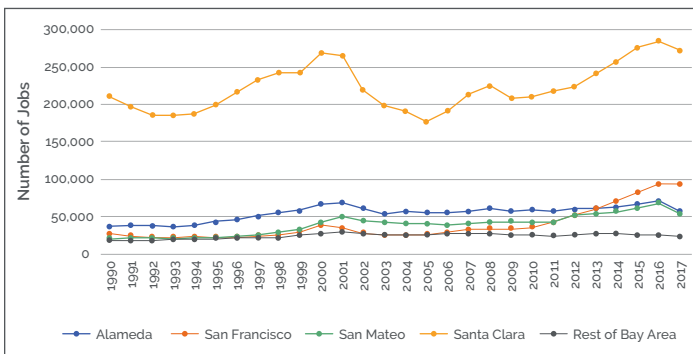


SOURCE: ABAG / MTC, from Bureau of Economic Analysis Data, Via FRED

### Knowledge-Sector Jobs Continue to Grow, Particularly in the Tech Sector

Looming large behind the strong growth in productivity we find growth in the tech industry, which in addition to advanced manufacturing includes any number of industries in which research and development of technologically based goods and services is prominent. These include biotech, software, social media, wearable tech, storage, cloud services, cleantech, database systems and more.

**Figure 4. Bay Area Technology<sup>16</sup> Jobs by County.**



SOURCE: BLS QCEW

Santa Clara County, which contains most of Silicon Valley, is the clear regional leader for tech employment and certainly a highly volatile one, with well-defined boom and bust cycles. It is also noteworthy that a sizeable share of the tech economy is now found in San Francisco, San Mateo and Alameda counties. In 1990, for

each tech job in San Francisco, San Mateo and Alameda counties, there were 2.64 in Silicon Valley. Now that number is much closer to parity at 1.35, suggesting a strong diffusion of these industries to more parts of the region – though it is still concentrated predominantly in four counties.

The North Bay counties of Napa and Sonoma, both centers for grape growing and wine production, accordingly have high location quotients in both farm employment and manufacturing. Counties that serve as major population centers have concentration in activities that serve the regional population, from government (Alameda, Napa, Contra Costa, Solano, Sonoma) to wholesale (Alameda) to retail (Solano). Contra Costa is also a financial service back-office center for the region. Tourism-related functions are important to Marin, Napa, and Sonoma counties as well as San Francisco.

### Manufacturing Jobs—But Not Output—Continue to Decline

The region's boom and bust cycle may imply a seesaw pattern where what goes down ultimately comes back up. While this is true to a point, each cycle reveals structural churn, as recessions may shed less viable parts of a business or even industries. The dot-com bust resulted from excesses of the first internet-based bubble. It turned out also to be a manufacturing bust, with nearly one in three manufacturing jobs lost since 2000. A sizeable share of these losses were in computer and electronics manufacturing as the region's tech work has become more focused on software and design than actual hardware production. Unlike the tech sector, most of these jobs have not been recovered to pre-2001 levels. All said, the region went from nearly 500,000 manufacturing jobs in 2000 to about 350,000 by 2017.

Notably, the decline in manufacturing jobs has in no way meant loss of output for the region's manufacturing industries. On the contrary, regional manufacturing output has more than doubled since 2001 with just two-thirds as many workers.<sup>17</sup> This speaks to both the rise in productivity of the diverse local manufacturing industries, many of which have undergone considerable automation already. Overall, the net result has been strong growth in regional productivity from tech as well as from manufacturing.

## As Boomers Retire From Labor Force, a New Generation Is Needed

While automation and higher productivity could lead to less demand for workers in a narrow sense, demographic factors could suggest the opposite problem: that there will be a quite dramatic shortage of skilled workers because of high regional demand for these workers, combined with the median age of the labor force. For the region this figure is 42, with a low of 37 in San Francisco and high of 48 in Marin. Indeed, per a 2018 Manpower survey, 46 percent of U.S. employers report they cannot find workers with the skills they need. Worker shortages are common as it is.<sup>18</sup>

It is normal for labor markets to see entry and exit due to both the age composition as well as the economic decision of whether to be in the labor force (with the labor force participation rate typically dipping during recessions). Given the age composition of the labor force, the normal turnover process may present an extra challenge in the years ahead. All told, the part of the labor force aged 55+ (the baby boomer generation) amounts to 920,000 people, or 22 percent of the labor force. These workers are expected to retire in the next 10+ years, representing considerable churn in the labor market.

The millennial generation is also quite large, and as of 2018, it eclipsed the boomer generation in sheer size. The Bay Area has seen strong labor force growth in both cohorts during the past decade, in different ends of the age spectrum.

**SOURCE:** ABAG / MTC, from U.S. Census, ACS PUMS 1-Yr 2017

The labor force is also generally well educated. More than half of the Bay Area's 60 to 69 year olds have college degrees and nearly a third have graduate degrees, higher than for any other age group. While the younger cohorts appear to at least formally be as prepared in terms of education as the workers they will replace, this generational transition will nonetheless be a significant shift in the labor market as those with the most experience leave their jobs.

There are also noticeable gaps in labor force participation, not just by age groups, which is to be expected, but as a function of educational attainment. Across the board, participation in the labor force is noticeably lower for those without a high school education. Whereas half of 60 to 64 year olds with less than a high school education are already out of the labor force, more than 3 out of 4 post-graduate degree holders still work at that age. It will remain a challenge to close the labor force participation gap across educational boundaries.

**Figure 5. Educational Attainment, by Age Group.**  
(Each Column Sums to 100 Percent)

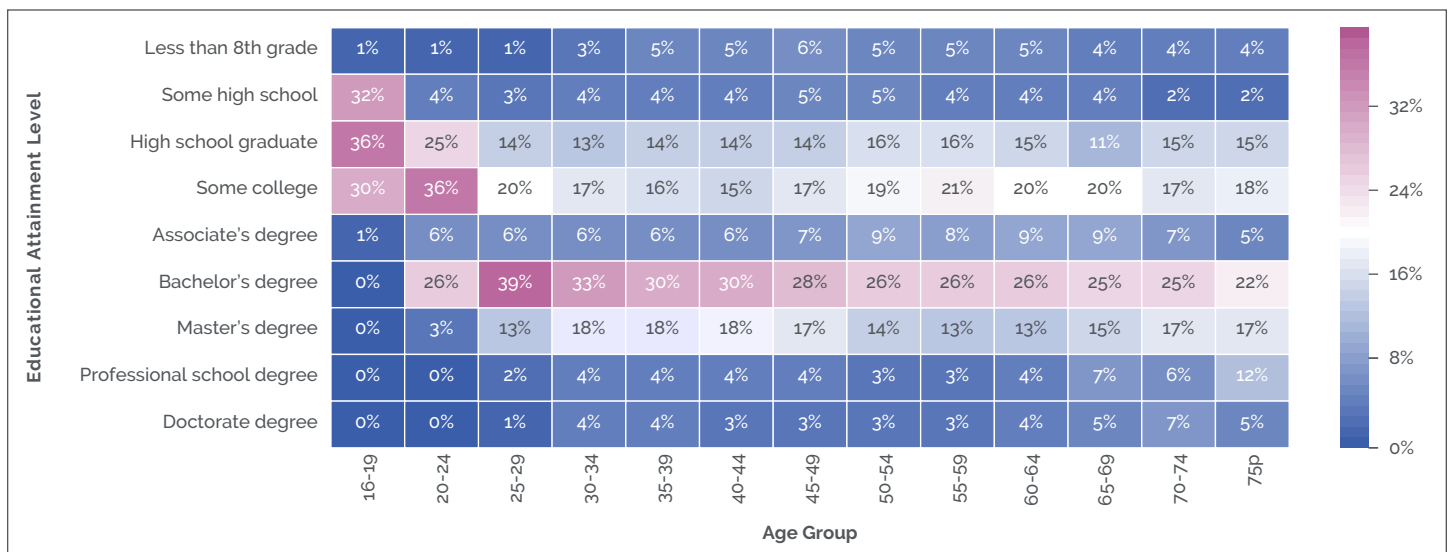
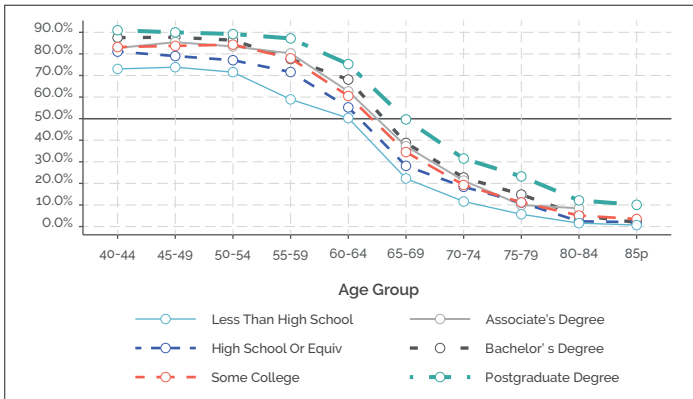


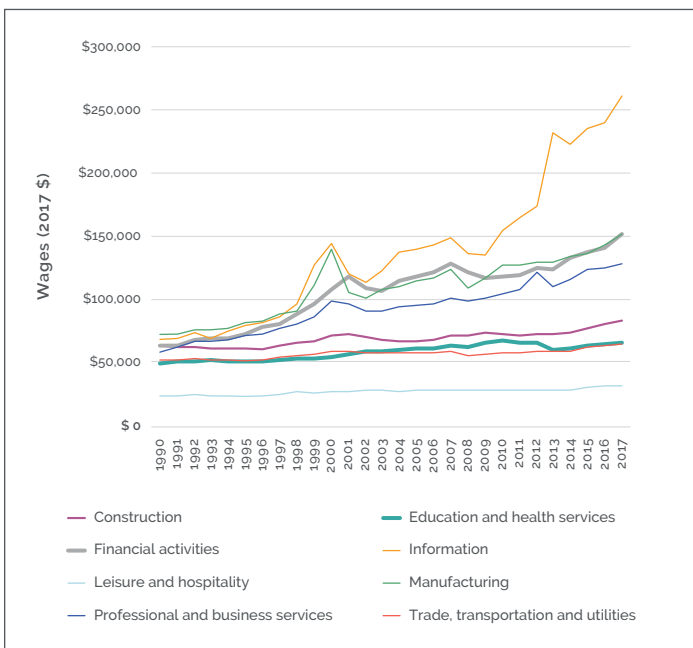
Figure 6. Share in Labor Force, by Education, Age Group.



SOURCE ABAG / MTC, from U.S. Census, ACS PUMS 1-YR 2017

The differences in education and skill are part and parcel of the wage differences across industries. As the information sector has put its mark on the region's economic landscape in terms of output, its workers have been well paid, with a large uptick in mean wages.<sup>19</sup> Notably, manufacturing wages continue to be high, consistent with the high productivity of the sector discussed earlier.

Figure 7. Mean Wages by Industry Supersector.



SOURCE: ABAG / MTC, from BLS QCEW

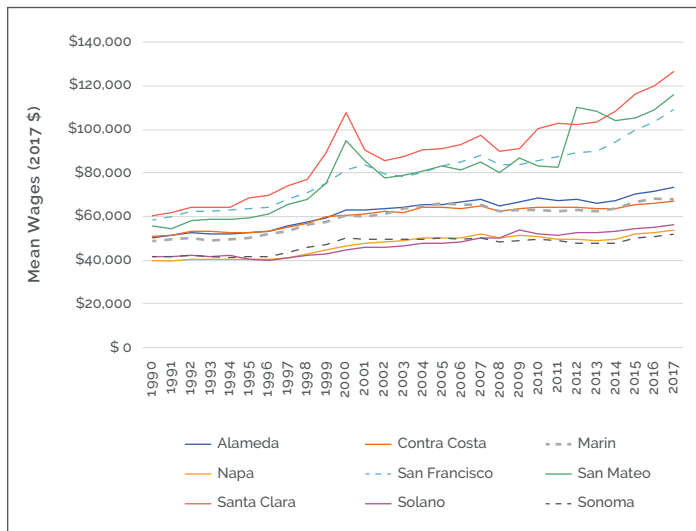
The same wage data tell us of the different regional economies reflecting differences in industry and occupation mix and overall economic function. There are three groups of counties in terms of mean wages. At the top, we see Santa Clara, San Mateo and San Francisco.



Photo - Christina Morillo, Pexels.com

In the middle band, we find Marin, Alameda and Contra Costa, whereas the lower band include the North Bay counties of Napa, Solano and Sonoma.

**Figure 8. Mean Wages by County.**



SOURCE: ABAG / MTC, from BLS QCEW

## A POISED ECONOMY, WITH CHALLENGES AHEAD

The Bay Area is a global innovation hub, I think, that is a good macro fundamental for the Bay Area. The businesses of the future across all sectors will begin to look more like technology companies. If San Francisco continues to be an innovation place, large companies will come here. They will want to have some sort of business footprint here.

— Personal Interview, Managing Director, Executive Search Firm

The region has a strong and highly diversified economy with considerable subregional differences. As it has moved increasingly to services with fewer workers earning their livelihood making things, a pathway to prosperity has somewhat diminished for workers who do not hold college degrees but are skilled nonetheless. Yet the regional economy continues to draw workers to its many strong sectors. As a new wave of automation is expected to ripple through the economy, increasing productivity, it raises the policy stakes to ensure an inclusive labor market and to further proper transitions at the individual level and workforce development more generally. As the economy is further reinvented, new challenges and opportunities present themselves:

- The economy is increasingly more professionalized, yet also more unequal, as seen both at the individual level and at the community level.
- The economy relies on the import of skilled workers, yet many workers in the region lack the training to secure a sufficient wage to support their families. As the region looks to secure viable career pathways for its next generation of workers, observers are talking about the need for "new collar"<sup>20</sup> instead of blue collar or white collar workers, with more agile and responsive ways of training tomorrow's workforce than typical four year programs, with a renewed emphasis on shorter term apprenticeships and continued learning.
- The economy offers many opportunities, but often far from where the workers live, with the lion's share of job growth in a relatively small number of subareas of the region.

These challenges and more call for solutions in today's economy. This report is a contribution to the discussion on how the region is changing, and how it may change further in the future.



# CHAPTER 3

## TECHNOLOGICAL SHIFTS: THE PROMISE AND PERIL OF AUTOMATION



# TECHNOLOGICAL SHIFTS: THE PROMISE AND PERIL OF AUTOMATION

One hundred years ago, Detroit led the way in changing how we work, with vast factories relying on new organizational and social ideas, including that workers should be able to afford the product they make. Now, the future is being forged not on conveyer belts but on fiber-optic conduits of the information age. Technology companies, many of which are headquartered in the San Francisco Bay Area, are building tools to connect us with each other while compiling the new gold of the 21st century: data. These data may make businesses more efficient, cities and their traffic more manageable, and logistics more transparent – but the shift to a data-driven, increasingly-productive workforce also may bring new challenges to the region's labor markets.

## TOWARD AUTOMATION 2.0

During the past decade, automation has caught the imagination of labor market observers and workers alike. Automation, defined as the application of a range of tools to make the production process more efficient, is not new but has been part and parcel of the work process since the Industrial Revolution.

The poster child of automation is automotive manufacturing, where assembly lines were coupled with machines to both make production more efficient and products more standardized. In 1949, Ford Motor Company opened a highly automated plant for engine block construction in Brook Park, Ohio, where automatic machine tools cut manpower by 90 percent.<sup>21</sup> As production became more streamlined, fewer workers could produce more output, growing the economy and in turn generating more demand for workers overall between 1945 and 1980. In more recent decades, globalization further transformed the American economy, with manufacturing jobs shrinking in the U.S., but output expanding apace.

Today, closer to home, the “dot-com” bust is nearly two decades behind us and the Bay Area is in the midst of another transformation. New technologies are driving major changes to the region's economic landscape, including the Internet of Things (IOT), Artificial Intelligence (AI), Machine Learning (ML) and Software as a Service (SaaS). Of these, some observers believe artificial intelligence may present the biggest challenges and opportunities, with computers increasingly able to complete cognitively complicated tasks such as recognizing speech, translating language, categorizing objects from images or moving pictures, and making decisions. To some, this is a generational watershed moment that can fundamentally reshape global economies and strategic alliances.<sup>22</sup>

Earlier waves of automation put blue collar workers at risk, and the pace of automation, as indicated by the rapid rise in shipments of industrial robots, has more than doubled the past decade.<sup>23</sup> While putting pressure on jobs, such shifts have paved the way for a new wave of jobs for engineers and technologists while shifting the nature of manufacturing work toward operating and monitoring semi-automated production equipment.

If you talk about manufacturing, the number of workers that are actually working on the manufacturing floor have gotten fewer because you've got more robots and automation. But what you may have is more industrial designers per square foot of an area.

— Personal Interview, Principal,  
Design and Architecture Firm

With the rise of AI, the scope of tasks that can be performed by computers is considerably larger. Paired with machine learning, these new technologies can transcribe interviews from audio or video, detect fraudulent financial transactions, discover prudent investment opportunities, and predict risk in legal contracts. Such technical capabilities mean many more workers could face displacement, while at the same time it may increase the productivity of other workers, grow the economy overall and spur further labor demand. The net effects are both quantitative and qualitative in nature. The rollout and adoption of these technologies are uncertain, as are their effect, but two primary schools of thought have emerged on this issue:



- Some experts believe we are heading toward a disruption with few historical parallels, in which the advances of automation machinery and robotics, coupled with big data driven by artificial intelligence, will profoundly impact today's economies and labor markets. Brynjolfsson & McAfee<sup>24</sup> fall into this camp, though with a certain sense of optimism that public policies and institutions will help mitigate automation impacts through better training and hiring. Other experts in this camp, such as Ford (2015), argue more ominously that disruptions will be so profound to our work lives that the traditional education-based strategies will be insufficient. They argue that 21st century technological shifts ultimately will result in the collapse of the social contract.
- Other experts find these arguments less convincing, noting the U.S. economy as a whole is lacking growth in productivity while at the same time featuring low unemployment rates. Others note a reduction in productivity, capital investment, and information equipment investment and software, and interpret that instead as a slowdown of automation in the past decade, before noting that occupational shifts have been slower in the 2000s than in any period since 1940.<sup>25</sup> To these writers, the current data does not suggest a large transition at our doorstep, but rather that one is needed.

The disagreement is in part methodological: What is a reasonable way of estimating effects of technologies not fully identified let alone implemented, along with economic and societal responses to them? Indeed, while a number of reports estimate the number of workers in occupations which could be automated, which we consider first order effects, a more challenging task is to estimate second order effects—how job markets could realign given a change in technology, going beyond the loss side of the equation and considering what might ultimately follow for the people and places most affected as the economy evolves and the policy environment and workforce adapts.

While our factories employ fewer workers than they did in times past, there may ultimately be reasons humans retain a comparative advantage in many fields, including in manufacturing, where the human touch will remain valuable. Elon Musk noted in 2017 that humans were

“underrated,” after having realized some of the limits to automation. Workers are good at making assembly lines run smoother, quality control more meaningful, correcting process error, and being nimble and good at assessing process flaws and scope for improvement. In Volvo's plant in Ridgeville, S.C., a number of patents have been filed based on ideas that came from workers at the plant. As the ratio of robots to workers went up, the need for workers to function as process “glue” seems to have gone up too. We still need lights on in many of our factories.<sup>26</sup>

While the first order potential loss numbers are thus not to be confused with an ultimate effect, they are worth paying attention to as an indication of the number of occupations likely to be touched, even if we do not know the ultimate station of affected workers. A core assumption of this report is that this outcome will be in part shaped by wider public policy discussions about our economy and labor markets and that technical possibility does not translate to actual certainty.

This section describes how automation is part and parcel of the production process but how the degree may be changing with AI. These changes may in turn affect the demand for different occupations, and we examine the demographics of workers in occupations most at risk.

## BALANCING LABOR AND EQUIPMENT TO INCREASE PRODUCTION

A firm needs workers and equipment to bring products or services to market. Yet the relationship between workers and tools is a complicated one: an employer's investments in equipment can increase the productivity of her workers, increasing output and generating new business for the firm, which could mean growing the labor force.

- Accounting software can increase the speed and accuracy of analyzing company financials, while 3D animation software can boost the efficiency of otherwise tedious and repetitive renderings.
- By the same token, investments in equipment can decrease the need for workers, at least in the short-term, while at the same time can create a need for more skilled workers to operate complex machinery and industrial processes.

As labor markets tighten, business planners may look to automation to address shortages, aided by generous write-off and depreciation rules available for investing in capital equipment but not for training the existing workforce.<sup>27</sup>

### **New Technologies: Substitution or Complement?**

Economists have long talked about “disruptive technologies,” meaning technologies that have profoundly challenged existing paradigms and reshaped markets and consumption patterns accordingly. Overall, disruptive technologies challenge existing supply chains, while enabling the development of entirely new ones. In the 1980s, personal computers replaced typewriters and over time typists en masse (though the people in those occupations likely found their skills applicable to handling computer keyboards). Beyond replacing specific occupations, the personal computer came to transform a wide number of industries engaged in analyzing and processing information, with “killer apps” like word-processing and spreadsheets becoming ubiquitous and the skills of handling the new digital arbiters proving to be in high demand. The rise of computers did not eliminate the need for workers capable of analyzing information; rather, computers boosted the fortunes of workers with those skills.<sup>28</sup> Computers reorganized many classes of work rather than eliminating them. New work, and mainly services, have appeared as industries have declined. Taken as a whole, each wave of creative destruction removed the economic rationale for pre-existing industries, while at the same time growing new ones in their wake. In addition, the task content of occupations have been changing in response to new technologies, even over relatively short timeframes.

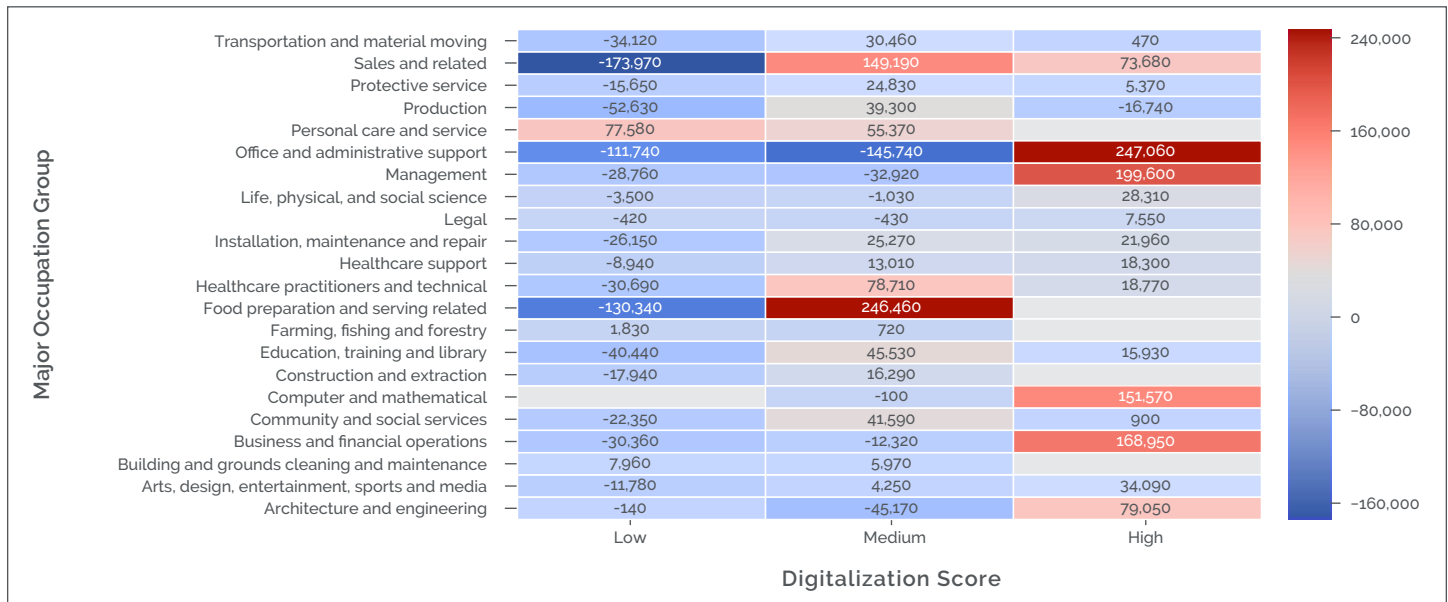
Marketing used to be about customer branding. Now it's all about data analytics and personalization. A very different kind of skill set.

— Personal Interview, Managing Director,  
Executive Search Firm

Following computers, a longer standing cross-cutting trend across the occupational structure is for many jobs to be much more oriented toward handling information. Much more work has become “digitalized”: encoded, stored, and transmitted with and by computers, increasing the scale and scope for sharing and collaboration, which are critical components of an information-based economy. Accordingly computer skills are increasingly the identified as a prerequisite to performing the basic job functions of a large share of occupations.<sup>29</sup> Xerox’s Palo Alto Research Center floated the notion of the paperless office in the 1970s, and the ability to digitize and thereby transmit information using computers has profoundly changed how offices work. The digitalization that has followed has redefined many industries and changed the workday of millions in the Bay Area and beyond, while better integrating the work of multi-establishment firms across the country.

While about 190,000 Bay Area jobs were considered “highly” digitalized in 2002, that number had increased to more than a million by 2017. Occupations in which “digitalization” is now commonplace go well beyond management, science and engineering occupations. They now affect otherwise low-tech industries such as food preparation and community and social services. Even sales occupations have seen a marked decrease in jobs with little “digital” content, with most growth in mid-range digital jobs. These changes may lead to higher entry-level requirements than a generation ago.

Figure 9. Job Change, 2002-2017, by Occupation Group and Digitalization Content.



SOURCE: BLS O\*NET Data, 2002 and 2017 Releases. Digitalization Definition from MURO ET AL (2017)

**AI Capabilities Are Considerable, But (Still) Limited in Scope**

With the increases in computing power through cloud computing coupled with ever larger pools of “big data,” new frontiers of automation are becoming a reality. Observers are asking whether “this time is different.”<sup>30</sup> Computers increasingly have the capacity to perform the analytical work otherwise thought to be the distinct province of human workers. Machine learning and neural network software programs increasingly can identify patterns and connections in large troves of data, from Netflix’s movie recommendations to medical diagnostics and chances of survival.

The technology is moving rapidly, sometimes exceeding experts’ expectations, as pointed out by the historian Yuval Harari.<sup>31</sup> In 2004, economists at Yale University wrote about the changes computerization would bring about to work at different parts of the skill spectrum, suggesting both a new division of labor as well as considerable changes in compensation. Levy and Murnane, deft observers of labor markets and technology, wrote on the formidable engineering challenges associated with having computers driving cars, noting that “executing a left turn across oncoming traffic involves so many factors that it is hard to imagine discovering the set of rules that can replicate the driver’s

behavior. ... (and that) articulating this knowledge and embedding it in software for all but highly structured situations are at present enormously difficult tasks.”<sup>32</sup>

Less than a decade later, Google and Tesla not only have proven the technology’s capabilities, but are running prototype self-driving cars in several states, owing to rapid advances in sensor technology and real-time image feature extraction, serving as a reminder of how quick the technological development cycles are. Notwithstanding the service benefits, this could have significant effects on labor markets, given the many workers for whom driving is a core part of the job. Nationally, in 2015, 3.7 million workers were employed in occupations where the operation of motor vehicle is the primary task.<sup>33</sup> In the Bay Area, the figure was 68,000 in 2017.<sup>34</sup> The bigger perspective is not on driving, but on what the same technologies can do to other work tasks.

AI also has led to another arena of progress, natural language processing, or the ability of a computer to extract relevant and contextual meaning from a text, as amply demonstrated when IBM’s Watson defeated Jeopardy master Ken Jennings in 2011. The semantic skills that could be used to play and win subtle word games can also be applied to more practical use. Other notable AI applications from a job market lens include:

- Natural language processing has been applied to more technically complex domains in the legal field, where AI software can identify risk in a range of contracts, purchase orders, non-disclosure-agreements, supply agreements and licenses.<sup>35</sup>
- AI is being used to diagnose strokes, recommend therapies and even estimate the likelihood of therapy success given detailed data on the patient's history.<sup>36</sup>
- Alphabet's DeepMind recently beat academic researchers in predicting the three-dimensional shape of proteins, a problem with applications for determining how molecules will bind to it. "It is not that machines are going to replace chemists, it's that the chemists who use machines will replace those that do not," according Derek Lowe, a drug discovery researcher.<sup>37</sup>

In these cases, AI would serve to complement existing workers, enhancing the ability of carrying out existing work tasks by finding more complex patterns in faster and better ways. This would lead to a more collaborative approach between people and the tools they use, though it would likely also mean a reduction in demand for some of the more routine analytical occupations.

New technologies regularly benefit early R&D. But when we move from early drug discovery work into clinical development and commercialization for cancer therapies, I think that the majority of tasks involved in getting a drug approved, marketed, and reimbursed are far too nuanced and complex to benefit from most of the typical tech advances we see these days.

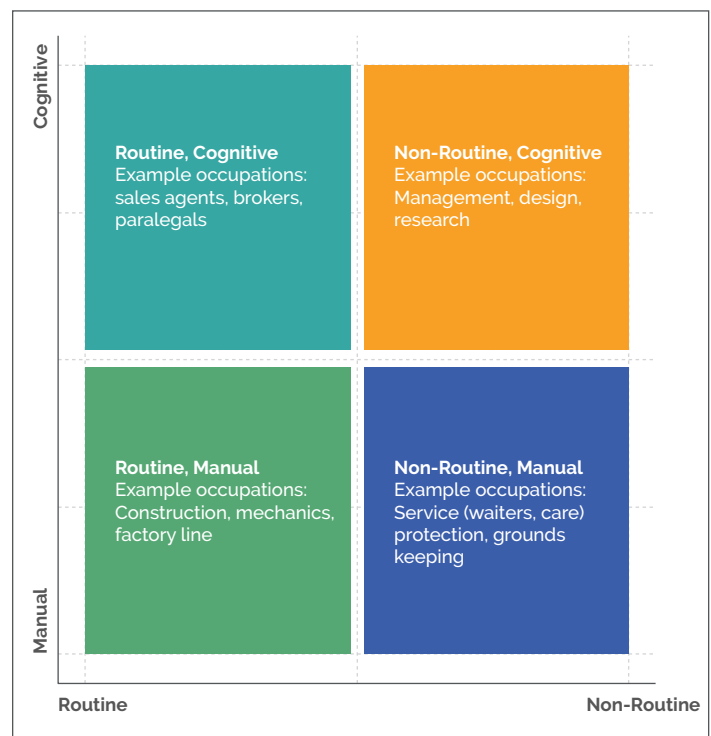
— Personal Interview, Vice President,  
Bay Area Biotech Company

While the effect of this type of technology is by definition uncertain, at a minimum we should expect qualitative realignments of work as with earlier automation waves. Insofar as some workers inevitably will be displaced, we need to consider ways of cushioning unemployment effects and preparing a range of workers of different skill levels to transition to new occupations and sometimes new industries.

## Risk of Automation Highest in Routine Occupations

Researchers estimate effects of automation by examining an occupation's task content. For example, a taxi driver needs to be able to drive but also to orient himself around town, perform customer service and handle luggage. The O\*NET dataset compiled by Department of Labor and occupational experts rates the importance and levels of a large number of work activities across occupations, like moving objects, analyzing data, and interacting with people face-to-face. This allows for classifications by whether a job consists mainly of manual or cognitive tasks, whether a job involves personal care or other site-specific requirements, and whether a job is predictable or changes on a daily basis. While intuition might suggest much manual work would be automated, there is much manual work that is highly situational, shifting, and non-predictable. Automation does not work well in these situations, meaning, perhaps surprisingly, that many non-routine manual jobs are relatively safe for the time being.<sup>38</sup>

Figure 10. Risk of Automation, Manual/Cognitive-Routine Non-Routine Quadrants. After Autor<sup>39</sup>; Schwab.<sup>40</sup>



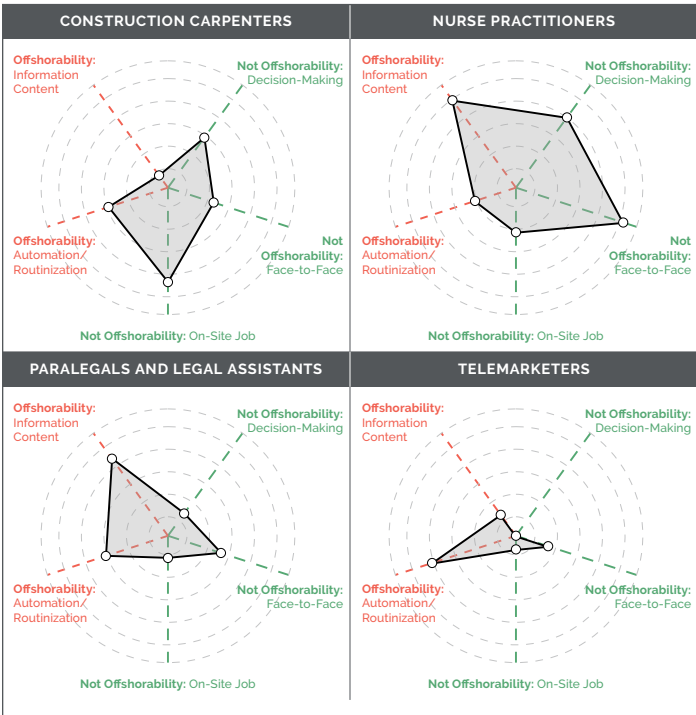
Using these data, Autor & Dorn were able to show that jobs that have been moved offshore in recent decades tend to have been more routine, well-described jobs that could easily be plugged into an international supply chain for domestic companies.<sup>41</sup> Telemarketing is a such routine job which has been decimated by first offshoring and later, to some extent, by either robo-callers in the narrow sense, or web marketing in the wider sense. Some routine legal work could be subject to competition from AI systems, and the introduction of AI will likely lead to a reorganization of tasks in the legal profession.

Broadly, the AI effect will reorganize jobs and tasks, as components of the work can be done by computer processing power at a distance. This may leave workers to focus on higher order functions like agenda setting, new ideas, design, decision making, and synthesis in a more complex division of labor involving people and AI. The task data allows for the comparison of different occupations in terms of how much a job relies on decision making, its level of information content, whether it involves moving equipment or material in a particular location, or whether it requires face-to-face interaction as part of the core duties. **Figure 11**, using O\*NET data, compares four occupations on these dimensions, revealing highly distinctive profiles: Construction carpenters need to work on site, making them difficult to automate or off-shore. Nurse practitioners' work involve much face-to-face interactions. Paralegals' work has a high level of information content but also an elevated automation / routinization score. Telemarketers score low on most counts, except automation / routinization. Indeed, the number of telemarketers in the region has dropped by nearly 80 percent since 2001, while paralegals have held steady.<sup>42</sup> Such occupational sun-setting is not uncommon.

This issue of automation and robotics as job killers—there will be job losses and simultaneously there will be greater and greater need for continuous learning and upskilling of people—if I have a workforce today of 50,000 folks within a given firm—in the future—I may only need 30,000 folks tomorrow, however those 30,000 folks will need to be very agile to continuously up-skill and to continuously learn new skills and new capabilities.

— Personal Interview, Managing Director, Strategy + Innovation, Real Estate Service Firm

**Figure 11. Profiles of Select Occupations, Scores on Five Measures of Automation/Off-Shoring Ability.**



**SOURCE:** ABAG / MTC, from BLS O\*NET Data. Dimensions From Firpo<sup>43</sup>

Oxford researchers Frey and Osborne went beyond occupational scoring to calculate an actual risk score for automation. They started with a list of around 700 occupations, with a subset of occupations flagged by whether they were—or were not—automatable by occupational experts. The characteristics of these occupations then became the “training data” for a model of which occupational characteristics, similar to those shown in **Figure 11**, are most associated with automation risk. Overall, they found that 47 percent of jobs might be “potentially automatable over some unspecified number of years” based on an assessment of tasks which could conceivably be carried out by robots and/or AI systems with already existing technologies.<sup>44</sup> Other economists, however, caution that such estimates are substantially inflated based on within-job heterogeneity of tasks. Even if a large number of discrete job tasks could in principle be automated, the fact that most jobs bundle a variety of tasks where only some are automatable means the impact may be less severe. By one estimate by a group of OECD researchers, this reduces automation risk to just 9 percent.<sup>45</sup> Uncertainties aside, the task-based approach is commonly used and data is the best

we have in terms of offering considerable detail on upwards of 800 occupations.

There are several caveats worth considering:

- The task-based approach treats occupations as static, whereas in reality the tasks associated with a job changes over time as workers and organizations adjust to new technologies and demands.
- New technologies create new jobs directly (e.g. data scientists) but also indirectly related to how they reorganize markets (smartphones led to app developers; the internet led to search engine optimizers). The more dire predictions largely miss this considerable scope to grow the overall economy owing to efficiencies and new areas of value created by new technology. In a recent report, for example, machine translation was found to increase trade on eBay by 12 percent by removing language barriers through machine translation.<sup>46</sup>

Ultimately, our purpose in using data per the task-based approach is not to estimate these wider economic effects, but to understand the relationship between changing occupations and the Bay Area labor force as a way to understand where policy approaches would be most needed.

## ESTIMATES OF MAGNITUDE FOR THE BAY AREA

To estimate Bay Area-specific characteristics of the labor force at some risk of automation, we used data from Frey and Osborne<sup>47</sup> on occupational risk for 702 occupations.<sup>48</sup> Knowing which occupation a sample person is employed in, and the risk associated with it per the Frey and Osborne data, we can tabulate demographic characteristics associated with occupational risk down to the Public Use Microdata Area geography level.<sup>49</sup> We report on risk in three categories – low, from 0-30 percent; middle, 30-70 percent; and high, above 70 percent risk of automation or computerization.

### Limitations

- First, relating to Frey and Osborne's data, they represent potential risk over an unspecified timeframe and should not be construed as a forecast of what will actually come to pass. Second order effects where labor markets adjust are not represented here. Economic, social and political questions are expected

to loom large mediating the extent, magnitude and timeframe of automation.

- Second, the occupational data ultimately are classified based on a national description of occupations. Considerable variation could exist from the national norm. The content of some Bay Area occupations could well spend more time on higher value-added tasks relative to regions with lower costs of living and lower levels of technology penetration. This could mean some Bay Area occupations already have evolved into a more efficient territory. This could in turn either make them less risk-prone than the Frey and Osborne data suggest.

## THE BAY AREA AT THE FOREFRONT – WITH MORE RISK BUT A STRONG STRATEGIC POSITION

For [the Bay Area], I see nothing but continued future growth pressures. And it will become challenging to meet the future talent growth requirements and to meet the digital talent demands for those companies that reside within the San Francisco Bay Area—even with the growth of AI and Automation—the growth pressures will be exacerbated because it's the lower level "routinized" jobs that can be most easily automated and replaced by AI in the future.

— Personal Interview, Managing Director, Strategy + Innovation, Real Estate Service Firm

With a new wave of automation looming, should we expect the Bay Area, strong in these technologies to begin with, to be relatively more or less disrupted than other regions? There are reasons to think a bit of both:

- **The high cost of living makes it more likely that firms will seek automation sooner here than elsewhere.** This is likely compounded by the widespread knowledge of the capabilities of automation and AI in the region.
- **Conversely, the Bay Area's role as an epicenter of new technology suggests that the most mission critical management, research and design functions would still find it worthwhile to remain in the region.** However, many routine jobs could be automated away or moved to lower cost locations, posing risks to lower-wage workers.

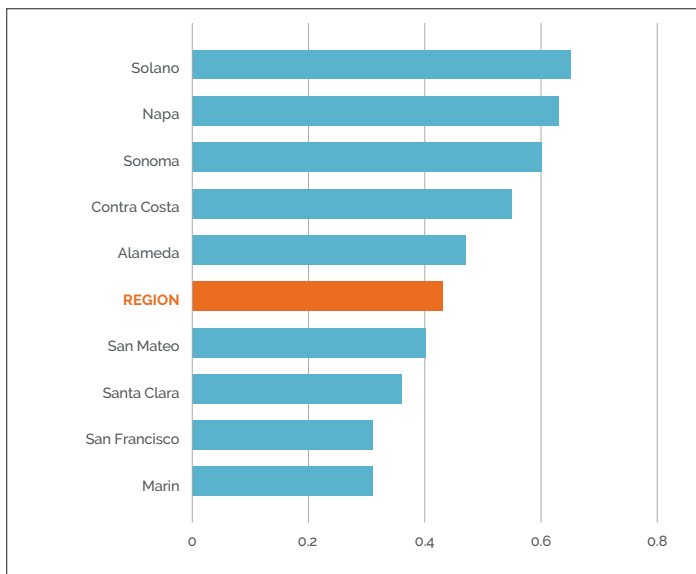
- **AI impacts on Bay Area workers may be hidden.**  
Those losing jobs may not be able to afford to stay in the region and may leave, unless effective adjustment programs can be put forward.

While the net effect of these is uncertain, the following section describes automation risk as it affects different occupations.

### Bay Area Demographic Profile of Automation Risk

Overall, the region's automation potential is marginally lower than the one for the country as a whole, with San Mateo, Santa Clara, San Francisco and Marin counties being at lower risk; Alameda at the U.S. level; and other North and East Bay counties having higher than average risk. Owing to the composition of occupations, nearly two-thirds of Solano County's jobs are susceptible to automation (Figure 12).

**Figure 12. Estimated Probability of Automation, by County of Residence.**



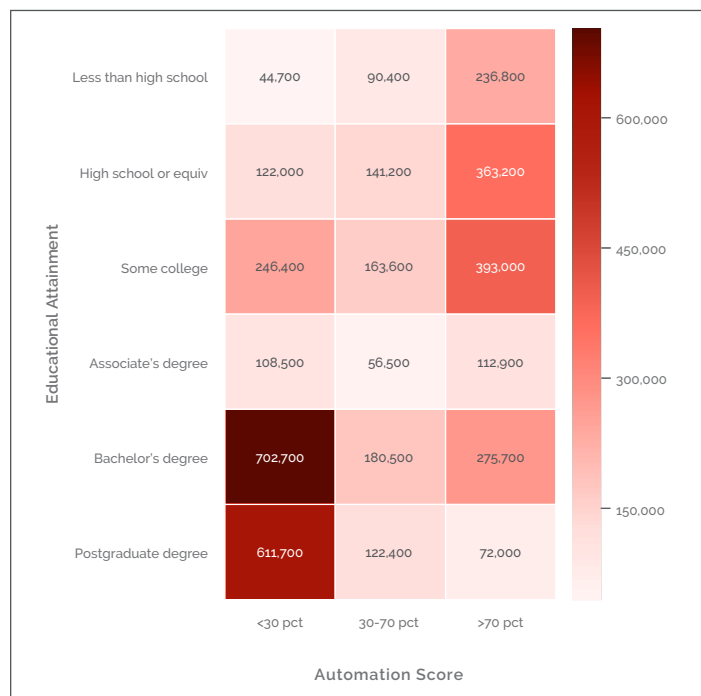
**SOURCE:** Automation Data from Frey and Osborne (2017); Occupations Weighted by Demographic Data from Bay Area ACS PUMS 2013-2017

With respect to educational attainment, the highest risk group is workers with "some college," at more than 300,000 workers, followed by those with a high school diploma. Conversely, those with a college education and beyond fare better, with most falling in the lowest risk category. Nevertheless, over one-fourth of workers with bachelor's degrees are in occupations found in the highest risk category.

In the next three figures, general risk of automation is shown in relation to different characteristics of the

Bay Area economy and labor market. **Figure 13** shows the Bay area labor force broken down by educational attainment (vertical axis) and susceptibility to automation risk depending on the occupation held and how feasible it is for that particular occupation to be automated, per data from Frey and Osborne. **Figure 14** shows the same workers, but details race / ethnicity instead of education. **Figure 15** offers automation risk by industry group for the region's workers. Lastly, **Figure 16** presents occupational detail.

**Figure 13. Automation Probability, by Educational Attainment.**

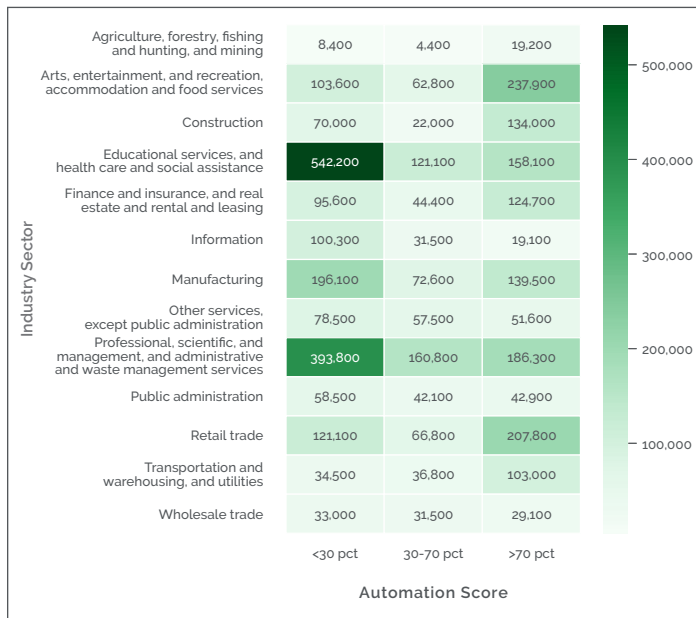


**SOURCE:** Automation Data from Frey and Osborne 2017; Demographic Data from ACS PUMS 2015-2017

Occupations in manufacturing, retail trade and food services (shown together with arts, entertainment, recreation and accommodations) have the largest number of jobs susceptible to automation. This includes half the retail jobs (which already have been impacted by online sales), six out of 10 transportation and warehousing jobs, and a third of manufacturing jobs. Surprisingly, three in five construction jobs also fall in this category, as the risk classification data is sanguine about automation potential of various construction tasks, such as painting and operating machinery or even building inspection. While prefab is gaining some traction as well as bricklaying robots, the on-site requirements and high cost of mistakes suggests it could be a while before such numbers become a reality.

Other researchers expect the current seed stage of many construction automation technologies will soon see large scale adoption.<sup>50</sup> Educational services, health care and social assistance have a bimodal split, with over 158,000 jobs in the high-risk category (one-fourth of total jobs in the sector) but almost twice that number in the lowest risk range.

**Figure 14. Automation Probability, By Industry Sector.**



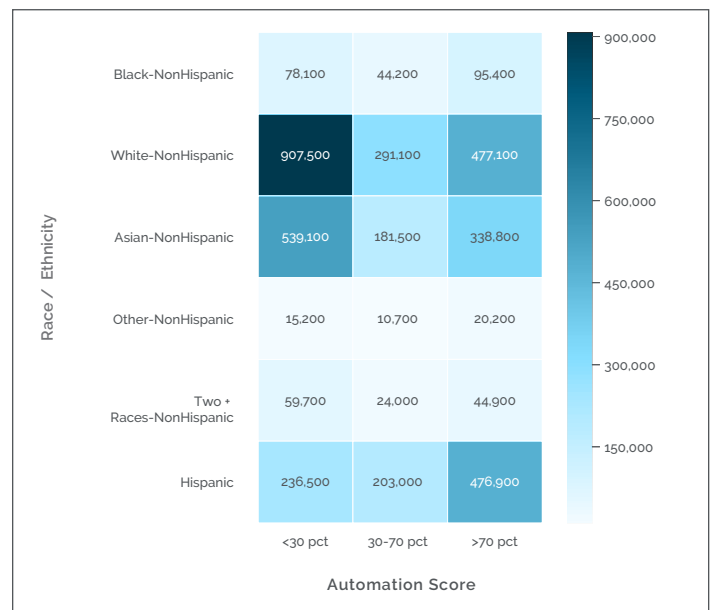
**SOURCE:** Automation Data from Frey and Osborne 2017; Demographic Data from ACS PUMS 2015-2017

Because of the distribution of educational attainment and industries by race and ethnicity, the risk of automation is spread unevenly among different racial and ethnic groups, although significant numbers of most ethnic groups are in occupations at high-risk of automation. Almost 477,000 of Bay Area workers in high-risk occupations are in the white non-hispanic category—about one-third of all workers in high-risk occupations. The high-risk category also includes 477,000 Hispanic and 339,000 Asian-American workers. On a percentage basis, only White and Asian-American workers have a below average percentage at risk (28 and 32 percent), while Hispanic workers, at 52 percent, have the largest proportion in high-risk categories.

Being a stylist is something you can't readily hand over to a robot. There's a real human component to it, by people who fundamentally believe in what they're doing. So that keeps those kind of jobs alive and keeps them coming back to San Francisco. The reason that there are stylists or even engineers at [startup company] is because they believe in the product, and work there even if they could be making three times as much at [a big firm].

— Personal Interview, Industry Leader, Architectural Services Firm

**Figure 15. Automation Probability, by Race / Ethnicity.**



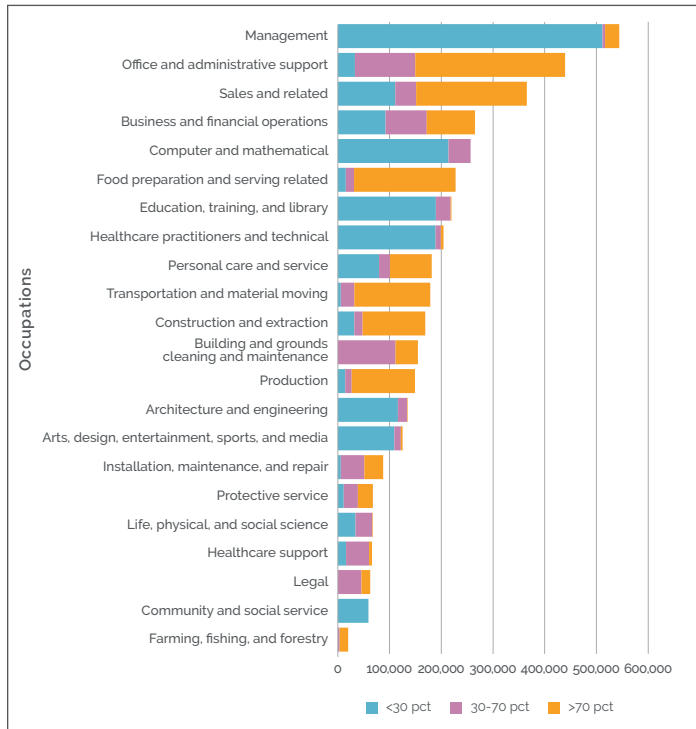
**SOURCE:** Automation Data from Frey and Osborne 2017; Demographic Data from ACS PUMS 2015-2017

Looking at jobs by occupation instead of by industry, sorted by the existing number of jobs, we see that the Bay Area's many workers in management occupations generally fall in the low-risk category, while more workers in the office and administrative support function group are in the high-risk category, followed by sales and food preparation. It is worth noting here that while there is the potential for job loss, there are data points pointing in the other direction, at least in the short-term. The Manpower 2018 survey on worker shortages, in its top 10 list of most demand skills included sales representatives (mostly Business to Business) and drivers and office support workers<sup>51</sup>; those groups have seen solid growth in the Bay Area in the past decades.



Automation risk is ultimately different from automation certainty, with many analysts pointing to the enduring value of the “human touch” in a number of occupations.

**Figure 16. Employment, by Major Occupation Group and Automation Risk Category.**



**SOURCE:** ABAG / MTC, from U.S. Census, ACS PUMS Data, Classified Using Automation Data from Frey and Osborne

## WHAT IT MEANS FOR THE REGION

While these at-risk numbers may seem dramatic, we expect new lines of work to appear as industries realign. We see it as a continuation of a longer standing churn in which some job functions have become less common in the region due to outsourcing or earlier waves of automation. We agree with the Brookings Institution’s recent assessment of the effect of automation entailing “a more complicated, mixed understanding that suggests that automation will bring neither apocalypse nor utopia, but instead both benefits and stresses alike.”<sup>52</sup> Occupations have long come and gone as technologies and markets have changed. It is not unusual for occupations to see declines over time and even in relatively short order. As noted, the region lost a third of its manufacturing jobs since 2000, even as output for the

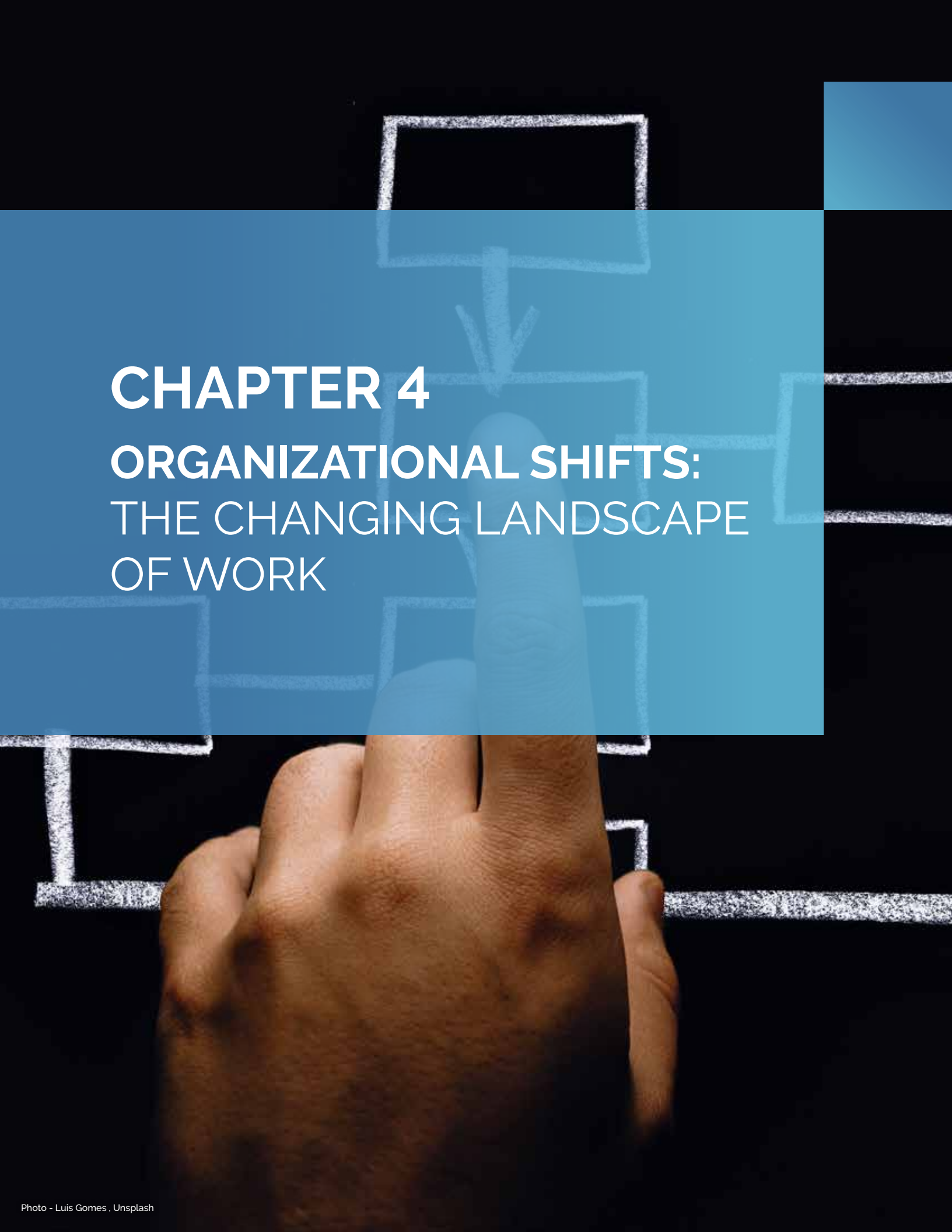
sector rose overall. The extent to which AI will increase the rate of “occupation sun-setting” AI is unknown; but it is plausibly the case, though it will also lead to a more complex division of labor between workers and tools, boosting productivity on some occupations while supplanting others. We should also expect entirely new occupations and ways of working, while jobs involving distinctively human qualities could see a boost.

Looking to hopes rather than fears, developments in AI are spurring new industries and expanding the scope of existing sectors. Bay Area companies playing a role in developing the concepts and tools behind automation and AI are contributing to the region’s economic vitality and resilience.

While it appears unlikely that the latest wave of automation and AI will lead to permanent structural unemployment, specific occupations and industries will likely undergo disruption and transitions. The geography of the labor force will mean effects will be felt more in some places than in others: increasing the vibrancy of some areas and arguably decreasing it in others, while raising the stakes for public policy to connect and transition those communities.

For the wider Bay Area workforce, it seems likely that automation and AI will make some jobs much more productive, and to the extent that they also are “abstract, creative, problem-solving” jobs, workers may well be rewarded with higher salaries. Yet there may be another set of occupations where what were once skilled tasks requiring judgment (insurance underwriting, for example) are winnowed down to small areas of de-skilled work, leaving workers in those occupations with lower pay levels and little prospect for wage increases. These countervailing tendencies, if both occur, will have a negative effect on Horizon’s **DIVERSE** Guiding Principle, leading to widening disparities, and calling for both agile and sustained public policies to address it.

Further implications of the changing technology base of jobs are addressed in the next three sections of this paper, which look at how work is organized, how it is compensated and where it takes place.

A hand with a dark skin tone is pointing upwards towards a chalkboard. On the chalkboard, there is a faint, hand-drawn organizational chart with several rectangular boxes connected by lines. The background is dark, and the chalkboard is a light blue color. The text is overlaid on the blue area.

# CHAPTER 4

## ORGANIZATIONAL SHIFTS: THE CHANGING LANDSCAPE OF WORK



## ORGANIZATIONAL SHIFTS: THE CHANGING LANDSCAPE OF WORK

While wage and salary jobs remain the predominant type of employment in the Bay Area, they coexist with a number of alternate work arrangements, including independent contractors, freelancers and “gig economy” workers. These types of independent work hold the promise of more dynamic labor markets where workers can scale hours at will and where customers can more easily find services they need. At the same time, for many workers, there are risks associated with independent work, including less stable benefits than those found at comparatively stable wage and salary jobs. Labor historians note that an economy in which short-term gigs are attractive is precisely one where standard employment as a model has eroded and where low-wage unskilled jobs play a primary role and offer little career growth.

The nature of employment itself is changing. The broadest estimate states that four out of 10 U.S. workers are currently engaged in alternative employment arrangements, from part-time employment and temporary positions to gig work and other forms of independent contracting<sup>53</sup> (see Text Box on alternative work). These forms of work represent a shift away from the traditional full-time, single-employer career that became common after World War II, when major corporations needed long-term, stable workers. At that time workers, often through collective bargaining, secured key benefits such as retirement, paid time off, healthcare for their families and middle-income wages. Worker protections at both state and federal levels were built around the core employment relationship concerning overtime pay, safety and benefits.<sup>54</sup> The “standard” employment relationship was never universal, but it was the dominant job type in the late 20th century<sup>55</sup>—although not all employment agreements match the high-wage-high benefit ideal just described.

## ALTERNATIVE WORK ARRANGEMENTS – MORE COMPLEX LABOR MARKETS

The standard employment relationship working in wage or salary arrangements is still very common<sup>56</sup> and represent nearly four out of five workers in the Bay Area. These work arrangements coexist with several alternatives that have appeared in the past few decades. Alternative work arrangements refer to a range of modes of employment, such as independent contractors, on-call workers and temporary help agency workers. Increasingly, “work” is now part of a wider ecosystem of tasks performed for pay under a greater variety of organizational arrangements. Companies are still the main locus of employment, but there now exists a wider constellation of work orchestrated by or around them.

While there is general agreement that the employment landscape is shifting, there is less consensus around how to define the phenomena or the magnitude of this shift. The employment universe may be defined by formal status (such as wage and salary workers versus self-employed individuals); the nature of the relationship with an employer (e.g. full- or part-time, temporary or “permanent”); or even the technology used to obtain new work (e.g. the app-based gig economy). The segments are not necessarily mutually exclusive and may overlap: Wage and salary workers can have gig work on the side, or work in temporary or part-time capacities. Some contract workers, if placed through a temp agency, may over time become eligible for worker benefits. Estimates may vary widely, depending on what is counted and whether it includes secondary jobs where the respondent has a “main” wage and salary job.

Despite uncertainties in measurement, it is clear that there are a growing number of workers outside the standard employment arrangements. Their significance lies in both the promise of a more dynamic economy as well as in the attendant risks of falling outside the typical worker protections and benefits built up around and associated with wage and salary jobs.

## A PRIMER ON ALTERNATIVE WORK

**Bureau of Labor Statistics (BLS)** identifies several types of alternative work arrangements, with about 15.5 million workers nationwide (May 2017):

- **Independent contractors:** provide limited-scope goods or services to clients. Common occupations include doctors, dentists, veterinarians, lawyers, accountants and building contractors.
- **On-call workers:** provide work on a time limited or often spontaneous basis with varying work sites. Works on an as-needed basis.
- **Temp help agency workers:** works for a company that places workers with a third-party company of shorter or longer duration.
- **Contract workers:** works for a typically short amount of time on a limited-scope project.

A somewhat overlapping, somewhat distinct subset refers to workers whose work is organized around short-term independent "gigs."

- **Gig economy workers:** BLS notes there is no formal definition of gig workers but describes a gig as "a single project or task for which a worker is hired, often through a digital marketplace, to work on demand." This is often segmented by labor platforms where time is shared, or capital platforms where homes or other assets are shared.
- **Electronically mediated work:** refers to gig economy workers relying on apps to coordinate gigs.

- **Independent work:** A category used by McKinsey to characterize a large number of non-wage and salary employment arrangements of varying duration and focus.

A cross-cutting **characteristic** of several of these work genres is the notion of contingent work.

- **Contingent workers:** As defined by BLS, a contingent worker is either a wage and salary workers or a short-term self-employed worker who, for reasons not of their own choosing, is in their current job for less than a year.

Key Data Sources on alternative workers:

- **Bureau of Labor Statistics, Current Population Survey (CPS):** The leading survey on a number of labor market characteristics, conducted from a monthly sample of 60,000 households. BLS conducts a number of supplemental questions to the main CPS is sample, providing further details on specific topics. In May 2017, a contingent worker supplement was administered. CPS is issued monthly, but supplements are infrequent. The previous contingent worker survey was conducted in 2005.
- **U.S. Census Bureau, data on nonemployer statistics:** reports on sole proprietors without employees based on administrative tax records from the Internal Revenue Service. Data issued yearly.

The shift has long-standing organizational roots. Declining profit margins, globalization and overseas competition have in the past several decades led to reorganizations of many industries, with both more international supply chains and shorter cycles of product development. Companies have responded to shorter development cycles by offshoring and outsourcing more routine, non-essential parts of the business.<sup>57</sup> For places like the Bay Area, this has meant leaving the more strategic decision-making and

design functions of the business here, where the high cost of real estate is less of an issue, and moving some more routine occupations to lower cost parts of the region, as with the back office boom of the 1980s, or outside of the region. At the same time, to be more lean and focused on the core business, many companies increasingly rely on "platform sourcing" parts of their workforce, where the size and skill of the company workforce can be adjusted to fit business needs more quickly.<sup>58</sup>

Companies can now seamlessly outsource many pieces of their business. They can get access to programmers through the gig economy roles. There's no doubt that this will continue to play out in the world of big companies as well.

— Personal Interview, Managing Director,  
Executive Search Firm

A class of workers referred to as TVCs (Temporary, Vendor and Contractual workers) work side-by-side with wage and salary peers, getting different pay and frequently inferior benefits for often similar work. At some big tech companies, these may be equal in size to the regular workforce.<sup>59</sup> While much of this shift is anecdotal, there are some traces of it in the federal surveys when examining industry and occupation at the same time. In California for 2012, some 40 percent of medical transcriptionists were employed by hospitals. By 2017, this number had dropped to 27 percent. The 13 percentage point drop corresponds almost directly to the 12 percentage point increase of transcriptionists employed by the administrative support service industry (from 21 percent to 33 percent), reflecting this organizational shift. Over the same period of just five years, California added nearly 1.5 million jobs in the business support services industry. Insofar as companies farm out services to administrative support services firms to save costs, and the industry ranks near the bottom in terms of retirement and health benefits, this transition raises the question of the larger effect on employment stability and worker benefits.<sup>60</sup>

MBO Partners, in their national 2018 survey on independent workers, noted several factors driving the growth in independent work:

1. Use of independent workers on a project basis has increased flexibility and agility for **employers**.
2. **Workers** have valued the autonomy, control and flexibility independence provides.
3. Stagnant wage growth has induced **workers** to add side gigs.

Reorganizations mean more than the existence of workers in alternate arrangements but also changes to benefits for wage and salary workers. Overall, 68 percent of private sector workers have access to health care

benefits through their employer, with the number being higher for professional workers and lower for sales and service workers. Workers for companies with fewer than 50 employees are less likely to be covered. Low-income workers are particularly poorly covered, with just a third of workers with wages at the 25th percentile having this benefit.<sup>61</sup> Similar between-group differences appear when looking at retirement benefits. The uncoupling of benefits from many wage and salary workers makes benefit availability less of an argument for that type of employment, with many deciding to go for the flexibility of alternate arrangements.

While short-term adjustments to the company workforce generally have been handled by staffing agencies in past decades, companies now often turn to digital newcomers to the field, such as Upwork, Toptal and Fiverr, to connect to freelancers and companies across geographic boundaries in another facet of the fledgling platform-based gig economy—a growing subset of the wider alternative work ecosystem.

### **When Alternate Means Very Short-term: Gigs**

The gig economy is a facet of the organizational change landscape that is particularly familiar to Bay Area residents given the local prevalence of its defining companies. Gig work can be characterized as on-call contingent work for which workers supply their own equipment. The recent incarnation of this type of work often (though not exclusively) relies on smartphone-based applications to access customers, without promise of future engagement.<sup>62</sup> Gig work can be considered a subset of independent contracting, but with a wider range of occupations and often shorter tasks compared to the more traditional tasks in construction, real estate, professional, waste management services, and the arts and entertainment.<sup>63</sup> It fits well into the overall rise of alternate work arrangements, driven by wider currents of organizational realignment to focus on the core business and delegating secondary or episodic work. This translates to a bigger focus on contract work and shorter tenures with the same employer for younger workers.<sup>64</sup> While it tends to make the economy more efficient, it also marks the gradual transferring of economic risk from companies to individuals.<sup>65</sup>

Some activities that we go through that are very cyclical, meaning one week or so per quarter, or encompass just a temporary push to achieve a short-term goal. With these periodic or compact efforts, we tend to use contractors or temporary employees.

— Personal Interview, Vice President, Biotech Firm

The wider premise of the gig economy is that there is demand for a range of micro-tasks at the same time as there are people willing to supply them on a piece-work basis. Whereas such work may have been facilitated in the past at a smaller scale through poster boards or the local newspaper classifieds section, the transaction cost often proved prohibitive relative to the scale of the task. The ubiquity of the internet, and later smartphones, enabled a range of service markets to emerge and reach scale in a remarkably short timeframe. While "ride-hailing" and "home-sharing" have perhaps become synonymous with this economy, the model of technology-enabled peer-to-peer markets between buyers and sellers is more widespread.<sup>66</sup>

"Peers" in the gig economy are not just private individuals but also businesses purchasing goods and services through these platforms, ranging from Upwork delivering all manner of freelance-based services to business end-users to Caviar and Uber Eats, bundling rides and food. TaskRabbit, a platform for finding local help with everyday tasks, reports that more than a third of jobs posted on the site come from businesses,<sup>67</sup> underlining the blurring boundaries between traditional staffing agencies, their clients and the gig economy.

This whole idea of an "API economy" is a big deal—where you can disaggregate the business and outsource pieces to specialized cloud services providers, across almost any function or business process, while you can focus on your core competency. In this world the question of where does the company begin and end and the definition of "I am an employee" are increasingly blurred.

— Personal Interview, Managing Director, Executive Search Firm

As more work becomes digital in terms of both product and process, it is likely that the gig economy will continue to grow. This upside is perhaps most evident by the high pre-IPO valuations of the platform companies involved.

## SIZING THE ALTERNATIVE WORKER UNIVERSE?

Given the differing definitions of alternative work, it is not surprising the estimates vary considerably, ranging from 5 percent to about a third of the U.S. labor force.<sup>68</sup> Per Census Bureau researchers, official datasets track alternative employment forms poorly, as evidenced by differing accounts of self-employment from survey-based and administrative data. Many respondents to the main labor market survey conducted for the Bureau of Labor Statistics indicate holding wage and salary jobs, whereas matched administrative records identify them as independent contractors.<sup>69</sup>

Federal agencies track the alternative work economy in part using administrative data. The "1099-MISC" economy refers to workers receiving the form by the same name, typically issued to independent contractors and freelancers if they bill more than \$600 in a tax year. From 2000 to 2015, the number of 1099-MISC issued increased by 22 percent, while W-2 forms, filed for wage and salary workers, decreased 3.5 percent.<sup>70</sup>

In a much cited paper adding weight to the notion that this slice of the economy is worth paying attention to, economists Katz and Krueger put the number at just under 16 percent, up 5 percentage points since 2005. Katz and Krueger note the vast majority of job creation during the first decades of the new millennium had in fact been in alternate work arrangements, not in standard wage and salary jobs. However, the authors in 2018 revised down their estimate, saying the rise was perhaps only 1 to 2 percentage points, citing methodological and cyclical issues.<sup>71</sup> While many workers dabbled with gig work during the sluggish labor market in the years after the Great Recession,<sup>72</sup> these gigs tended to be less a substitute than a complement to existing work. Along with the BLS data on contingent work holding relatively steady, this suggests the more fanciful expectations of the gig economy have not yet been realized.

An alternative approach comes from creative use of transactional datasets from financial institutions, logging sources of income from a large number of platforms associated with the gig economy (thus representing a subset of alternate work arrangements only). Researchers from the Chase Institute, using perhaps the most comprehensive dataset recording incomes from

more than 100 gig sources among Chase Bank customers from across the country, found that 4.5 percent of families received gig platform income over the course of a year but just 1.5 percent over the course of a particular month, suggesting the highly uneven earnings profile from these platforms. Chase further found that the platform economy is a minor source of income for the vast majority of participants, with a smaller number of workers accounting for a large share of the overall work, a finding consistent with data from Lyft.<sup>73</sup>

Further complicating accounting of the number, the platform economy has high attrition. As many as half of those signing up in a given month are inactive within a year, suggesting it is a stop-gap or a temporary experiment. Lastly, the Chase data showed a peak in 2014.

One researcher notes this may be due to actual earnings and working conditions often failing to live up to the hype.<sup>74</sup> This highlights the contingency of this type of work. While flexibility is the upside—during the recent federal government partial shutdown, federal workers turned to ride-hailing for supplemental income<sup>75</sup> — inconsistency is the downside.

Pew Research Center estimates that 8 percent of workers earned money through gig employment during 2016, which is a little higher than the estimate from Chase Institute. Of these, 56 percent of gig workers reported their income as “essential” or “important,” highlighting the significance of gig work on household earnings potential.<sup>76</sup>

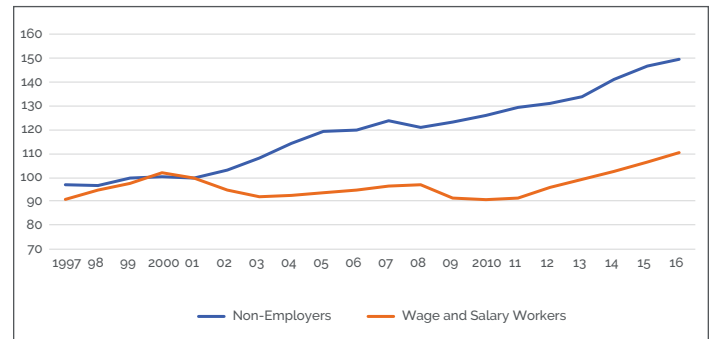
Although the numbers seem stagnant at the national level, there are indicators suggesting that gig work is a growing component of California’s economy. Increases in sole-proprietor tax filings in California in service sectors may be indicative of growth in online gig work.<sup>77</sup> Out of 26 cities reported on by Chase Institute, San Francisco had the highest participation in online gig work at 2.9 percent, and San Jose was not far behind at 2.2 percent, compared with a BLS estimate of 1 percent of workers nationally. Nearly half of this work is in the transportation sector.<sup>78</sup>

### The Bay Area Has a Relatively High Number of Alternative Workers

While survey data may undercount many alternative worker segments, administrative data from tax records compiled by the Census Bureau may offer clues for the region’s alternative worker universe.

Statistics on self-employed workers (“non-employers”) indicate that the Bay Area ranks high on this subset of alternate employment arrangements. During the past few decades, the number of non-employers has substantially outpaced the growth in wage and salary jobs in the region, with a noticeable kink in the curve for non-employers beginning in 2013, per **Figure 17**.

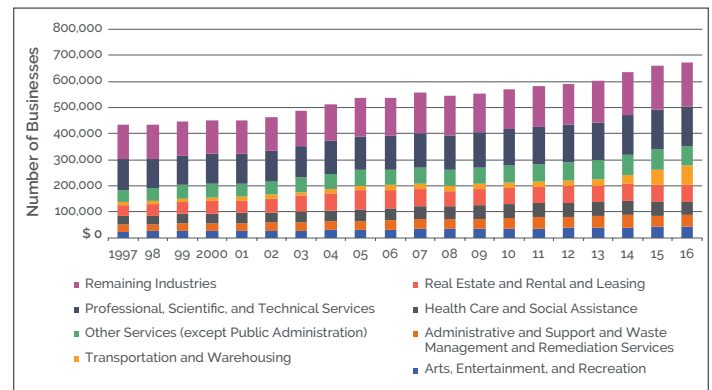
**Figure 17. Bay Area Wage and Salary Jobs and Non-Employer Establishments (2001: Index 100).**



**SOURCE:** BLS QCEW; U.S. Census Non-Employer Statistics

Common non-employer areas of activity include Professional, Scientific, and Technical Services; Administrative Support Services; Real Estate and Rental and Leasing; Health Care and Social Assistance; and various workers in the arts and entertainment industry (**Figure 18**).

**Figure 18. Bay Area Top Non-Employer Industries.**



**SOURCE:** U.S. Census Non-Employer Statistics

As is well-known, the ride-sharing industry has come from humble beginnings to a revamped mobility landscape in less than a decade while realigning labor markets in many ways. As the key companies are based in the Bay Area, the effect on local labor markets is notable: The number of non-employers in the personal transportation sector in the Bay Area has increased eightfold from 1997 to 2016 (**Figure 19**),<sup>79</sup> a likely underestimate as many drivers come from outside the region.

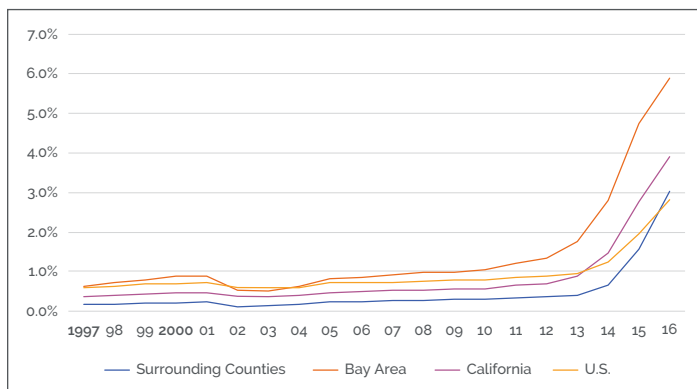
**Figure 19. Job Growth, Self-Employed Proprietors vs. Wage/Salary Workers, Passenger Transport Industries, 1997-2016, Bay Area Counties.**



SOURCE: ABAG / MTC, from U.S. Census, Non-Employer Statistics

The Bay Area growth in workers in the taxi and limousine services industry means that these workers went from a less than 1 percent to a 6 percent share of all non-employers, more than double the national figure and substantially above California's 4 percent share (Figure 20).

**Figure 20. Share Of Non-Employer Establishments Engaged in Taxi and Limousine Service.**



SOURCE: ABAG / MTC, from U.S. Census, Non-Employer Statistics

## CHARACTERISTICS OF WORKERS IN ALTERNATIVE ARRANGEMENTS

Given the multitude of alternative employment arrangements, it is not surprising that workers are diverse in terms of education and income. At the same time, there are some notable differences between them and wage and salary workers (themselves a varied group).

### Education

- In 2017 contingent workers were more than twice as likely to have less than a high school degree than non-contingent workers (13.5 percent vs. 7 percent), while also having a higher share of workers with a bachelor's degree than non-contingent workers (43.5 percent vs. 40.6 percent), reflecting the different educational groups subject to stints of contingent work.

### Occupation

- Contingent workers were more likely to be employed in professional and related occupations, compared with non-contingent workers (31.2 percent vs. 23.5 percent).

### Race / Ethnicity

- Asians and Latinos are more likely to be contingently employed.<sup>80</sup>

### Earnings

- In 2017, contingent workers earned 77 percent of their non-contingent peers, though this is in part explained by a larger share of part-time workers (41 percent vs. 17 percent).
- From 2008 to 2010, temporary workers in California were twice as likely to live in poverty and receive food stamps.<sup>81</sup>

### Benefits

- Contingent workers were far less likely to have employer-provided health coverage (25 percent vs. 50 percent), while just 18 percent of contingent workers had an employer provided pension plan.<sup>82</sup>
- 32 percent of independent contractors (a subset of alternative workers) received employer-provided health insurance, compared to 69 percent of wage and salary employees.<sup>83</sup>

Despite these vulnerabilities, and despite 55 percent of these workers expressing the preference for non-contingent work,<sup>84</sup> we expect alternative work, and the wider universe of independent work where choice is more of a factor, to continue in an economy increasingly driven by services.

While many of these statistics underline hardships and subpar returns to contingent workers, it is important to keep in mind the differences between workers in these types of work and wage and salary workers. Evidence of low returns and instability does not necessarily translate to a critique of alternate work arrangements in and of



itself. Insofar as those engaged in such work are more likely to not hold a high school diploma, the instability reflects as much on the difficulties of this skill group as the difficulties of securing steady employment in general. When employed in wage and salary jobs, this subset also makes substantially less than those with more education, suggesting the need for more targeted policies reaching groups with the least developed skillsets, regardless of class of worker or line of work.

### Many Prefer Alternative Work

While contingent workers represent a mostly cautionary tale of loss of options and the erosion of labor market options over the past few decades, the data looks less bleak when including a larger range of alternate workers than those who are by definition contingent. McKinsey, in a 2016 study based on its own survey data, broke down the independent workforce based on primary/secondary income source and financial needs of surveyed workers:

- 32 percent of independent workers are **Free Agents** who rely on this work for primary income and enjoy the flexibility.
- 14 percent are **Reluctants** who rely on independent work for their primary income but would rather have a traditional job.
- 40 percent are **Casual Earners** who are supplementing their income by choice.
- 14 percent are **Financially Strapped** workers who must supplement their primary income to make ends meet.<sup>85</sup>

These data reveal alternate work arrangements are more likely to appeal to those who are well educated, for whom choices of employment are available and where flexibility is valued. They also are appealing to people wishing to supplement another, primary job in the wage and salary sector.

The issue for preference and choice varies considerably by type of alternative worker. Independent contractors often report higher rates of satisfaction compared to respondents in other forms of alternative work arrangements. In May 2017, 79 percent of independent contractors preferred their job arrangements, compared to 44 percent of on-call workers and 39 percent of temporary help agency workers. In fact, just 3 percent of independent contractors viewed their work as contingent, and their weekly median earnings was

similar to standard workers (\$851 vs. \$884).<sup>86</sup>

While some prefer their alternative work arrangements, many in the narrower contingent subset are unsatisfied and engaged in work that generates earnings below comparable wage and salary work for comparable skills, suggesting an opening to reform labor markets to remove the parts of alternative work giving workers most pause while allowing for some of the benefits of flexibility for both workers and employers.

## WHAT IT MEANS FOR THE REGION

There are two sides to the coin. From a business standpoint, there has been a long-standing shift to focusing on core competencies and contracting out much of the work to companies specializing in a range of business support services. From a labor standpoint, whether it leads to contingency depends on the conditions under which workers are placed by temp agencies or consultant firms specializing in services typically contracted out. Still, companies' platform sourcing for labor force needs has regional implications, as there are no inherent reasons current or future workers will be based in the Bay Area. Indeed, per data from Upwork, a freelance platform company, some 96 percent of transacted work is performed by workers more than 50 miles from the client,<sup>87</sup> which could suggest much work is done by vendors outside the Bay Area. This blurs the distinction between inside and outside the region, while changing the relationship between economic output and the local workforce (as well as housing and infrastructure) needed for the economy to function.

From a labor market and economic development perspective, the shift away from traditional wage and salary careers for a single employer and toward temporary positions and independent contracting gives workers fewer protections through labor laws and may complicate access to benefits and—for some—career building. Most gig platforms categorize their workers as independent contractors, absolving themselves of responsibilities like unemployment insurance and workers' compensation.<sup>88</sup> These companies are discouraged from providing benefits, as doing so under current regulations might classify gig workers as employees.<sup>89</sup> Given current employment trends and the prevalence of the online gig economy in the Bay Area, strategies to improve access to some form of social

safety net and career paths for all workers, regardless of employment classification, will be imperative to protecting the financial stability of individuals, households and their communities while maintaining a fluid labor market for employers and providing next-generation innovations for customers.

The changing organization of the labor market addresses several Horizon Guiding Principles, focusing on ensuring that the Bay Area is a **DIVERSE** and **VIBRANT** place in future years across different segments of the labor market. This means working toward ensuring basic workplace protections for all workers and building pathways for careers and a framework for benefits. In the absence of portable,

affordable health care and pensions, alternative work arrangements leave more workers uncovered and imperil the financial security of tomorrow's seniors as workers currently lacking retirement benefits would be precariously positioned.

Yet these arrangements may also be part and parcel of the vibrant economic conditions in the Bay Area as they increase the labor supply and allow better matching between workers and those looking for their services. Therefore, developing strategies to strengthen safety nets and provide better tools for workers to navigate the new employment arrangements may help to maintain the region's innovation nimbleness while improving stability and earnings for an increasingly diverse population.



Photo - STEMShare NSW, Unsplash

A close-up photograph of a pink piggy bank being held by several hands of different skin tones. The piggy bank is the central focus, and the hands are positioned around it, some holding it from the sides and others from the bottom. Below the piggy bank, several coins are scattered on a light-colored, patterned surface. The background is blurred, showing more hands and what appears to be a person's face in the upper part of the frame. A large blue semi-transparent rectangle is overlaid on the left and center of the image, containing the chapter title.

# CHAPTER 5

## COMPENSATION SHIFTS: GROWING INEQUALITY IN THE REGION AND NATION

# COMPENSATION SHIFTS: GROWING INEQUALITY IN THE REGION AND NATION

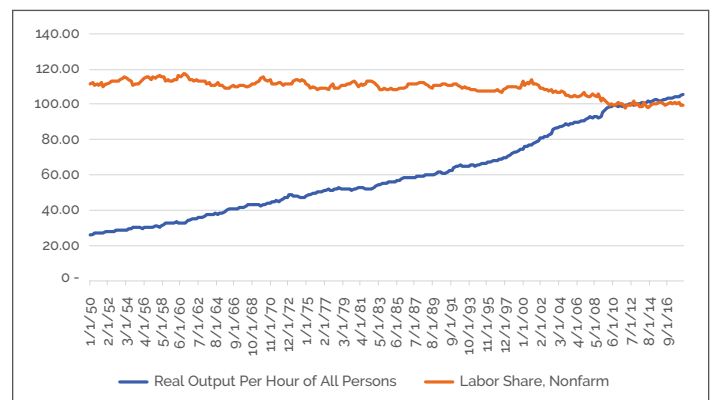
Compensation for work is fundamental to securing one’s livelihood in the short-term and building wealth in the long-term. Workers exchange time for money and with their spending they grow the economy through a complex web of economic multipliers. With the decline of bargaining positions of many workers in the past few decades, the returns to work is less uniform than it was during the booming postwar period. As the economy has changed, many workers have more precarious positions with fewer benefits and less job security, while skilled workers enjoy more benefits and competitive salaries.

The appearance of another wave of automation with considerable risk to jobs raises questions about the livelihood of many workers and the stability of the communities they live in. The discussions in the preceding chapter on automation and the changing organizational structure of business, highlight two forces that may affect earnings and income from future jobs. A long-standing tenet has been that technology enables many routine jobs to either be automated or offshored, and that it has had different effects on different parts of the labor force. Computers are part of what economists refer to as a “skill-biased technological change” where their introduction have complemented the skills of the best-trained workers and largely substituted for workers with less training. According to the two Oxford University researchers we used as the source for automation risk in Chapter 3, low-wage jobs tend to have a higher risk of automation. At the same time, automation job risk is also high for many middle-wage occupations, from legal secretary to tax preparers and insurance underwriters.<sup>90</sup> Furthermore, the changing employment structure affects hourly wages and benefits as well as the reliability of earnings over the course of the year.

## Workers Receiving Less of the Economic Pie

For much of the 20th century, workers, aided by collective bargaining and rising fortunes of U.S. industries at home and abroad, commanded increasing shares of the industrial bounty. The grand bargain was that higher productivity meant lower costs and higher wages, and middle-class workers could afford consumer products and keep the economy growing with rising consumer spending. With increasing foreign competition, margins have been squeezed for many industries, and increases in labor productivity have not been matched with rises in the labor share of GDP. This likely reflects both automation and offshoring of labor intensive, routine components of the U.S. supply chain, putting downward pressure on the bargaining position of U.S. labor. As seen on **Figure 21**, the overall labor share held steady for the full second half of the 20th century, before slipping after the 2001 recession, as the U.S. economy shed large numbers of manufacturing jobs.

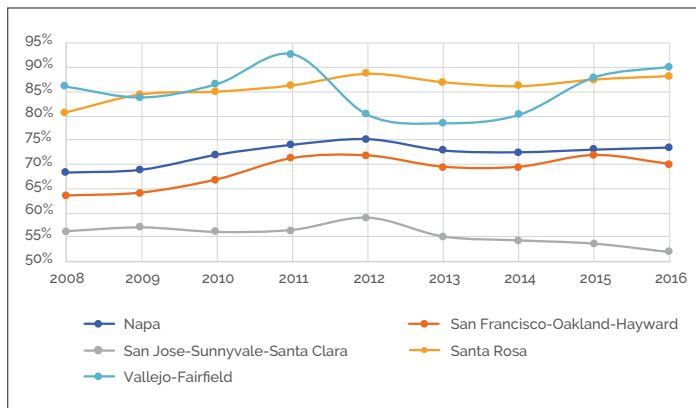
**Figure 21. U.S. Real Output vs. Labor Share.**



**SOURCE:** ABAG / MTC, from U.S. BEA, VIA FRED, Series PRS85006173 and OPHNFB. Index 100: 2012.

During the past decade, the Bay Area, in part because of the rise of the highly productive tech-focused digital economy, has seen labor share declines in the San Jose-Sunnyvale-Santa Clara Metropolitan Statistical Area (MSA), but nonetheless a small increase overall since 2008.

Figure 22. Bay Area MSAs Labor Share (as Real Personal Income vs. GDP).



SOURCE: U.S. BEA, Via FRED.

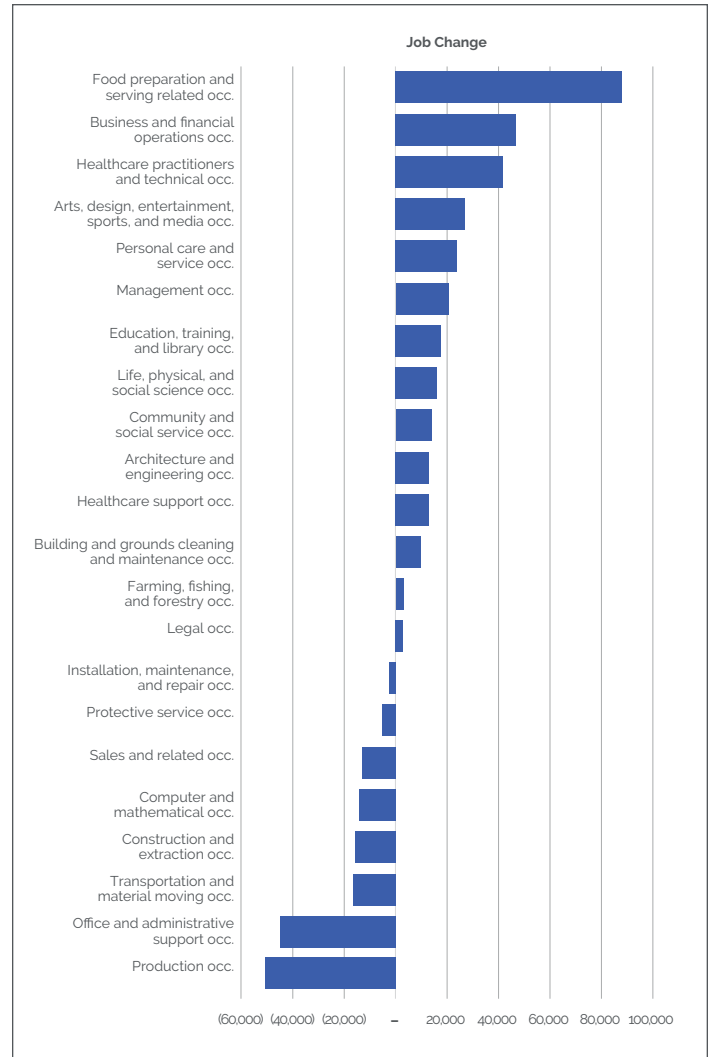
## JOBS ARE SHIFTING – AND SO ARE EARNINGS

The long-term shift in occupations brings with it shifts in compensation. Among the occupations that have been declining are middle- and higher-wage occupations that may require manual or a combination of manual and cognitive skills. In the Bay Area, occupations losing the most jobs in the last decade and a half are a mix of middle-wage occupations for high school graduates and entry-level, career-track positions for administrative workers. Growing occupations are a mix of high-wage, high-skilled, specialized occupations and low-wage, less-skilled occupations. The latter set of occupations do not necessarily have the career-track opportunities of some of the occupations that are shrinking, a key concern for labor market policymakers going forward. The decline in sales occupations is notable as they served as stepping stone jobs leading to careers in management for generations of workers.

Many of our workers gain skills here that are necessary and then they move on. But part of this is the baby boomer generation. This was a great career job 40 years ago. Forty years ago, people moved up. We always have had opportunities for growth, professional development and promotion. It's still a very good job, a very stable job.

— Personal Interview, Corporate Director, Retailer

Figure 23. Bay Area Job Change, by Occupation (2001-2017).



SOURCE: Bureau of Labor Statistics, OES Data, 2001, 2017

Looking ahead, it is striking that the top growing occupation in the past decade and a half in food preparation is one which the automation data suggests we might not see as a comparable job generator going forward, which would take a big cut out of the low-skilled jobs available to entry-level workers. At the same time, parts of the retail sector is being reimaged as local focal points organized around food service for increasingly discerning customers, with skilled staff increasingly drawn from the restaurant business.

We're finding with (one of our brands of stores), is driven by a passion for food. Individuals want to work there, driven by the conversation around what's healthy. Staff includes former restaurateurs who are now working in retail food service. The convenience, the elevation of food service, the elevation of having things made in house, all of those will continue to drive our innovation and our ability to serve our customers.

— Personal Interview, Corporate Director, Retailer

## INCOMES ARE GROWING – BUT NOT FOR EVERYONE

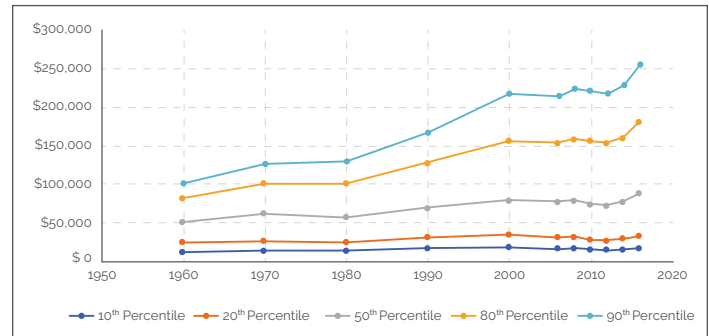
Incomes of workers are related to prevailing technologies, skills and education, hours worked, organizational arrangements and relative worker bargaining power.

The increasing ubiquity of computers, increased entry-level educational requirements and globalization have contributed to the polarization of the U.S. labor market and to earnings declines for non-college-educated workers. There is still growth in many positions that do not require a college degree, though at modest pay. In earlier periods, technology enabled some workers to be much better off, even without advanced education. Economists refer to it as skill-biased technological change, where technology works as an accelerator for workers with a particular type of skill set and a brake on others. On Henry Ford's belt-driven car assembly lines, for example, the production technology broke the production process into minute parts so relatively unskilled workers could participate. For decades in the middle of the 20th century, middle-class wages grew across the country, often built on factory work.

Since the introduction of personal computers in the 1980s, workers in design, media and finance can process much more information, and their industries reach much bigger markets. This has meant more demand and wage growth typically for workers with more education. Compared to the early 1960s, college graduates see 30 percent higher incomes after adjusting for inflation and those with graduate degrees see 60 percent higher earnings, while those without a college degree have seen earnings stay relatively flat. These lower wage workers, in relative terms, are worse off competing for expensive goods like housing. This is reflected in household incomes as well, where the households in the highest income brackets have seen

income growth at a rate far outpacing lower brackets, while those in the lowest income brackets have seen no inflation-adjusted earnings at all.

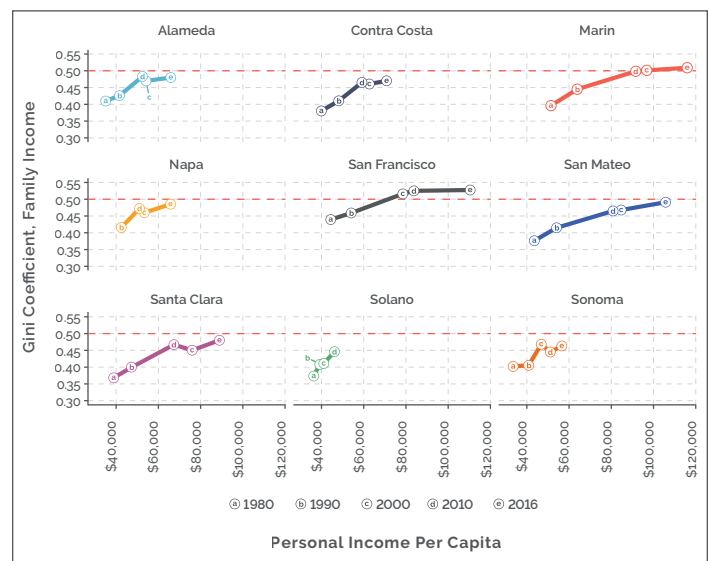
Figure 24. Household Income Trends (Quintiles) – Bay Area (In 2017 Dollars).



SOURCE: ABAG / MTC, from IPUMS 1960-2016<sup>91</sup>

The widening of the earnings spectrum has led to greater inequality. An aggregate measure of inequality of incomes commonly used is the Gini coefficient, measuring the equality of the distribution of income, where 0 means perfect equality and 1 means perfect inequality. As incomes have risen, so has the measure of inequality for each of the nine Bay Area counties since 1980. This does not reflect that the poorer have gotten poorer as much as the strong rise of incomes at the top of the distribution. The Great Recession further meant personal income was lower in 2010 than in 2000 for most counties and more unequal. The decline did not mean a reversal of inequality but a slight increase.

Figure 25. Inequality (Gini Coefficient) Increases With Rise in Personal Income.



SOURCE: BEA CA1; IPUMS

Additional to this overall change in the income structure, there has been a geographic sorting with some areas accounting for a larger share of skilled workers and others less skilled ones. This will be discussed in greater detail in the next subsection as well as in the “lens” that looks at locational shifts.

One contributor to wealth inequality is being driven by digital transformation — as the Superstars become bigger Superstars; and some Superstars become Supernovas. Superstar companies and regions will require more and more Superstar digital talent. With the arrival of more and more digital talent the housing demand will continue to increase.

— Personal Interview, Managing Director, Strategy + Innovation, Real Estate Service Firm

## EDUCATIONAL ATTAINMENT PLAYS AN EVER GREATER ROLE TO INCOME

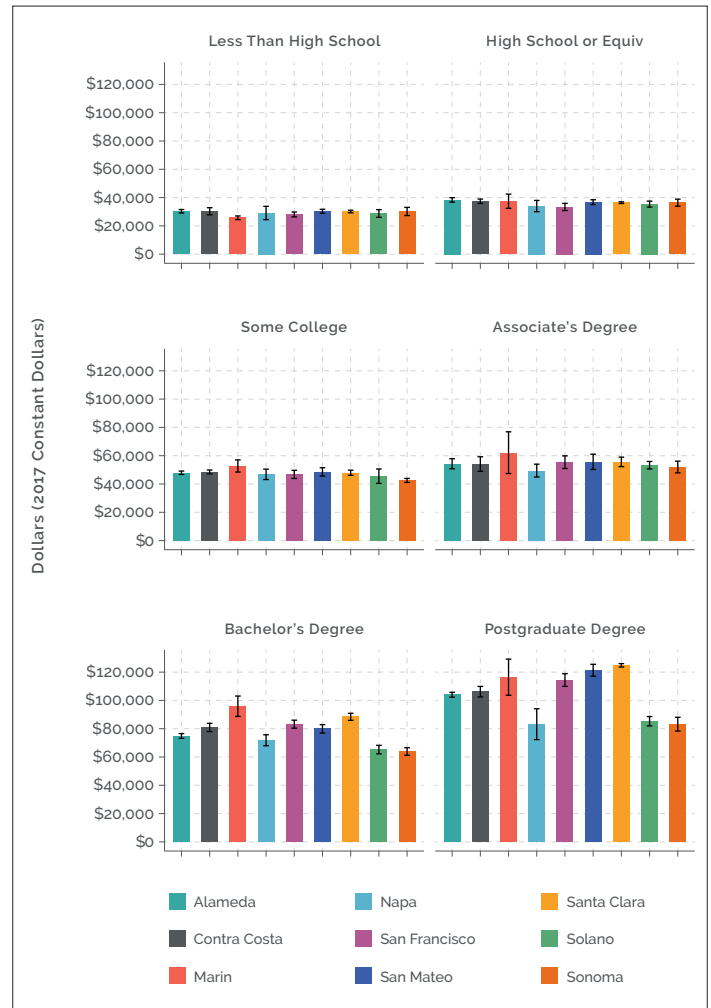
As education becomes an increasingly strong predictor of future income potential, getting a good education is even more important than in years past. A community college graduate or others with some college experience earn 25 percent above a high school graduate in Alameda and Solano counties, but as much as 38 percent higher in San Francisco County. Someone with a bachelor’s degree has earnings almost twice that of a high school graduate in Alameda County, and 2.5 times in San Francisco and Santa Clara counties. Also of note is that while the counties have relatively similar pay for workers without a college degree, substantial differences in pay emerge for workers at the higher end of the educational spectrum. Holders of postgraduate degrees make almost 50 percent more if they live in Santa Clara County than if they live in Sonoma County. This mostly reflects the difference in training and occupational mix for the counties, and the high premium placed on the STEM fields (Science, Technology, Engineering and Mathematics) and the concentration of those workers in Santa Clara County.

Given these premiums on a good educational foundation, it is alarming that student debt in the Bay Area has tripled, the prevalence of loans has doubled, loan delinquencies are up by 60 percent, and defaults are up 135 percent from 2003 to 2018, with Solano and

Napa counties seeing disproportionate rises. These burdens are increasingly carried by families, a partial result of “state divestment in higher education and rising college costs.”<sup>92</sup>

For tomorrow’s labor force, it is imperative that better and more affordable access to higher education remains a critical priority to policymakers.

**Figure 26. Median Earnings in the Past 12 Months by Educational Attainment (Adj. 2017 Dollars).**



**SOURCE:** ABAG / MTC from U.S. Census American Community Survey PUMS, 1 Year Samples 2015-2017

The relative returns to a degree have not held steady. For the Bay Area overall, adjusting for inflation (but not for age of the earner), workers in every education category earned less in 2017 than in 2010. This may in part be due to a changing mix of age groups in the workforce, with a large influx of younger, entry-level

workers over the seven-year period. Per **Figure 27**, those with graduate degrees overall are somewhat more insulated from the drop in earnings, while the biggest declines are seen in those with high school degrees and some college. San Francisco is the only Bay Area county where earnings overall have risen, even adjusting for inflation. In part, this may be the result of lower income families leaving the county because of high rents. The smaller North Bay counties show greater variation in income change among the different education levels.

**Figure 27. Change In Median Earnings, 2006-2008 vs. 2015-2017 (Adj. 2017 Dollars).**

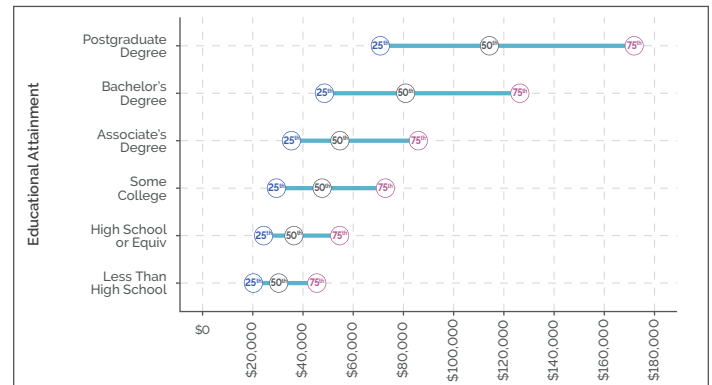


**SOURCE:** U.S. Census American Community Survey PUMS, 1 Yr Samples 2006-2017

A closer look at wage ranges shows higher levels of education are generally remunerated, but there is big internal income variation even within educational groups. Although college graduates earn more than high school graduates and graduate degree holders generally earn more than college graduates, this masks a wider

bifurcation within these educational groups, where those working in STEM fields tend to command higher wages, and those in social services and teaching earn less. The highest 25 percent of earners with a high school degree earn more than the lowest 25 percent of those with a graduate degree.

**Figure 28. Bay Area Spread in Personal Wages (>32Hrs/Wk), by Education.**



**SOURCE:** U.S. Census, Acs Pums 1-Year 2017

Thus there are overall income returns to formal education at every level, and greater stability for four-year and advanced degree holders. However, the wide variation in earnings at different levels of education implies that many other factors, from the area of study to the occupation and industry, also influence earning levels. The changing work requirements and opportunities brought about by automation as well as organizational changes may have profound effects on the levels and distribution of earnings in the future.

As we saw on Figure 26, these differences in pay have a corresponding geography to them, with some subregions offering premiums for skilled workers. In some counties, postgraduate training is barely sufficient to land a middle-class salary. Across the region, a quarter of college graduates make just over \$40,000. In all counties, however, workers without a college degree face even tougher choices should a move be required for family or other reasons. In a constrained housing market, such differences in income become amplified to crisis levels should the family situation require relocation.

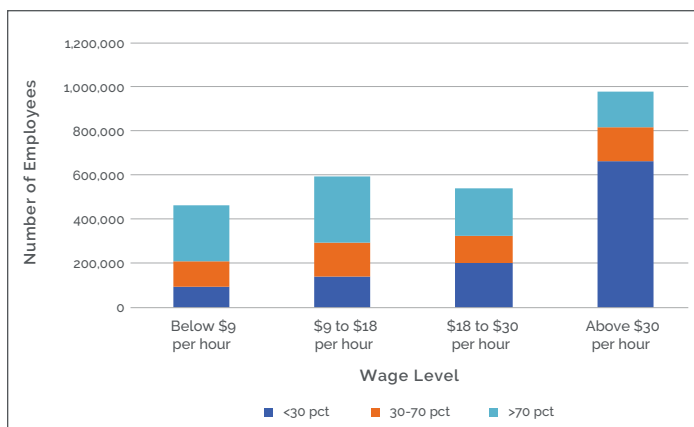


## AUTOMATION AND EARNINGS

Analyses of the wage structures of occupations at risk find that many of the occupations most likely to be automated pay lower wages.<sup>93</sup> Applying the Frey and Osborne categories to Bay Area occupations, we reach similar findings. More than half of the Bay Area's workers earning a median hourly wage of \$18 or below work in occupations where 70 percent or more of tasks can be automated. In contrast, only one in four workers earning hourly wages above \$30 are in a similar risk category, while almost 60 percent are in the lowest risk category (with 30 percent or less of tasks that could be automated).

In spite of the contrast of risk, not all higher wage occupations are immune to automation pressures. Higher-earning occupations in Bay Area categories at risk of automation include many types of financial occupations (credit analysts, budget analysts, accountants and auditors, appraisers and assessors of real estate, loan officers, title examiners, insurance underwriters and sales agents, and real estate brokers) as well as transportation occupations (equipment operators, and legal occupations (paralegals and secretaries). The list is much longer for middle-wage occupations but also involves a mix of those using cognitive skills and those whose expertise is in manual skills.

**Figure 29. Bay Area Occupation Risk of Automation by Wage Level (percent of tasks that can be automated).**



**SOURCE:** Authors from ACS Data, Applied to Frey and Osborne Categories

Yet automation of tasks could raise the median wage in the region. Indeed, partial automation of work may raise earnings of those who stay in the occupation, while new occupations leveraging local expertise in a range of technology areas would likely place well on the income spectrum. The question remains what happens to workers in situations where occupations are substantially impacted relatively quickly, with far fewer jobs than the people who held those positions earlier (as has happened over time with farm workers and factory workers). This could lead to substantial downward pressures on wages for affected workers and occupations, underlining the need for effective transition strategies to other occupations for individuals and their communities.

### Structural and Organizational Changes Affect Compensation

The long-term trends described earlier as well as the organizational changes discussed here have implications for compensation. This can be observed through the competitiveness of leading companies, the role of successful innovation in generating high returns, and the effects of the overall shift from a career with one employer and one job family to careers involving multiple employers over time and periods of self-employment. Furthermore, the source of earnings changes as more workers become "proprietors" or the share of earnings from non-wage income, such as dividends, grows.

These changes do not necessarily lead to higher compensation across a wide range of households, although there are some who may benefit from the shifting employment structure. There is a tendency in the digital economy for heavy concentrations at the top, with leading platform companies becoming the default operators in the market, with commanding leads over the runners-up. The Bay Area has a number of these industry leaders, which in turn is reflected in the wage profile. It is an open question how much further technology will accelerate this bifurcation and what the role of public policy is to foster more balanced economic development across the region's many communities.

In California, investment income has accounted for an increasing share of total personal income over the last 20 years, as shown in **Figure 30**. At the same time, proprietors are an increasing share of total employment compared to wage earners. While this trend provides opportunities to new entrepreneurs, a few of whom may reap very high rewards, it also shifts the balance of earnings away from wage earners, and it may be a factor contributing to the widening gaps in income.

**Figure 30. Share of Personal Income By Source, California.**



**SOURCE:** ABAG/MTC from U.S. Bureau of Economic Analysis Data

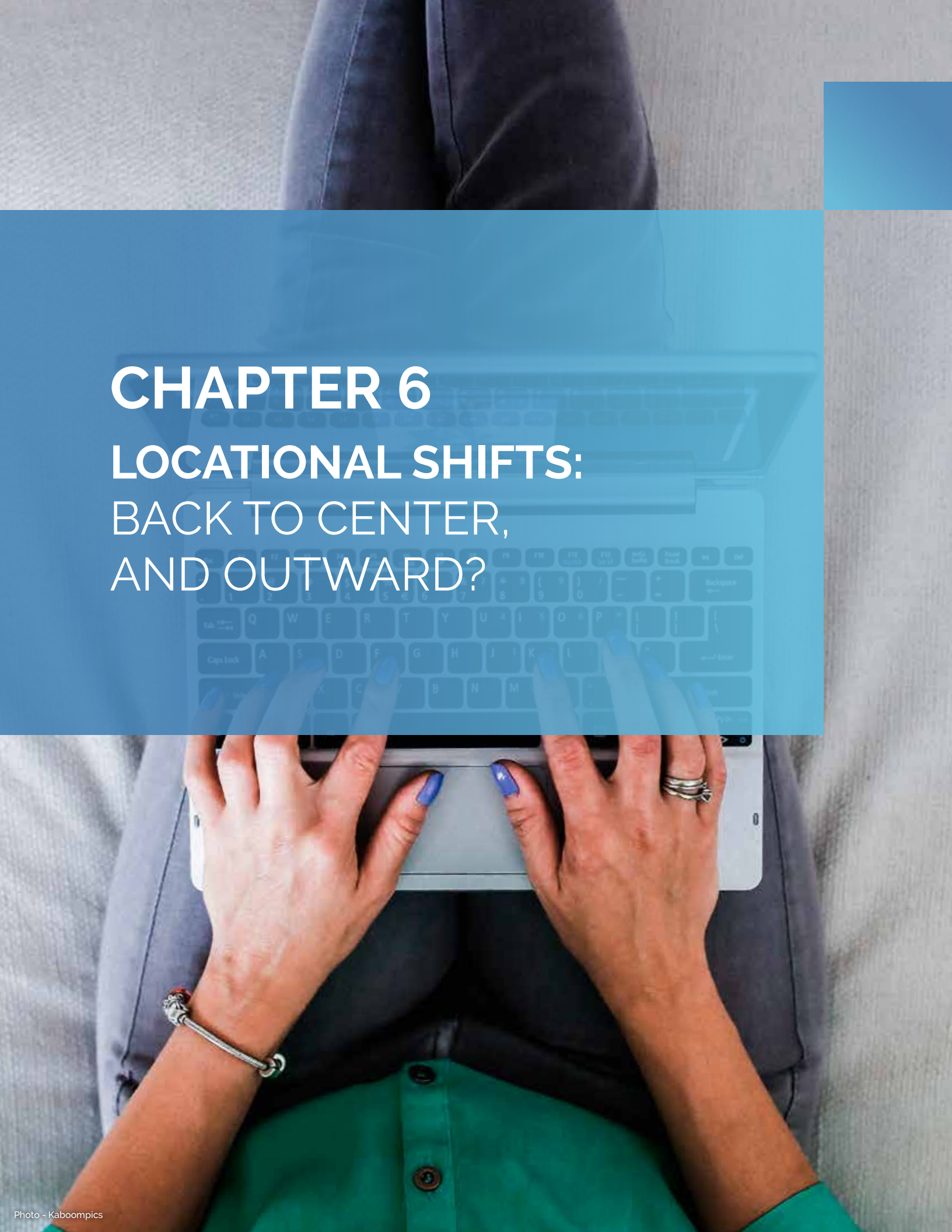
## WHAT IT MEANS FOR THE REGION

As returns to skill have increased over time, many of the Bay Area’s skilled workers have seen strong growth in their compensation packages, including from non-wage sources of income. Changes in compensation have contributed to the vibrancy of the region, as entrepreneurs take advantage of opportunities to create whole new fields of endeavor, with the possibility or expectation of high returns.

At the same time, workers at the lower rungs of the income distribution with typically more routine- or service-focused jobs, while nominally not worse off, have seen their paychecks hollowed out by increasing costs of living. Housing looms large, as the region continues to attract new residents. As housing costs crowd out other costs for not just low-income workers, many families struggle to pay for basic necessities. As this happens, employers in a range of industries will find it harder to hire new workers, from servers in restaurants to entry-to-mid-level programmers at tech firms where the starting salaries will not allow workers to find shelter for their families. Over time, this will impact job prospects for the region across the spectrum, with many opting to go for longer commutes in the short-term, exacerbating transportation challenges in the region.

The ethnic dimensions of these challenges are familiar to many, with White and Asian earners gaining a far higher share of income gains compared to their Black and Hispanic counterparts. As housing is a strong vehicle for building wealth, access to the housing market will be a determinant of longer term financial well-being for workers in the region.

As the region continues to grow from the top but with a large segment unable to successfully function in the new economy, it will remain a key priority for public policy to build access to pathways to prosperity for the many in order to make the region function better; establish more trust across and between communities; enable more search for common solutions; and lead to a more **VIBRANT, DIVERSE, and CONNECTED** region. These are challenges today, without further technological or organizational challenges. Those will only increase the urgency of having the right tools available when the need is there.



**CHAPTER 6**  
**LOCATIONAL SHIFTS:**  
BACK TO CENTER,  
AND OUTWARD?



## LOCATIONAL SHIFTS: BACK TO CENTER, AND OUTWARD?

As the nature of work changed, so did the geography of work. More routine tasks were moved to back office locations during the 1980s while the Bay Area's regional transit network meant easier access to the center and a sorting of typically higher paid professional or management occupations there. More suburban job centers have sprung up with well-paid professional jobs closer to many of their workers, offering often welcome alternatives to commuting to the core. At the same time, these locations are often more difficult to service with effective transit solutions, let alone freeways, as the region has grown. As manufacturing jobs have declined and more information-based variants of earlier tech industries have taken their place, more workers have been added to former industrial and old-guard tech sites, replacing shop floors and cubicles with open floorplans and more flexible workstyles. This chapter explores the push and pull between centralization and decentralization as it relates to different industries, and as a way to gauge what to expect going forward.

### DOUBLING DOWN ON REGIONS

The Bay Area's strong position in knowledge sector jobs, from tech to a range of professional services as well as food production and tourism, is evident in regional job totals. While the very technologies invented in Silicon Valley allow for dispersion of work virtually across the planet, the world has not gotten entirely flat, as Thomas Friedman put it a decade ago: The world is still "spiky" with respect to the location of economic activity. Economist Enrico Moretti notes, "[w]hile many people think that email, smartphones and the internet have made proximity less important to the creative process, in reality the opposite is true. Location is more important than ever, in part because knowledge spillovers are more important than ever."<sup>94</sup> The notion of "knowledge spillovers" denotes that ideas tend to be generated,

spread and refined to a significant extent at the local level. As ideas are often sticky in the initial stages, location matters to the most innovative regions.

Workers have not dispersed away from the big metro areas. In fact, economists report an increased sorting of knowledge sector jobs in select metro areas in the U.S.,<sup>95</sup> with many regions finding they lack the sectors with the strongest economic multipliers, including tech jobs. Regions build specialized expertise and competitive positions in a number of industries, which can become self-reinforcing: In the Bay Area, job growth has been strong overall, and workers come for jobs generated here, while a host of supporting industries, institutions and funders have sprung up to support the economic ecosystem, further increasing the attraction of the area.

Big innovation hubs and geographic districts have continued to feed on one another with the growth of talent, fueled by the growth with businesses that come to attract that talent—and with more talent to come—digital talent is seeking digital talent for greater socialization and engagement—as major drivers for quality of life. Digital Talent seeks other digital talent to socialize and ideate and incubate new ideas and to enable new learning potential.

— Personal Interview, Managing Director, Strategy + Innovation, Real Estate Service Firm

While there are some signs that the tech sector is moving well beyond the Bay Area, with serious questions raised about the long-term sustainability of the Silicon Valley model,<sup>96</sup> the region has survived bouts of downturns, offshoring and outsourcing. Each time—so far—a new phoenix has risen from the ashes of the old economy, repurposing old guard corporate campuses for a new generation of workers eager to remake the future economy.

### TOWARD THE EDGE CITIES

Over the decades, the region has gone through alternating waves of centralization, decentralization, urbanization (as suburbs grew up into cities) and re-centralization. Up through the 1960s, San Francisco remained the region's largest employment center even as it was losing population to the suburbs in the East Bay and South Bay. Bridges had for a generation enabled considerable transbay commuter traffic, increasing the scale of the labor market for the region's

largest employment center. Over time, high costs of doing business in downtown San Francisco, coupled with management innovations that separated core and supporting business functions, led to waves of job shifts. Much work used to be both vertically integrated with big companies performing many functions in house to control the product and the value chain. Over time, that model gave way to a more market-based approach where suppliers are used for parts of the value chain. This "vertical disintegration" has in turn enabled a geographic dispersal of the work, within and beyond the region.

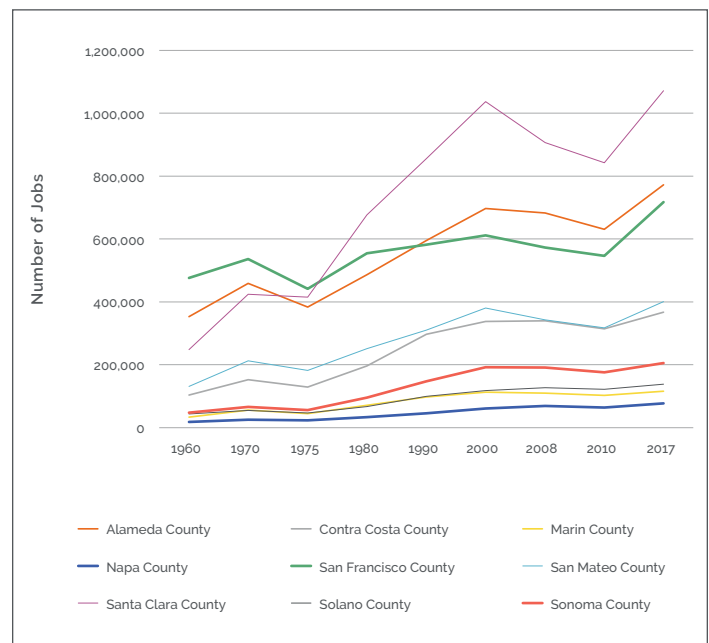
Beginning in the 1960s, back-office operations in planned business parks in the East Bay and South Bay were later followed by further shifts of functions to lower-cost areas outside the Bay Area, and increasingly outside the United States. While San Francisco's role as a financial center remained intact through the 1980s, many supporting but decidedly middle-wage jobs were shed and relocated outside the city and beyond. Personal computers in the office brought a new topology of jobs, as routine information entry and processing operations required larger footprints than were cost-effective in costly downtown offices.<sup>97</sup> This change in technology was then followed by a change in the spatial organization of core functions of the regional economy, as armies of data entry clerks and business analysts found work far from the region's central business districts but were nonetheless supporting their firms. This provided livelihoods for communities in places like the growing Interstate 680 corridor in East Bay centers like Walnut Creek and the Tri-Valley cities of Dublin/Pleasanton and San Ramon.<sup>98</sup> Overall, from the 1970s onward, decentralization of jobs (from the vantage point of the region's once pre-eminent job center of San Francisco) was widespread, and many industries found new locations that leveraged the Bay Area's increasingly expansive highway system.

In addition to the exodus of back-office functions, many of San Francisco's manufacturing businesses left or downsized as well. Emerging computer and microchip manufacturers largely bypassed the city as the industry developed around the Stanford University campus and in several Santa Clara and San Mateo county suburbs. As the region became a tech powerhouse anchored in what would later be known as Silicon Valley, by the mid-1970s Santa Clara County overtook San Francisco in terms of jobs,

with Alameda County also reaching a higher job count than San Francisco the 1980s. In the north, Sonoma County's population tripled between 1950 and 1980, leading to a boom in local-serving jobs mainly in Santa Rosa.

As a result, the Bay Area today is decidedly polycentric<sup>99</sup>—albeit with significant clustering of jobs in San Francisco and Silicon Valley. As the region has grown, it has strained existing infrastructure, demanding new investments and spurring difficult discussions on location decisions of new job and population centers. Suburban business parks served as the sites of economic growth as the region expanded its geography and scope of economic activity.

**Figure 31. Bay Area Job Growth, 1960-2017.**



**SOURCE:** (1975-2017) Bureau of Labor Statistics, QCEW; (1960-1970) Historic ABAG Projections

## ...AND RETURNING TO CENTER?

In more recent years, there has been much talk of an urban revival, in part as a companion to the move from predominantly manufacturing-based economies to service-based ones, and as knowledge industries have concentrated in urban centers.<sup>100</sup> The Brookings Institution, following up on an earlier study that had found widespread decentralization since 1998,<sup>101</sup> reported that decentralization to more far-flung locations for businesses had "stalled," though mainly as an artifact of the Great Recession's losses in sectors farthest from Central Business Districts, such as

construction and manufacturing.<sup>102</sup> Another report from Brookings notes that a “remarkable shift is occurring in the spatial geography of innovation, [as a] rising number of innovative firms and talented workers are choosing to congregate and co-locate in compact, amenity-rich enclaves in the cores of central cities,”<sup>103</sup> suggesting not just a concentration of innovation in select metros across the U.S. but also a realignment within regions.

The more virtual things have become, the more important it is for people to connect in person.

— Personal Interview, Managing Director,  
Architectural Services Firm

### The Value of Face-to-Face Interactions and Being There

The role of innovation in economic growth and development has long been demonstrated, and researchers have long focused on whether new ideas travel faster where face-to-face interactions are easier in the critical, early stages of idea development.<sup>104</sup> Serendipitous face-to-face encounters may play an important role for the innovative capacities of firms through the sharing of knowledge, views of markets, and assessments of opportunities and capacities.<sup>105</sup> This effect is often self-reinforcing: As an area builds up a specialization, new ideas are sparked, drawing more skilled labor to the area. As the economist Enrico Moretti recently suggested, “There is something almost magical in the process of generating new ideas. Being around smart people tends to make us smarter, more creative and more productive.”<sup>106</sup> This helps explain the appearance of “superstar” cities or regions where critical masses of ideas, capital and amenities serve to further concentrate resources there. The skills and institutional knowledge in the Bay Area further attract established firms from across the globe. Car makers from Detroit locate development shops in the Bay Area, recognizing the car as a product is changing to a computer with wheels. Walmart’s development shop is similarly located not at its headquarters in Arkansas but in San Bruno to be near tech talent.

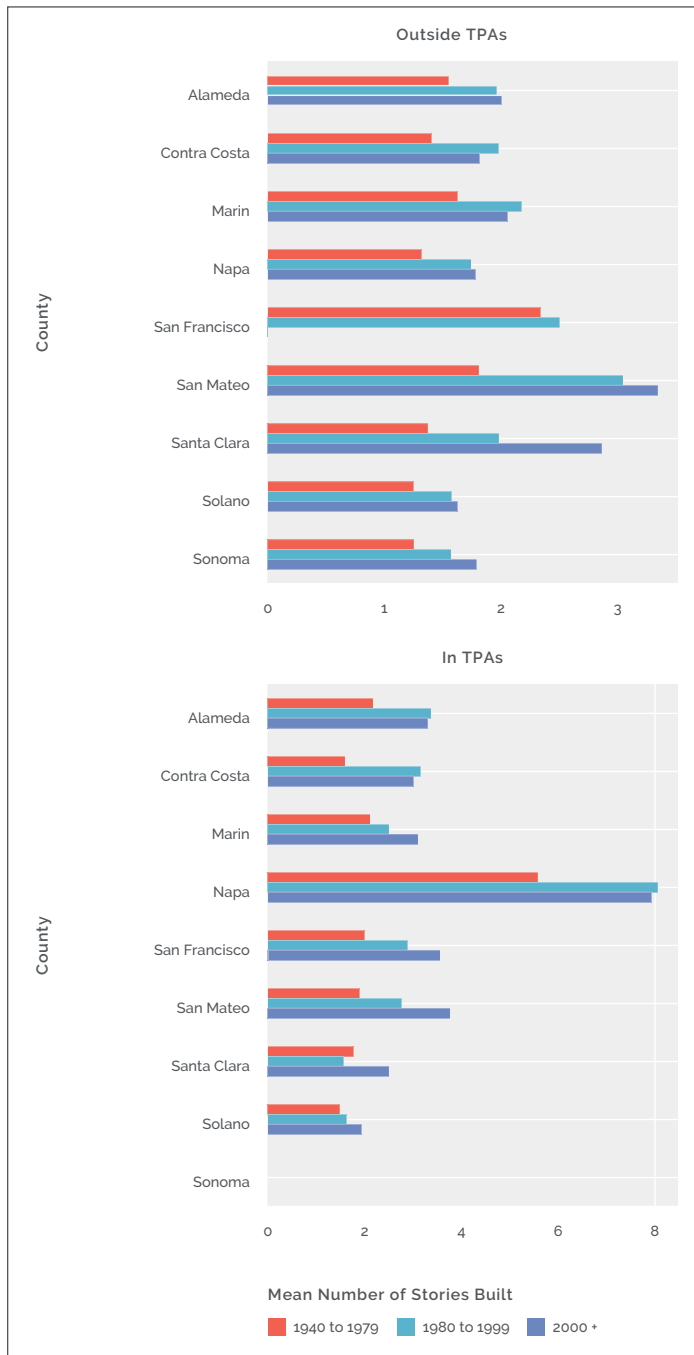
We are doing a lot for companies that are building out innovation hubs in the Bay Area. You’re not seeing companies fully relocating here; you are seeing corporate ventures, you are seeing automotive companies and others set up footprints here.

— Personal Interview, Managing Director,  
Executive Search Firm

### Office Parks to Remain, Slightly Denser Than Before

While downtowns offer quick access to a range of business partners as well as competitors, they do not necessarily hold monopolies on the most innovative work environments for sharing the new ideas of the knowledge economy. First, new architectural design ideas have led to an opening up of floors in corporate campuses to allow more connections of different working groups within the larger corporate structure, making suburban office parks a bit more “urban.”<sup>107</sup> Second, companies increasingly have distributed workforces and teams, with periodic virtual check-ins across time zones and even continents. These distributed locations can provide information needed to innovate for new markets.<sup>108</sup> Third, clearly, Silicon Valley companies have for generations innovated largely in the absence of downtowns and instead have chosen to “build” their own relatively self-contained campuses, to some extent emulating the functions of a city within. Therefore, while there are strong indications of a renewed focus on core centers, with Silicon Valley companies setting up outposts in San Francisco to tap the talent there, there is little to suggest a wholesale geographic shift away from suburban office parks or that innovative capacities take place in dense downtowns alone. Growth in the big cities notwithstanding, the transformation frequently comes in the form of infilling suburban locations with somewhat bigger structures than what they replace, per **Figure 32**, showing increases in average heights of new buildings, particularly in locations near transit (Transit Priority Areas, or TPAs, areas within a quarter mile of a major transit stop, shown on the right).

**Figure 32. Mean Stories of New Office Buildings, by Period Built, Whether Inside or Outside of Transit Priority Area.**



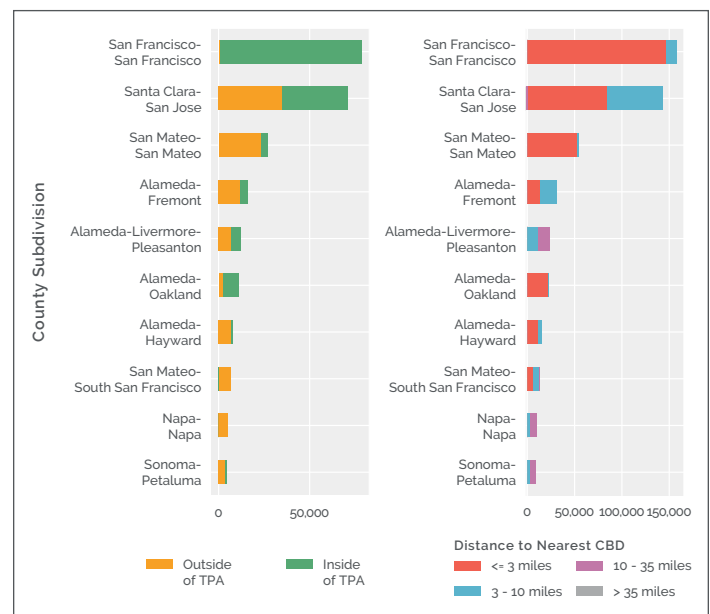
SOURCE: ABAG / MTC, from Costar Data on Existing Structures

### The Bay Area is Polycentric

The jobs data reflect this locational ambivalence. San Francisco has seen the strongest rate of total employment growth in the region, with a 31 percent increase since the end of the Great Recession. Many firms are doubling down on their downtown presence, opting to place many strategic research, design and

management functions in the most symbolically meaningful dots on the map in spite of the high cost. At the same time, Santa Clara and San Mateo counties have also seen solid growth in the high 20s, suggesting a more complex “both-and” pattern. It is important to remember that there are dozens of central business districts (CBDs) throughout the region serving as important centers. Much of the growth in Santa Clara and San Mateo counties has taken place in areas near these established centers, as measured by distance to the nearest CBD, as shown in **Figure 33**.

**Figure 33. Top Job Growth Areas, 2009-2015, Shown by Transit Priority Area Status (Left) and Distance to Nearest CBD (Right).**



SOURCE: ABAG / MTC, from U.S. Census LEHD Lodes WAC Data

As a truly polycentric region with several major employment centers, the Bay Area is decentralizing while it is centralizing, with gleaming corporate edifices appearing in regional centers and far from them. A feature of the polycentric region is the partial loss of meaning of old planning concepts such as city and suburb. While San Francisco has certainly seen large increases in jobs in recent years, a notable feature is the strong residential growth in and around its downtown following a more than a decade of planning work to increase the livability of an otherwise stark urban landscape, with pocket parks, greening and wider sidewalks changing the streetscape and the pedestrian experience. Since 1990, where roughly the same number of workers commuted each direction between

San Francisco and Santa Clara County, there has been a marked growth of southbound commuters, complicating the textbook “city” and “suburb” relationship.

The advent of the internet and the knowledge-based economy did not bring an end to major urban centers, but re-shuffled job functions and types, fueling growth in diverse locations within and beyond the region's borders.

## INDUSTRIES SHUFFLE AND ARE SUBJECT TO COMPETITION WITH OTHER USES

As Bay Area consumers have increasingly utilized e-commerce for purchases rather than brick and mortar retailers, more jobs in distribution have appeared farther afield in the larger megaregion.

For many local-serving industries, though, there are limits to where the work can be done. This is as true for hair dressers as it is for auto mechanics and tow-truck firms: They have to be relatively close to their customers. This insulates local economies from worldwide competition and outsourcing, though automation could be a separate risk factor, but something as mundane as land use regulation is also a risk factor to the viability of some classes of firms. Many companies in the repair industries supporting local economies face competition from office uses which can typically offer higher revenue per square foot. The need for housing has led to encroachment on erstwhile light-industrial zones.

### Industry Growth Drives Subregion Growth, in Turn Impacting Access to Jobs

Growth of various parts of the Bay Area has been driven in the past by the waxing and waning of different industries. East Bay job centers that built up to serve manufacturing needs in the second World War underwent the pain of workforce decline during the restructuring of manufacturing in the 1970s and 1980s.<sup>109</sup> San Francisco lost shares of financial services in the 1980s and 1990s as several of the city's key banking headquarters were lost in bank mergers, only to be replaced by successive tech-related booms, first in the late 1990s and again in the current decade. Silicon Valley has ridden several waves of growth and transformation, from the defense industry, the computer industry, and software giants and gaming to social media, adding more job centers with each iteration. As the South Bay shifts more to non-manufacturing jobs, real estate

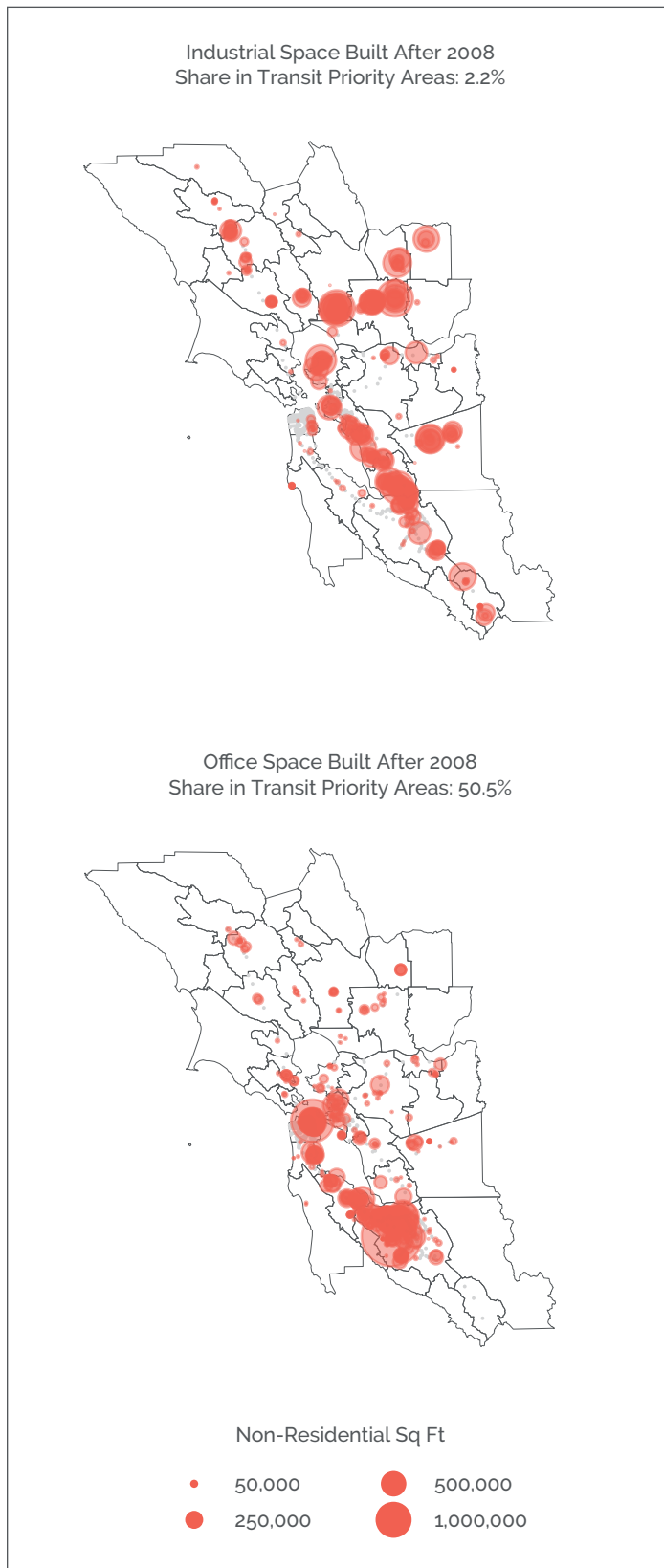
developers have added industrial and warehouse space in predominantly East and North Bay counties, while doubling down on office development in Silicon Valley, San Francisco and the peninsula more generally.

While we have seen a more decentralized pattern of industrial and warehouse development, there is a suggestion that even warehouses might not all head for the periphery where costs are lower. Jones, Lang LaSalle, a real estate services firm, recently reported that e-commerce and the expectation of same-day deliveries for consumers has led to a reevaluation of multistory warehouses in high cost areas such as New York City.<sup>110</sup> While this will not transform urban real estate markets, it nonetheless breaks with the pattern of information-based activities moving closer in and logistics further out, underlining the limits to dispersal of core functions in a region, and the production, distribution and repair jobs serving them.





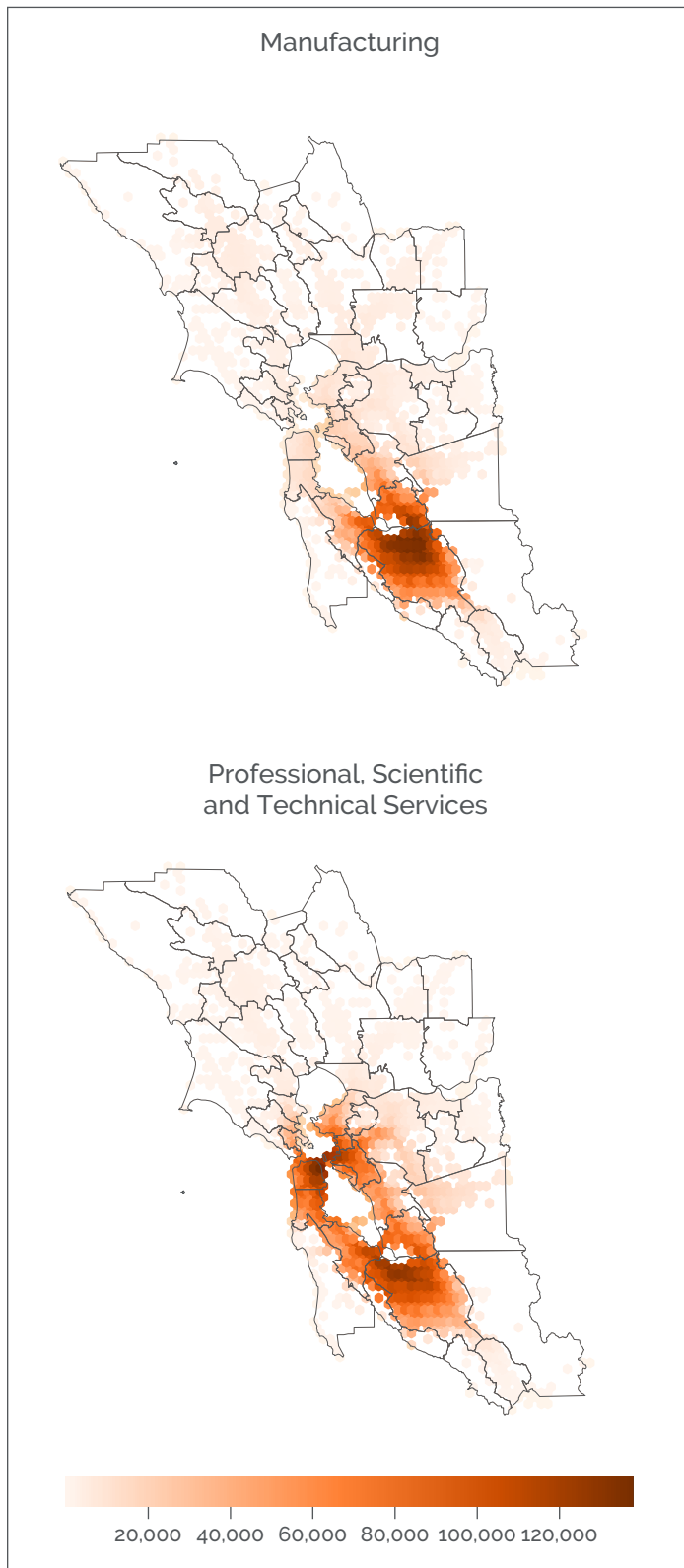
**Figure 34. Growth of Industrial and Office Space, by TPA Status.**



SOURCE: ABAG / MTC, from Costar Data

The resulting pattern is one of distinctive geographies for different industries. One way to visualize these concentrations is to see how many jobs can be accessed on congested roads for a certain period of time, from any intersection in the region. The resulting accessibility map reflects both where jobs are concentrated and the capacity of the transportation network. **Figure 35** compares the accessibility of both manufacturing and professional, scientific and technical services. Access to manufacturing jobs with a 30-minute drive is markedly highest in the South Bay, while professional and scientific services are more widely distributed around the Bay and generally more in areas accessible by transit. While the South Bay has lost many manufacturing jobs, the area retains the largest concentration of the industry in the region.

**Figure 35. Accessibility to Jobs Within a 30-Min Drive, PM Peak, Select Sectors in Transition.**

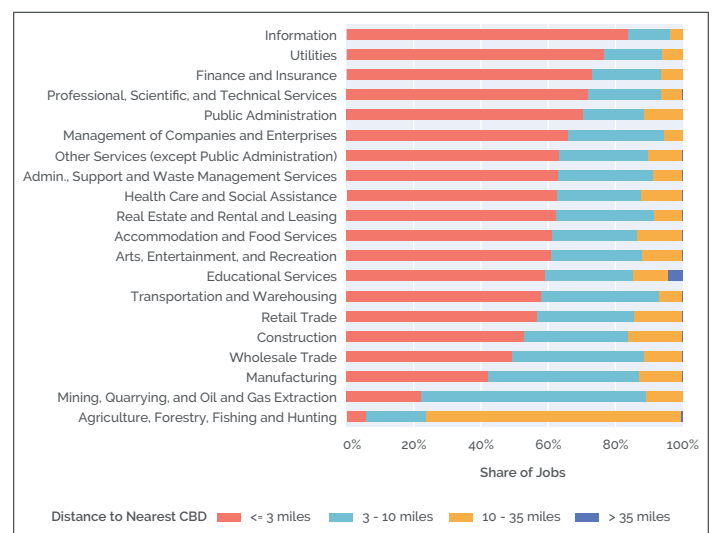


**SOURCE:** ABAG / MTC, from MTC Travel Model (Loaded Network); Jobs Data from LEHD Lodes WAC Files, 2015

Another way of looking at locational patterns of different industries is to track jobs by how close they are to central business districts (CBDs) in the region. This tells us both something about the customer base of the industry in question and the sort of environment in which the employer prefers to work. **Figure 36** shows the share of jobs falling in different distance bands from the region's CBDs. By this measure, the tech-focused information sector is the most concentrated in regional centers, but utilities are right behind it. This is likely due to historical reasons of where the headquarters are located. Other highly concentrated industries include finance and insurance; and professional, scientific and technical services. At the other end of the scale, the least concentrated industries include retail (which follows population patterns more), wholesale and construction.

These concentrations of more jobs in central areas—whether looking at jobs overall or where office development has been located during the past decade—have implications for work-trip planning. They improve the ability of the region's transit operators to better serve major job centers, benefiting goals of greenhouse gas reduction and the **CONNECTED** Horizon Guiding Principle. As more of the region's jobs may shift toward services, it could lead to further locational shifts to centers but where the list of centers may be larger than what we have today and may offer more of an indication of where to increase transit service capacities.

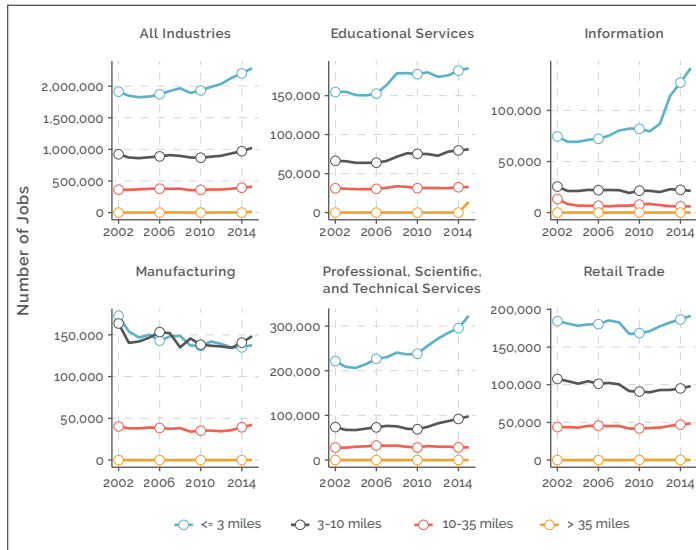
**Figure 36. Share of Bay Area Jobs, by Industry, by Distance to CBD.**



**SOURCE:** ABAG / MTC Analysis, from U.S. Census, LEHD LODES WAC, 2015

**Figure 37** shows these trends over time, counting workers in different distance bands. During the past decade, professional services and information jobs have become much more concentrated, doubling down on the urban centers. While retail jobs largely have held steady, it is in the most central areas that the sector has done best in terms of job growth, while the band extending three to 10 miles from central business districts has not recovered from the Great Recession.

**Figure 37. Jobs, Select Industries, by Distance to CBDs.**



**SOURCE:** ABAG / MTC Analysis, from U.S. Census, LEHD Lodes WAC, 2015

## REIMAGINING THE OFFICE

While our office buildings may look the same from the outside, the view from the inside has in many cases changed dramatically. While many old brick warehouse-type buildings have been converted to office space, office spaces have themselves been rethought the past few decades, as technology or other innovations offer new configurations for work activities. On both cost as well as performance grounds, companies may reorganize how their real estate portfolio is used, questioning the efficiency of the old model of dedicated space to each worker. Instead, they realign the allocation of space with new job functions, organizational arrangements and technological capabilities. This has given rise to terms such as flex-space, hoteling and hot desking, indicating a more on-demand corporate office where space is for meetings, ideation, negotiations and communication, with lesser focus on the individual work areas. "Future flex" spaces can adapt and grow with changing business functions as firms themselves adapt

to changes in the economy—and work culture.<sup>111</sup> Many of today's professional workers are less focused on getting their own offices and more on collaboration and meaning.

So, people are saying, "I'm NOT defining my success by the fact that I've got a corner cube or a corner office. I'm defining my success by, at the end of the day, who did I meet? What experiences did I have? What's the time that I was able to spend with my children, the time that I was able to check in with family?" How you define your success as a worker has really changed. How do we develop a workplace, or work platform, to facilitate that?

— Personal Interview, Principal, Architectural Services Firm

Technology has enabled older ideas of more mobile work, where the office becomes a practical and symbolical resource and a social anchor, with the possibility of work happening in a larger variety of places.

What you're seeing in the office environment is that we're really designing for activities what specifically needs to happen in this environment and then the rest of it can go home or to another location. So the future of the office might just be a glorified conference center.

— Personal Interview, Managing Director, Architectural Services Firm

Our teams meet regularly in conference rooms to review their work during meetings, and people often join in remotely via a conference call line. As long as everyone understands the proper etiquette for meeting with remote attendees, it doesn't really matter if every team member is in the room or not.

— Personal Interview, Vice President, Bay Area Biotech Company

Workers may be entirely mobile, with plug and play desks and meeting spaces available when they need to be in the office. As companies focus on open arrangements for collaboration rather than "cubicle farms," they also benefit from real estate savings by reducing personal space that is often left empty while employees meet with clients or work off-site. Some companies have gone so far as to function entirely

without a real estate presence in the region, with companies such as GitHub, Zapier and Automattic—the company behind the publishing platform WordPress—more or less being entirely virtual.<sup>112</sup> Most companies maintain an office, but recognize the increasingly mobile workforce, instead focusing on effective meetings.

Other companies “sort” the work, keeping some functions clustered together while performing other functions remotely.

Their model is the engineering talent, and a lot of the core of the company is here and we did their space. But most of their workforce is actually working from home. ...And then they bring them to the office for training and social events to make them feel part of (the company).

— Personal Interview, Principal, Architectural Services Firm

The net effect of both more open office environments and virtualization strategies is not to limit jobs in downtown as much as to reduce the overall size of a company's footprint per worker. A shift to a more information-based economy, where the key pieces of productive equipment is a brain and a laptop, could, all other things being equal, mean higher density work neighborhoods. The City of San Francisco, in its recent Central SoMa plan, anticipated such changes to space utilization and analyzed growth impacts assuming fewer square feet per worker than has typically been the norm. This would require revised understanding of the relationships between worksite, homes and the connecting transportation infrastructure.

### Re-Densifying Existing Neighborhoods

A concurrent component of this re-densification is the decrease of manufacturing jobs as the economy transitions to services. As this happened, a large amount of real estate has been repurposed and envisioned for a new age. For those areas, the nature of the neighborhood may change as deliveries and noise levels change, and new jobs may catalyze a new demand for local services and transportation services as more workers occupy the buildings than in times past. Such changes can take place relatively quickly by repurposing existing structures. With tenant improvements, companies can quickly re-fashion existing business parks to allow for higher occupancies and employment densities. As Santa Clara County in

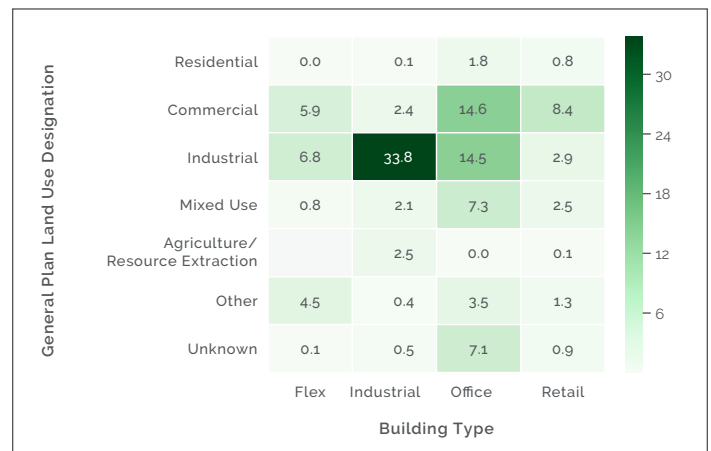
particular has shed manufacturing jobs since the dot-com bust, some 8 million square feet of manufacturing space has been lost, while a similar amount of office space has been added.<sup>113</sup> Manufacturing firms tend to operate in relatively large spaces, relative to the number of employees, while offices tend to pack more workers together.

The workforce is becoming much more agile, flexible and liquid—and as a result the workplace, corporate real estate and infrastructure needs to become much more agile, flexible and liquid so that we can meet any future workforce changes due to workforce automation combined the massive disruptions of digital transformation.

— Personal Interview, Managing Director, Strategy + Innovation, Real Estate Service Firm

As work activities change from developing circuit boards to designing code, less space per worker is needed, complicating the region's longstanding locational dynamics. All other things being equal, a change from manufacturing and warehouse work to information-focused office work translates to higher employment densities. An accounting of where office space has been added by the land classification per local general plans suggests that as manufacturing work has declined in areas formerly slated for industrial development, we have seen much office development. **Figure 38** suggests this repurposing has been considerable, with 14 million square feet of office space added in these districts.

**Figure 38. Growth in Non-Residential Building Space, 2008 to 2018, Million Sq. Ft., by Land Use Category (2006) and Building Type.**



SOURCE: ABAG / MTC, from Costar Data

For the region as a whole, this shift in space used per employee helps explain why the addition of nearly 800,000 workers since 2008 has been accommodated in just 35 million additional non-residential square feet.<sup>114</sup> The net loss in total industrial/warehouse square feet serving the Bay Area may be a different matter, as neighboring counties such as San Joaquin add order fulfillment centers to meet the needs of Bay Area customers.

### Coworking Spaces: A Sign of the Times?

Another variant of space use is the emergence of coworking spaces organized around amenities and shared resources for independent workers as well as corporate clients. These spaces emerged in earnest in San Francisco in 2005 as a shared workspace for individual workers outgrowing coffee shops and libraries, and as places to connect with other freelancers, increase professional networks, and have social connections throughout the workday. From a policy perspective, these "office as a service" spaces could help foster economic development by offering add-on services and supporting professional networks for emerging entrepreneurs on a flexible, low-risk basis, potentially closer to their homes. The City of Paris has long supported these places on such grounds but also as a way to bring employment centers to neighborhoods with fewer opportunities.<sup>115</sup>

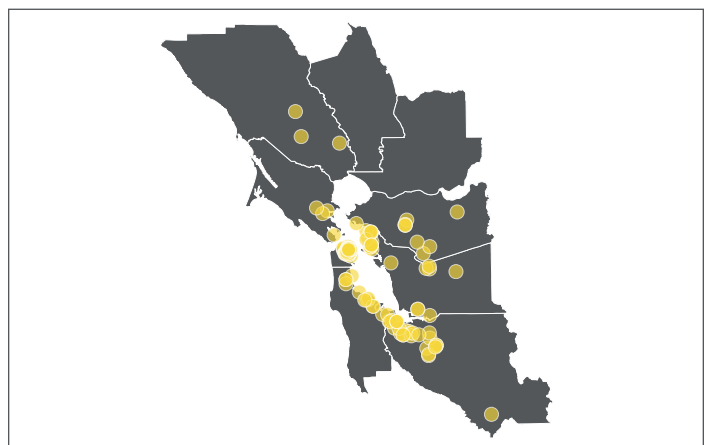
The rise of coworking spaces is a fitting companion to both the sharing economy and the tech-focused startup scene: If the wage and salary job corresponds to the corporate office, the independent freelance and gig economy might map to the emerging "open-source" coworking spaces without a long-term obligation, forming the physical underpinning of an increasingly large number of workers in the region. But the collaborative nature of coworking is increasingly adopted as a model for corporate clients as well. Gensler, an architectural services firm, in its 2019 workplace survey reported that team building was the top cited aspect of a great workplace. As teams in today's service economy are more fluid, and include partners within and outside an organization, the real estate portfolio has come to reflect this. Flexible office spaces are becoming common, while 1 in 6 workers at large companies use outside coworking spaces outright.<sup>116</sup>

The flexible workplace is here to stay, as the world of work has fundamentally changed. A new breed of flexible operators who constantly challenge the traditional business model is now disrupting the real estate industry.<sup>117</sup>

In a time of rapid employment growth and expansion of large employers, coworking space is offering flexibility to middle-sized and larger employers as well as to startups. San Francisco and Silicon Valley combined have 3.6 million square feet of coworking space, with a brokerage describing the industry as the "primary growth driver" in the U.S. office market.<sup>118</sup> The space may be leased by large coworking space providers such as WeWork, which in turn provide space to startups and to more mature companies such as AirBnB, that seek the ability to rapidly add staff in a new location.<sup>119</sup>

With the increasingly blurred boundaries between people's personal and professional lives, places with more amenities, social areas and break spaces are sought after, and often considered a way to attract and retain talent. More outlying office parks may be at risk of losing current and would-be tenants, and are responding by adding amenities to the mix. Bishop Ranch in San Ramon has recently sought to rebrand itself from a suburban office park to "City Center Bishop Ranch," creating urban amenities such as retail, a hotel and a 1-acre piazza, enlisting Renzo Piano to work on the design.<sup>120</sup> As such transformations happen in the suburban office parks, what will mainly separate the urban from suburban locations will be the transportation options available to serve them.

Figure 39. Sites of Coworking Spaces, Bay Area Counties.



SOURCE: ABAG / MTC, from COSTAR; 42FLOORS.COM

## GETTING HOUSED AND GETTING AROUND

Managing growth and its side effects comes with challenges. Some observers regret the concentration of jobs in a few core areas, citing a direct connection to longer commutes and higher housing costs for families. Instead, they say we should let—even encourage—remote work technologies that enable people to work further afield<sup>121</sup> rather than seek further concentration. Some companies employ virtualization as an explicit strategy, with one company we interviewed saying about 10 percent of their workers are virtual. ABAG and MTC in an earlier Perspective Paper proposed implementing a tax credit for employers' telework expenses as part of a wider transportation demand strategy dealing with congestion.<sup>122</sup>

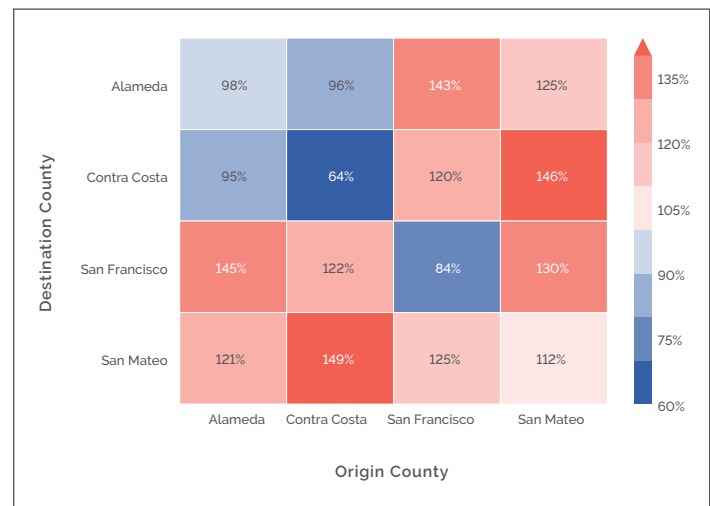
Voters in several Bay Area cities also registered their concern with traffic and rising housing costs as the economy has grown. As a result of job growth in a relatively small number of places, traffic congestion and challenges developing commensurate housing, voters in some peninsula cities approved levies on big employers or office development at the ballot box in November of 2018.<sup>123</sup> While many tech firms may find it worthwhile to locate in the centers, making other centers more accessible by transit or incentivizing commercial development in TPAs and Priority Development Areas (PDAs) in counterflow directions could be a way to disperse jobs while keeping them serviceable by transit. At the same time, this could remove some of the transportation and housing pressures from the center.

### Getting to Jobs

The location of both jobs and housing affects the supply and demand for transportation, and the availability of transportation in turn shapes demand for land. As jobs have dispersed to freeway interchanges away from transit stops, the value of the transit network in some ways decreases as fewer jobs are “reachable” by transit. Planners generally have responded by calling for either housing or jobs near transit stops. Due to the long-standing Bay Area housing crisis, urgency has centered on getting housing built. However, jobs may be at least as suitable a focus for strategic near-station areas as people are more likely to take transit if their job site is near the place they disembark from the train.<sup>124</sup>

Decentralization to areas like the Tri-Valley has occurred alongside a concentration of jobs along key rail corridors, in BART-served locations like San Francisco and Oakland as well as communities along the Caltrain line on the peninsula. San Francisco's Financial District is a relatively easy place to get to because of BART. As jobs in the region's centers have surged, so has ridership on transbay routes, with BART reporting all-time highs around 2016. Comparing commuter flows aggregated to the county level in 2008 and 2019, we see that longer commutes are becoming more common: Contra Costa County to San Mateo County has grown by 49 percent, even more than the 45 percent growth of the core route from Alameda County to San Francisco. At the same time, within-Contra Costa County BART trips in early 2019 were only 64 percent of the volume in 2008. In general, intracounty BART trips from 2008 to early 2019 have seen the least growth, suggesting its main value and competitiveness with driving for relatively longer trips crossing county lines.

**Figure 40. BART Average Weekly Ridership Origin / Destination Change, Four Bay Area Counties.**

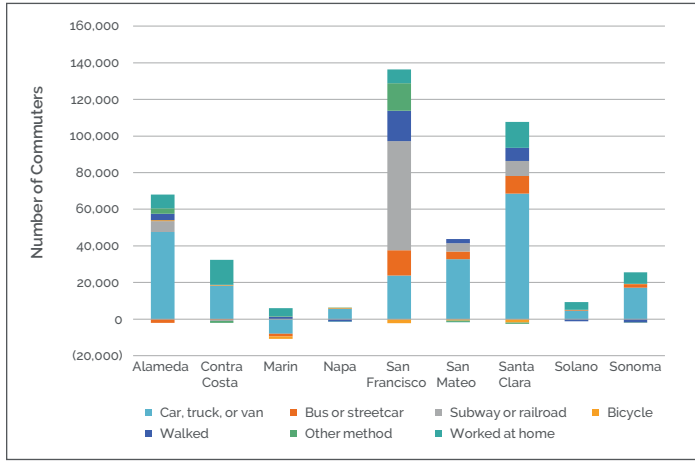


**SOURCE:** ABAG / MTC, from BART

More generally, we can see that job growth from 2012 to 2017 during the current expansion has been adding work trips mainly by driving (about half of the jobs added in that timeframe), but more than 100,000 jobs have been added on transit lines. An additional 57,000 workers reported working from home. As jobs have changed, it is notable that the transit growth is not just in San Francisco. A third of Santa Clara County's job growth came in the form of work from home or transit.

Overall, the net added job growth has been more transit and work from home focused than the overall proportion using these commuting approaches.

**Figure 41. Net Change in Commuters by Workplace County, 2012 - 2017, by Mode of Transport.**



**SOURCE:** ABAG / MTC, from U.S. Census, ACS 1-Year PUMS Releases 2012, 2017

## FUTURE RISKS AND LOCATION

Looking ahead, the impact economic changes will have on the regional economic geography is uncertain, particularly as we go farther out. Centers may be different, and certainly core industries will be different. We can anticipate where the risks of disruptions due to automation might be located as discussed in Chapter 3. While these data, as noted earlier, should not be taken as an overall employment effect—new occupations would be expected to appear in a dynamic economy—they do suggest that workers in the North Bay are more likely to hold jobs in occupations deemed at greater risk of automation. Workers in San Francisco, San Mateo, Santa Clara and Alameda counties have the largest share of their workers in the least at-risk occupations. But across the region, workers are expected to be at some risk and not just in lower wage occupations.

**Figure 43** maps for each subarea the share of high-income workers in the highest risk category, revealing North Bay locations but also portions of San Mateo as well as Alameda counties. That Santa Clara has the lowest share of high-income workers in the high-risk category largely reflects the occupations of workers there—heavily focused on STEM computing and mathematics currently deemed to be relatively safe from automation. This stresses the need for ongoing

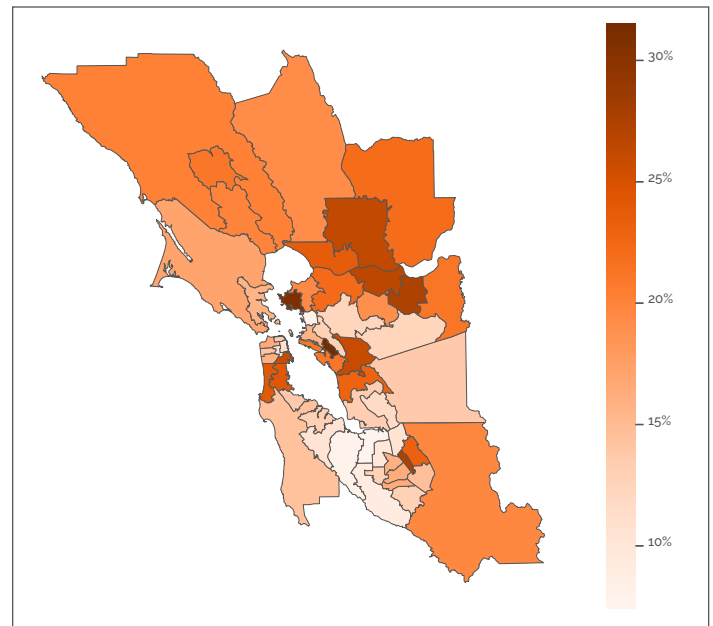
monitoring of economic transitions with locally sensitive and sensible adaptation strategies. For a region as large and diverse as the Bay Area, one size does not fit all.

**Figure 42. Automation Probability, by County.**



**SOURCE:** Automation Data from Frey and Osborne 2017; Demographic Data from ACS PUMS 2015-2017

**Figure 43. Share of High-Wage Workers in Top Risk Category**



**NOTE:** Plot shows, for each subarea, the percentage of a demographic group that falls in the shown risk category

**SOURCE:** Automation Data from Frey and Osborne 2017; Demographic Data from ACS PUMS 2015-2017

## WHAT IT MEANS FOR THE REGION

The Bay Area's economy of 4 million jobs in a range of industries is dynamic not just in terms of job generation but also in terms of the locational dynamics reflected by those industries. As the region has shed a third of its manufacturing jobs since the dot-com bust, other jobs have followed them but often in different forms than the ones they replaced. Instead of shop floors, many new jobs come in more open office environments where collaboration is in focus and where ultimately more workers can fit in the same amount of real estate, leading to denser centers of employment. Some of those centers are better served by transit than others, adding to the challenge of the 4 million commutes taking place on the region's buses, trains and cars. Owing to the partial recentralization of jobs and generally better transit access there, a relatively higher share of the added workers since 2012 are taking transit compared to the region's workers as a whole.

Companies have responded to high costs of housing and labor by relying more on a distributed or virtual workforce, with an uptick in workers staying home. Some firms have decided to forgo local offices entirely, relying on virtual workers where they are, in their homes or in coworking spaces, often outside the region. There are limits to virtualization, though, with some companies we talked to reporting best results from virtualization when a relationship is already established. There is a tech backlash of sorts against virtualization, with companies instead opting for the face-to-face collaborative environments when developing their businesses. The high cost of doing this will mean some firms move parts of their operations outside the region, or just forgo growing them here, looking for expansion opportunities in other regions where the skilled workforce can do the work at a lower cost. This was seen as a strategy for some companies, but the outlook for the region was nonetheless a strong one, owing to the critical mass of skilled labor and knowledge base here, which attracts the most strategic functions of many emerging industries.

As automation 2.0 enters the fray, it is anticipated to disrupt workers living in the North Bay counties more than those living in the South Bay ones, owing to compositional differences in their respective resident

labor force. Transitioning those workers and their communities to a good footing will be an urgent priority for local and regional policymakers.

## IMPLICATIONS FOR ACTION

Our educational systems must now support workforce up-skilling—entirely new workforce learning platforms will need to be developed and “matured” at levels that we’ve never had to develop and mature such upskilling/learning platforms if we are to adapt and evolve further on a societal level.

— Personal Interview, Managing Director, Strategy + Innovation, Real Estate Service Firm

The types of changes described in the previous four chapters will have long-term implications for the region's economy, but the sum their impacts in 20 or 30 years remains uncertain for technical, economic and policy reasons. Automation alone, for example, may well offer more opportunities than challenges to the Bay Area, while broadly reshaping the nature of jobs over time. Currently undefined occupations may expand rapidly, garnering high-wages to match the high level of sophistication and technical expertise required. At the same time, workers without the ability to pick up new skills in occupations where technologies are changing will have difficulty maintaining employment or living wage levels as some skills become gradually devalued by machinery. Even the income returns to advanced technical knowledge are not guaranteed.

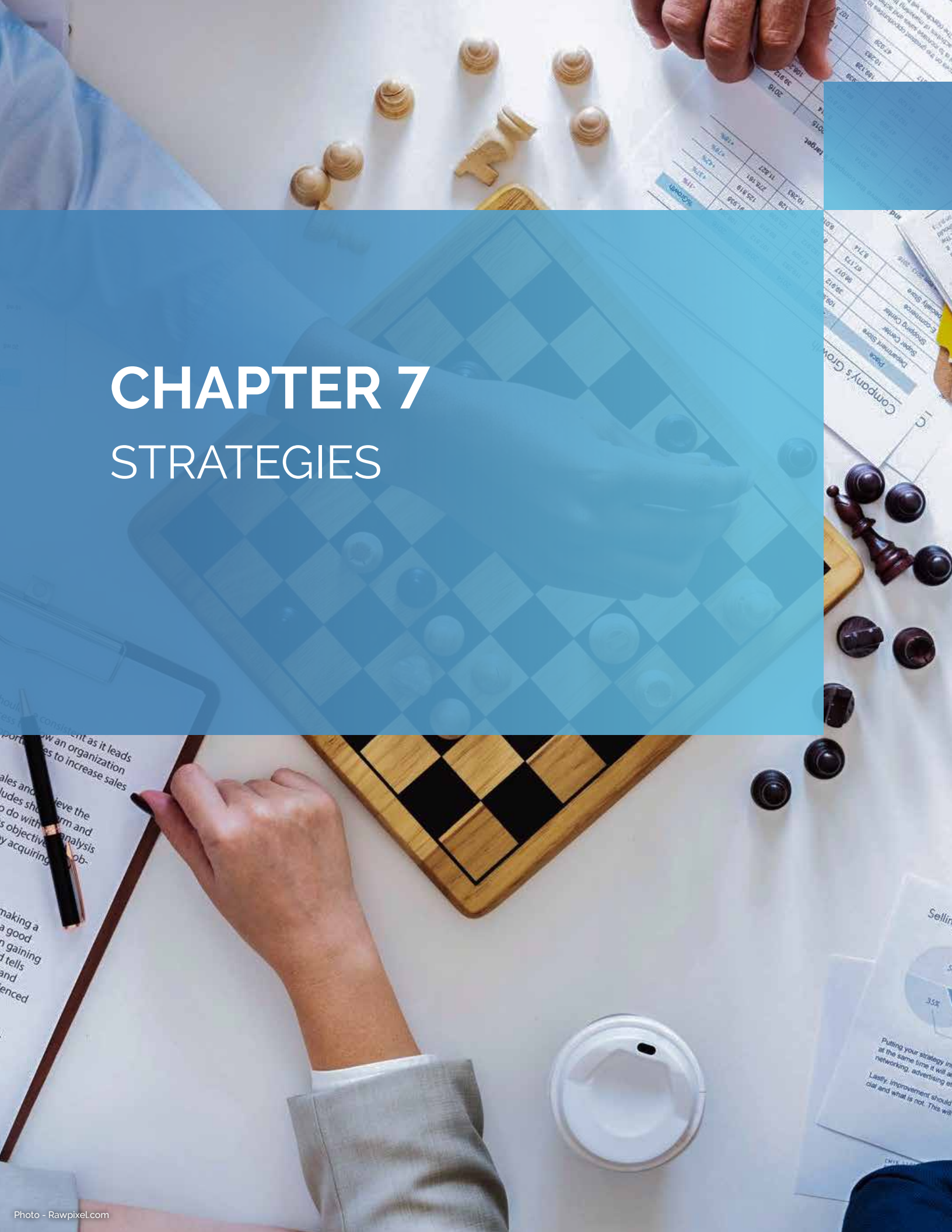
At the same time, as retail has been struggling against e-commerce, there are signs that the sector is reinventing itself, focusing on local experiences, quality materials and engaging consumers, particularly on food products. An economy more focused on experience could offer a new lease on older business models, where the human touch and connection matters. Further, an aging population may find increasing value in hands-on, caring occupations to improve quality of life.

As the economy will go through further economic evolutions, some technical and some organizational in nature, it is critical that policymakers pay close attention to the many component parts of the economy and the Bay Area's many differently situated communities, with a view to bridging them and helping to forge strong and lasting connections.



# CHAPTER 7

## STRATEGIES



...should be consistent as it leads  
...an organization  
...to increase sales  
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...include the  
...to do with  
...s objective  
...by acquiring  
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Putting your strategy in  
at the same time it will be  
networking, advertising et  
Lastly, improvement should  
cial and what is not. This will

## STRATEGIES

The preceding discussion highlights the uncertainties facing the economy and the future workforce 30 years from now. We do not know if there will be more jobs or fewer, more intense employment for some with unemployment for others, or more leisure time for all. Will income become still more concentrated in a small elite group, or will we find a way to improve and expand opportunities? Will improved productivity enable us to use land, a key natural resource, more intensely? More wisely?

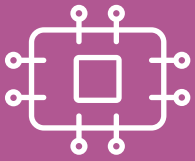
These profound uncertainties present us with many policy dilemmas. Over the next three decades, Bay Area policymakers will need to respond to a wide range of challenges. The strategies outlined in this section provide an array of possible approaches to the issues facing the economy and workforce going forward. Yet they also are strategies for today. Some are relatively simple, low cost and easy to implement. Others are broad reaching, more costly, and politically challenging.

The strategies are described in the context of the four lenses presented earlier: technological, organizational, compensational and locational changes. Each strategy is briefly defined and includes examples of programs already in place that illustrate application of the strategy. We also explain how each strategy addresses one or more of the Guiding Principles underlying the Horizon process.

After further review with stakeholders, strategies with high consensus or those deemed both financially and institutionally feasible and likely to be effective will be “tested” in the analysis of the Plan Bay Area Preferred Scenario development. While many of the strategies focus on workers and skills in a world of changing industrial structure, we would be remiss if we did not also note that a potentially momentous realignment of national labor markets cannot be the sole responsibility of individual workers or companies involved. Sensible policies easing switching between roles are critical, as are enforcement of federal laws protecting workers, from overtime to workplace hazards and minimum wage as well as programs to foster both the growth of new ventures and ways to broadly share the fruits of those ventures.



Photo - Rawpixel.com



## TECHNOLOGY

**T1. Priority Production Areas to Protect Key Industrial Lands:** Identify critical areas to the regional industrial land base and establish a program to protect such areas, thus helping to stabilize land markets.

**T2. State-Level Training Fund for Workers Displaced by Automation:** Establish a state-level transition fund for automation-induced displacement and distribute grants to regional programs working in partnership with county workforce development boards.

## TECHNOLOGICAL STRATEGIES

### STRATEGY T1 : Priority Production Areas to Protect Key Industrial Lands

#### Overview

The Bay Area is experiencing rapid employment growth and an increasing need for new housing production. Much of the job growth is in professional occupations or in low-wage service and retail jobs. The combination of rising land and housing costs has led to the shrinking of production and distribution jobs in the region and to the relocation of these activities to more distant places. Yet policymakers must balance the need for increasing housing production at different income levels and places for production throughout the Bay Area. Industrial lands perform a vital role in the supply chain of many of our highest wage industries, provide services to residents and offer sites for middle-wage employment. ABAG and MTC are in the process of developing a Priority Production Area (PPA) program that will provide a framework for identifying areas that should be kept for industrial use or provide opportunities for industrial sector growth, as well as tools for communities to maintain and improve those industrial areas.

#### Examples

The following examples describe zoning strategies that local staff have reported to be successful within their specific economic and land use environment:

- **“Tradeshop zoning”** is a term used to describe mixed-use zoning in San Francisco that allows for light Production, Distribution and Repair (PDR), more commonly referred to as “light-industrial,” in neighborhood corridors. Tradeshop zoning is supported by the next example.
- **Cross-subsidizing industrial uses with office revenue** allows San Francisco to support manufacturing uses in certain PDR zones. A 2014 ordinance requires that

at least one-third of total gross floor area of new development consist of PDR uses. This ordinance encourages construction of PDR buildings and mixed-use buildings with PDR uses.<sup>125</sup>

- San Jose adopted a **Framework for Preservation of Employment Lands** into its San Jose 2040 plan. The framework protects employment lands from conversion to non-employment uses and allows intensification of job-creating industry types and development forms. In addition to prioritizing employment lands, San Jose 2040 also supports new housing through strategies like conversion of commercial to mixed-use buildings and development of Urban Villages.<sup>126</sup>
- In San Leandro, **“Industrial-Transition”** is an industrial land use category used to encourage the transition of historically industrial areas into a broader mix of industrial with other uses, such as office, retail and restaurants. Residential uses are permitted in Industrial-Transition areas within a half-mile of BART or within live-work developments.<sup>127</sup>

#### Potential Impact

Zoning that protects or develops new industrial land ultimately supports the supply chains for the region’s economic clusters, provides a setting for new firm development and offers the possibility of retaining middle-wage jobs. Transition zoning as one choice in a PPA program can encourage communities to deal with the tradeoffs between residential and industrial needs in transition areas. There may be benefits from mixed-use development in some areas—in the case of San Francisco, economic development staff report that manufacturing businesses benefit from retail sites and increased foot traffic. However, staff in other cities have warned that there are some industrial uses that are not compatible with residential, office or community uses. Allowing these non-compatible uses in industrial areas may preclude job-creating industrial areas from expanding over time. Ultimately, zoning to protect

employment-rich land should be tailored to meet the needs of individual communities. Last-mile solutions like electric bikes and scooters could be helpful in localities where connecting jobs to housing or transit is complicated by limited public transportation options.

### Primary Guiding Principles

This strategy aligns with the Horizon initiative's **AFFORDABLE, DIVERSE** and **VIBRANT** Principles. The PPA program can enhance job opportunities for workers without a four-year college degree, encourage communities to plan for the tradeoffs between housing and employment land pressures, and provide a framework for planning for new job location and expansion in places with better access to affordable housing.

## STRATEGY T2 : State-Level Training Fund for Workers Displaced by Automation

### Overview

As artificial intelligence (AI) and automation raise productivity of firms across industries, enabling game-changing products and services, new jobs will be created while others will cease to exist. To ensure a proper transition of affected workers, another strategy would be to establish a state-level fund for automation-induced displacement and distribute grants to regional programs working in partnership with county workforce development boards to assess, train and redeploy workers displaced by automation. In addition to upskilling displaced workers, a state-level fund could be used to equip high school students with vocational skills to work alongside machines. In the future, entry-level jobs that are largely routine-based will require new specialized skill sets or could be entirely replaced by machines. Initial funding could focus on pilot programs and then expand to more permanent and comprehensive workforce development programs.

### Examples

The following are examples of workforce development programs that a state-level fund for automation-induced displacement could support:

- The **Hartz Reforms in Germany** in 2003 created a new job category that allowed employers to pay a flat rate for employees who work a limited number of hours. The government supplements the wages of these "mini jobs" with welfare payments. In addition, unemployed individuals are assigned **counselors** who assess their skills, enroll them in training programs and attempt to place them in jobs. Currently, Germany is **piloting an expanded counseling program** that uses online and offline tools to provide personalized counseling to students, unemployed individuals and workers who may be impacted by digitalization.<sup>128</sup>
- In **Denmark**, the "**flexicurity system**" allows unions, with support from employers and the government, to provide job counseling to unemployed individuals and vocational training to all workers. Employers and unions work together to identify needed skills and negotiate paid leave during training. The end result is a flexible and adaptable employment system.<sup>129</sup>
- Currently operating in **Colorado** and **Indiana**, **Skillful** is a non-profit initiative supported by the Markle Foundation that teaches specific skills aligned with growing state industries, such as advanced manufacturing and cybersecurity. **Skillful** partners with major employers like Microsoft, encouraging them to look beyond educational degrees as the primary indicator of a capable worker. In Colorado, Skillful is working in partnership with a local economic development agency and a foundation to **upskill rural job** seekers trained in the extraction and agricultural sectors for jobs in emerging industries.<sup>130</sup>
- **OER or digital learning resources** such as **Coursera** may provide a model for a highly accessible and affordable workforce development program. Through Coursera, quality courses and online degrees from reputable colleges and companies can be accessed online at affordable prices.<sup>131</sup> Similar to Skillful, state or regional agencies could partner with digital learning resources and major employers to provide displaced workers with low- or no-cost, industry-aligned training.

- **Germany's dual-system apprenticeship program** combines work- and school-based learning to prepare secondary students for transition to full-time employment, with the option of a vocational or college track. Students who choose the vocational track work at an employer as part of their curriculum in high school. In **Switzerland**, a similar program rotates vocational students between school and workspace settings, and even offers them a salary. In **South Korea**, the government pays for students' tuition, room and board as an incentive to participate in vocational training despite the societal preference for university enrollment.<sup>132</sup>

### Potential Impact

Current federal retraining programs are under-enrolled and curriculum is poorly matched to student and employer need.<sup>133</sup> A state-level fund for automation-induced displacement could support the piloting and implementation of programs that equip displaced workers with skills needed to quickly reenter the workforce and also train high school students for the entry-level jobs of the future.

The Hartz Reforms in Germany increased the working-age population by 10 percent and contributed to a reduction in unemployment from 10 percent in 2003 to less than 4 percent today.<sup>134</sup> However, an IMF study found that workers who accepted short-term jobs received 10 percent lower earnings when they returned to standard work, compared to workers in long-term employment.<sup>135</sup>

CEO Jeff Maggioncalda envisions Coursera as a resource for upskilling American workers for the future of work. Coursera plans to address skill gaps in both hard skills like data science and soft skills like leadership and adaptability. Thirty million users are enrolled on the platform and 900 companies utilize Coursera for workplace training.<sup>136</sup> Leveraging the success of digital learning resources, in tandem with employer input and government support, could be an effective workforce development strategy.

In Germany, the dual-system apprenticeship program is widely respected, with one-third of students choosing to participate. In Switzerland, 70 percent of students choose vocational training, and studies show that on average vocational students achieve higher lifetime earnings. Inspired by Germany and Switzerland, South

Korea's program has resulted in higher employment rates for vocational graduates than college graduates (90 percent vs. 65 percent) and a drop in college enrollment in favor of vocational school.<sup>137</sup>

The above-mentioned private and non-profit examples from the United States and largely government-led examples from other countries serve as evidence-based inspiration for how a state-level fund could create quality, effective workforce development programs. To achieve maximum success, funding should be used to pilot and implement workforce development programs that combine the specializations and resources of the private, public and non-profit sectors.

### Primary Guiding Principles

This strategy primarily aligns with Horizon's **DIVERSE** and **VIBRANT** Principles. A state-level fund that pilots and implements workforce development programs to upskill displaced workers and trains high school students would help low-income individuals access quality job opportunities and remain in the Bay Area, and would augment workforce needed by Bay Area employers.



Photo - Mirko Tobias Schäfer



## ORGANIZATION

**O1. Lifelong Learning and Training Accounts (LLTAs):** Establish LLTAs to address the decline of traditional single-employer jobs, resulting in a better trained workforce with greater flexibility to change careers.

**O2. Portable Benefits:** Uncouple benefits from employment and address the rise of part-time employment by advancing a portable benefits system and creating a safety net for workers in alternative arrangements.

## ORGANIZATIONAL STRATEGIES

### STRATEGY O1 : Lifelong Learning and Training Accounts (LLTA)

#### Overview

As traditional wage and salary careers become harder to obtain – whether due to automation or organizational realignments – many workers increasingly find themselves cobbling together multiple jobs. This sometimes means working in different industries over the course of a career. Lifelong Learning and Training Accounts (LLTAs) that are linked to the worker, rather than the employer, would result in a better trained workforce by retraining mid-career workers, improving unemployed workers' ability to find new jobs and giving workers the flexibility to shift careers when needed.

#### Examples

There are several example of LLTAs being implemented across the globe:

- The **Aspen Institute** proposes government-sponsored LLTAs that match worker contributions. Starting at age 18, an individual could contribute up to \$2,000 per year on a pre-tax basis. The government would match at a rate between 10 percent and 50 percent, dependent on adjusted gross income. The LLTAs would have a maximum balance of \$10,000, and employers would be able to contribute \$2,000 annually.<sup>138</sup>
- In **Singapore**, SkillsFuture Credit creates LLTAs with an initial credit of \$500 for all Singaporeans aged 25 and above. Launched in 2016, Singaporeans can use the LLTAs to pay for courses that deepen knowledge of an existing specialty or prepare them for a new profession. The credits are a single component of a greater SkillsFuture initiative that includes education and career guidance, work-study programs for polytechnic students, and fellowships for mid-career adults.<sup>139</sup>

- Since 2015, employees in **France** have had access to LLTAs that accrue 24 hours per year worked until a threshold of 120 hours, and then 12 hours per year until 150 hours. Part-time employees receive hours commensurate with hours worked. Employees can use the hours for training programs that award professional certificates that match the anticipated needs of the economy. The program is funded by employer contribution based on a percentage of payroll.<sup>140</sup>

#### Potential Impact

Occupations with a high-risk of automation are primarily low-wage, such as food preparation workers and construction laborers. However, highly educated workers may also be at risk, as with parts of the legal profession. Digitization could result in the disappearance of many entry-level positions, threatening the job security of low-skilled, low-wage workers but also of more highly educated workers with a narrow area of training. LLTA in combination with coordinated workforce development would combat job displacement by helping workers upgrade their skills, expand their education and transition into emerging industries.

To ensure maximum impact, the Aspen Institute recommends implementing a maximum balance of \$10,000 to encourage workers to use their LLTA throughout their careers. In addition, a maximum employer contribution of \$2,000 would reinforce the importance of employer-led investment in the workforce. To boost the effectiveness of LLTAs, the Aspen Institute recommends easier accreditation for nontraditional education programs, termination of the Lifelong Learning Credit, and childcare assistance for workers and students with children.<sup>141</sup>

Singapore's SkillsFuture organizes courses according to Skills Frameworks, which are career maps for advancing within a field. In 2017, SkillsFuture offered 14

frameworks, ranging from Accounting to Sea Transport, and 285,000 workers used their credits. Aligning with global economic trends, SkillsFuture expanded in 2018 to include Advanced Manufacturing.<sup>142</sup>

In 2016, approximately 700,000 French workers requested approval to use their credits. The National Council for Employment approved 70 percent of requests, representing a 139 percent increase over 2015. Employed participants most frequently used their credits to learn languages or obtain IT certificates. In contrast, job seekers were most interested in vocational training aligned with a national certificate of key job competencies (a step above a certificate of general education).<sup>143</sup>

Implementing LLTAs in tandem with workforce development programs is critical to the success of this strategy. For workers, funds or credits for continuing education are only as beneficial as the courses made available to them.

### Primary Guiding Principles

This strategy aligns with Horizon's **DIVERSE** and **VIBRANT** Principles. Increasing access to training opportunities would help prevent job displacement, while enabling workers to grow their skills and knowledge with changes in job requirements. This will help workers to remain competitive in the Bay Area and will broaden the pool of skilled workers available to employers.

## STRATEGY 02 : Portable Benefits

### Overview

Benefits afforded to workers have not kept pace with changes in the economy. Forty percent of workers in the U.S. are engaged in part-time employment,<sup>144</sup> temporary positions or independent contracting, rather than the traditional single-employer career of the 1950s. More often than not, these workers must secure their own benefits, making them more susceptible to severe financial loss due to unemployment or disability. A portable benefits system that is decoupled from traditional employment would create a safety net for workers in alternative arrangements. At the same time, workers and employers would still enjoy the flexibility and efficient use of resources and skills associated with contingent work. Because contract workers are not afforded protections under the Taft-Hartley Act, wide scale implementation of portable benefits would require

changes to federal and state laws.<sup>145</sup> "The nature of work is changing rapidly, but our policies largely remain tied to a 20th century model of traditional full-time employment," said the U.S. Senator from Virginia Mark Warner, in connection with a draft bill in 2017 to fund pilot projects to study the idea.<sup>146</sup>

Notably, UBER and SEIU in 2018 advocated such a system based on principles of flexibility, proportional contributions (where multiple gigs exist), universality in scale, and innovation with "arrangements for social investments from private and public sources," and independence.

### Examples

With the adoption of new state and federal legislation, existing benefit models could be expanded to create portable benefits for contingent workers.

- **SAG-AFTRA**, or the Screen Actors Guild-Producers American Federation of Television and Radio Artists, is a health and pension plan supporting 160,000 performers and media professionals in the U.S. Following a collective bargaining agreement initiated by the union, the pension plan is solely funded by studio contributions, while the health plan is funded by both studios and members. Independent contractors are not covered under this model due to their limited ability to unionize under the Taft-Hartley Act.<sup>147</sup>
- The **Black Car Fund** provides workers' compensation coverage to 33,000 contract workers of black car companies in New York. The Black Car Fund was created by a New York statute that allows the fund to hire the drivers as employees for the sole purpose of providing workers' compensation. Benefits are paid by passengers, who pay a 2.5 percent surcharge on every ride. Expanding the plan beyond workers' compensation would require changes to the statute.<sup>148</sup> The **Freelancers Union** is a non-profit that negotiates benefits, such as medical and disability, on behalf of 375,000 independent contractors. In addition to negotiating benefits, the Freelancers Union advocates for independent contractors' rights. Most notably, advocacy led to legislation in New York City that protects contract workers from nonpayment.<sup>149</sup> If future legislation mandated employer contributions for workers engaged in online platforms, the Freelancers Union would be well positioned to administer those benefits.

- **San Francisco's Health Care Security Ordinance** mandates that all businesses with at least 20 employees offer health insurance to employees working at least 8 hours per week or contribute to City Option, a multi-employer city contribution pool for city-sponsored health care programs.<sup>150 151</sup> Although not required, employers can choose to contribute to City Option for independent contractors. The ordinance as part of a targeted health care system is a model for how city or state governments can create portable benefits for part-time or temporary workers.
- **CalSavers** will offer a portable retirement savings vehicle for California employees. Expected to launch in 2019, the program will require employers with at least five employees to offer a private retirement savings vehicle or enroll their employees in CalSavers. If employees do not choose a rate, they will be subject to a default contribution from payroll, to be set between 2 percent and 5 percent. Employer matches are not permitted.<sup>152</sup> California is one of 11 states that have enacted legislation for state-run retirement initiatives.<sup>153</sup>
- **State of Washington (Sen. Stonier)** in 2018 introduced legislation to introduce portable benefits for the state, citing the erosion of company provided benefits and the increasingly independent nature of the workforce.<sup>154</sup> The bill would require employers to "make contributions to benefit providers for the purposes of providing certain benefits, including industrial insurance, to workers who provide services to consumers under 1099 federal tax status." The bill would also clarify which workers classify as contractors and which count as regular employees.

### Potential Impact

Forty percent of the U.S. workforce is engaged in contingent employment, making now the time to enact social policy that protects workers from the mercurial labor environment. Many of the above models provide solutions for temporary and part-time workers, but not independent contractors. Through changes to federal and state laws, existing models could be expanded to create portable benefits that also apply to independent contractors, including those engaged in online platforms.

Collectively benefiting over 190,000 workers, SAG-AFTRA and the Black Car Fund are examples of successful models already in existence. However, as a union, SAG-AFTRA has limited ability to collectively bargain for independent contractors, and the Black Car Fund cannot expand beyond workers' compensation without changes to state laws. In lieu of new federal legislation, state statutes that allow organizations like Black Car Fund to "employ" independent contractors could serve as a tool for expansive implementation of portable benefits.

As government-led programs, San Francisco's Health Care Security Ordinance and CalSavers demonstrate wide scale success and efficiency. The first program covers 239,790 employees, including 192,000 employees with medical reimbursement accounts. On average, accounts have a balance of \$1,478. At 97 percent, San Francisco has a higher health care coverage rate than California's statewide coverage rate at 93 percent.<sup>155</sup> Upon launching in 2019, CalSavers is estimated to provide 6.8 million employees access to workplace retirement accounts with a projected participation rate of 70 to 90 percent.<sup>156</sup>

It is conceivable that companies forgo hiring workers in permanent positions in part because of the overhead associated with benefits. By uncoupling the costs of benefits more generally, it could boost the regular employment rolls.

### Primary Guiding Principles

This strategy supports Horizon's **DIVERSE** and **VIBRANT** Principles. Portable benefits would protect contingent workers from sudden financial loss and increase access to health care while allowing them to use their skills efficiently and take advantage of flexible work arrangements. At the same time, portable benefits provide a sensible framework that can evolve in pace with the economy.





## COMPENSATION

**C1. Increased Child Care Support for Low-Income Families:** Provide low-cost and accessible child care for low-income communities to remove barriers to working for young families and reduce the transportation impacts associated with driving to distant child care centers.

**C2. Wage Insurance:** Develop a wage insurance program to reduce the wage losses experienced by most re-employed displaced workers while encouraging them to continue participating in the workforce.

**C3. Universal Basic Income:** Provide households with guaranteed, unconditional cash transfers, commonly referred to as a “universal basic income,” should jobs be disrupted at a scale well beyond individual control. This could disrupt existing cycles of poverty and improve financial security, health and wellness.

## COMPENSATIONAL STRATEGIES

### STRATEGY C1 : Increased Child Care Support for Families

#### Overview

A bottleneck for many workers' full participation in the labor market is family obligations. In the absence of good, affordable and accessible child care options, women are more likely to either go part-time or forgo working entirely. While some families may prefer this, others lament the lack of supporting options when families prefer to have two working parents. Public policy can support working families by supporting the availability, quality and affordability of child care options, either through select capital grants, contributions to operating costs for non-profit operators, or through vouchers to parents. A location-conscious approach can address both labor market and transportation outcomes.

#### Examples

- **Tamien Station Child Care (San Jose).** Santa Clara Valley Transportation Authority (VTA) built a \$2.5 million child care facility, pooling state and local funds along with 80 percent federal funding made available from the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), which encourages development compatible with intermodal transportation. The center is fully certified and houses 126 children. Per VTA, the project was intended to demonstrate “that offering child care and transit services at the same location will provide a viable incentive to parents to use public transportation instead of single-occupant automobiles.”<sup>157</sup>

- **Google Children's Center (Mountain View).** Google operates a child care center near its main campus, offering care to employee children. Capacity is 148 children, and the center is open for 12 hours daily, providing flexibility.
- **Cisco Systems (San Jose)** partners with KinderCare to operate a child care center near its San Jose campus, in state of the art facilities.

#### Potential Impact

Availability of quality, affordable child care is critical to parents as they seek to reenter the workforce following the addition of a new family member. Care centers are more common in residential areas, meaning drop off takes place at the beginning or end of the work trip. Having care either near the work site or near a major transit node eases the drop-off and pickup routine. Good child care options in relation to job sites or transit hubs can boost labor market participation while reducing vehicle miles traveled for the region.

#### Primary Guiding Principles

This strategy supports Horizon's **CONNECTED** and **AFFORDABLE** Principles. It would increase family wages by making it easier to obtain child care and get to work in practical terms. Particularly for families relying on transit for transportation, doing multiple stops in connection with child care before work makes logistics harder. A transit-accessible location for child care leverages location to solve both labor market, family and transportation goals.

## STRATEGY C2 : Wage Insurance

### Overview

If automation does lead to considerable displacement of jobs in the future, unemployment insurance will be insufficient to shelter workers from economic vulnerability. Displaced workers may prefer to collect unemployment rather than accept a lower-wage job left in the economy. Further, if the organization of jobs continues along recent trends, displaced workers may find that the remaining viable options are mostly “1099” positions. Wage insurance would shelter displaced workers from financial crisis while also encouraging them to continue participating in the workforce, despite changes to the organization of jobs.

### Examples

Two well-known examples of wage insurance both take place in North America:

- In the **United States**, the Alternative Trade Adjustment Assistance (ATAA) program provides federal income support to workers displaced by international trade. Workers age 50 or older who obtain full-time jobs that pay \$50,000 or less within 26 weeks of becoming unemployed can qualify for 50 percent of loss in earnings, up to \$10,000, for two years.<sup>158</sup>
- In 1995 and 1996, **Canada** implemented the Earnings Supplement Project (ES) with displaced workers from five cities. All displaced workers could qualify for the pilot, not only those displaced by international trade. Workers in the experiment group who obtained a full-time job within 26 weeks of becoming unemployed received 75 percent of loss in earnings, up to \$250 weekly, for up to two years.<sup>159</sup>

### Potential Impact

While most experts predict that automation will complement human workers in the long-term, few disagree that low-wage workers likely will be displaced by new technological advancements in the coming decades. Programs like wage insurance, coupled with retraining programs, would supplement the income of vulnerable, displaced low-wage workers as they learn new skills and attempt to reenter the workforce.

In the 2016 State of the Union, the Obama Administration proposed expanding wage insurance to all displaced workers. Specifically, the proposal would have covered displaced workers who had worked at their previous

job at least three years. The estimated cost of proposed comprehensive wage insurance programs has ranged from \$3 billion to \$20 billion a year, with an estimated reach of up to 2 million workers. In 2006, the existing ATAA program distributed \$15 million in wage subsidies to 3,200 workers who lost their jobs as a result of increased imports.<sup>160</sup>

Evaluators of Canada's ES program found that only 20 percent of displaced workers received payments, in large part because of difficulty finding a new job within the eligibility period. Seventy percent of those eligible to receive payments registered for them. At the end of the eligibility period, the supplement group experienced 4.4 percent more employment. Although over 90 percent of recipients interviewed responded that the supplement made “at least a fair or big bit of difference in total income,” the evaluators ultimately concluded that wage insurance would not be a worthwhile program. However, they did not consider the possibility that wage insurance could offset the negative long-term effects of income downsizing and encourage continued spending in the economy.<sup>161</sup>

### Primary Guiding Principles

This strategy primarily aligns Horizon's **AFFORDABLE**, **DIVERSE** and **VIBRANT** Principles. Wage insurance would protect displaced workers from financial crisis and allow them to enter a new career with a cushion during their early years of working at entry-level wages. It also would reduce the likelihood of immediate displacement from housing due to a drop in income. Such a strategy would help Bay Area residents from all backgrounds, ages, and abilities remain in place and transition to new jobs in the region. However, it may be a short-term solution if wages for even the more experienced workers remain below those lost.

## STRATEGY C3 : Universal Basic Income

### Overview

If automation-induced displacement becomes systemic rather than episodic, it will require a policy solution that goes beyond just individually targeted and driven retraining programs (though those should be pursued vigorously). As part of a new social contract between workers, industry and government, a universal basic income program could shelter workers and households from the worst of economic volatility. It could provide households with guaranteed, unconditional cash

transfers, commonly referred to as a “universal basic income.” Providing households with sufficient money for basic needs could disrupt existing cycles of poverty and potentially improve a variety of outcomes, from financial security to health and wellness, affording households more personal freedom to retrain and plan for the long-term as their careers may have been affected by changing economic conditions. More narrow scope variants include a check sent to every citizen subject to taxation, or alternatively a negative income tax (NIT) where citizens below a certain income threshold receives money from the IRS.

### Examples

Two proposals for universal basic income are currently moving towards an implementation phase in the United States:

- **Y Combinator Research** is launching a randomized study of basic income in the United States. The study will investigate outcomes in several areas, including financial health and self-sufficiency; crime and domestic violence; and health, mental health and cognitive functioning. The study will consist of 3,000 individuals in two states whose household income does not exceed AMI for their county. A thousand individuals will be randomly selected to receive \$1,000 monthly for three to five years, while the rest receive \$50 and serve as the control group.<sup>162</sup>
- **Stockton** is currently recruiting participants for the Stockton Economic Empowerment Demonstration (SEED). Beginning in 2019, 100 Stockton residents will receive \$500 per month for 18 months. SEED strives to innovatively improve outcomes in Stockton, where the median household income of \$46,033 is 25 percent below the state average, and only 35 percent of students are college-ready by high school graduation. SEED also is intended to confront and humanize often misunderstood notions of poverty.<sup>163</sup>

### Potential Impact

Projections vary on the impact of automation on wages. Some experts believe mass displacement will threaten the incomes of all workers, while others predict that it will primarily affect low-wage workers with limited access to retraining programs. Beyond automation, changes in the organization of jobs threatens workers' access to benefits and protections that typically

correspond with single-employer careers. As such, universal basic income may be the solution needed to ensure that all households, regardless of which projection becomes reality and how drastically the organization of employment changes, will still be able to afford basic needs.

Although recent basic income proposals are still in their nascent stages of implementation, some indicators of potential impact can be gleaned from U.S. and Canadian field experiments on basic income in the 1970s. The U.S. experiment focused on labor force participation and earnings. It found that recipients worked less than those with no subsidies (but not necessarily less than they would have on other welfare programs where working immediately removed eligibility for the program), while training did not lead to improved employment and earning outcomes.<sup>164</sup> The Canadian experiment focused on social effects. Health administrative data revealed that hospitalization rates declined, especially for mental health diagnoses, in the experiment group. Contrary to the U.S. study's initial findings (later reevaluated<sup>165</sup>), the Canadian experiment found no evidence of increased fertility or divorce. The study also resulted in a slight increase in continuation of grade 11 students to grade 12.<sup>166</sup> These findings suggest that universal basic income can have a positive effect on outcomes beyond financial security, such as health, wellness and education.<sup>167</sup> Both the U.S. and Canadian experiments occurred more than 40 years ago. Results are likely to differ because the baseline economy, current welfare system and education status are different. Nevertheless, previous research demonstrates the complexity of implementing such policies and would help to flag important factors to track in any evaluation of such a program.

### Primary Guiding Principles

This strategy primarily aligns with Horizon's **DIVERSE** as well as **AFFORDABLE** and **VIBRANT** Principles. Universal basic income would protect workers displaced by automation or workers excluded from the single-employer career trajectory from economic volatility. This strategy would help Bay Area residents from all backgrounds, ages and abilities remain in place. As well, the strategy would provide more resources to families to pay for housing, and the infusion of income into the region could help to support retail and service businesses.



## LOCATION

**L1. Incubator Programs in Economically Distressed Communities:** Create incubator programs in economically distressed areas to create business and employment opportunities for low- and moderate-income individuals.

**L2. Means-Based Transit Pricing:** Develop regional means-based pricing for public transit to help low-income workers overcome cost-based travel barriers to access economic opportunities in the region and provide for their families.

**L3. Office Development Limits in Jobs-Rich Communities With Little Housing Development:** Implement annual caps of commercial development to better align growth in commercial space and housing. Alternatively, expand impact fees instead of introducing caps, internalizing costs to infrastructure and providing a funding stream for improvements.

**L4. Employment Incentives in Transit-Rich Areas:** Prioritize employment densification in PDAs and TPAs, with an emphasis on locations close to transit that currently have very low employment densities, through changes in development capacity or through new funding incentives.

## LOCATIONAL STRATEGIES

### STRATEGY L1 : Incubator Programs in Economically Distressed Areas

#### Overview

Create incubator programs in economically distressed areas to create business and employment opportunities for low- and moderate-income individuals. Incubation programs should provide pre-incubation services (technical assistance for establishing a new business), as well as access to workspaces, mentorship and financing. The program could be combined with Priority Development Area or Priority Production Area designations to encourage diversified business and job opportunities in the locations where new growth will concentrate or where production activities will be encouraged.

#### Examples

- **La Cocina** in San Francisco cultivates low-income food entrepreneurs who are formalizing or expanding their businesses by providing affordable commercial kitchen space and industry-specific technical assistance. La Cocina primarily serves women from communities of color and immigrant communities.<sup>168</sup>
- **Bronx Business Bridge Incubator** in New York City supports traditionally underserved entrepreneurs through one-on-one business counseling, workshops and advisory services on marketing; legal and tax issues; workstations; and access to interns from a local college.<sup>169</sup>

- **PhillyiHub**, originally launched as Philadelphia Immigrant Innovation Hub, is both a coworking space and educational center for entrepreneurs that is managed by Mt. Airy USA, a neighborhood business corridor. In partnership with the local initiative support corporation (LISC) and community college, PhillyiHub provides a free six-week course on how to open a business in Philadelphia.<sup>170</sup>

#### Potential Impact

As incubator programs gain more traction and graduate more participants, they increase their capacity to create lasting positive impacts in the communities they serve. La Cocina is leveraging its resources to open a food hall in the Tenderloin neighborhood of San Francisco that will feature immigrant- and women-owned businesses, while offering affordable food options for residents.<sup>171</sup> La Cocina both helps food entrepreneurs overcome the high cost of entry and empowers graduates to give back to their communities. Incubator programs in areas designated for job concentrations can help local entrepreneurs integrate innovative ideas into larger economic clusters.

#### Primary Guiding Principles

This strategy primarily advances the Horizon initiative's **DIVERSE** and **VIBRANT** Principles. Creating incubation programs in distressed areas would increase access to the Bay Area's fiscal resources, create quality job opportunities (especially for low- and moderate-income individuals), and enhance the employment base in development and job preservation areas.

## STRATEGY L2 : Means-Based Transit Pricing

### Overview

For most Bay Area households, transportation is the third-biggest monthly expense after housing and food. Expected rises in the cost of mobility could create additional financial strain for low-income workers. Developing regional means-based pricing for public transit could help low-income workers overcome cost-based travel barriers to access economic opportunities in the region and provide for their families. MTC published a Means-Based Transit Fare Pricing Study in 2017 and is currently in the process of developing a pilot program that will offer a 20 percent discount with BART, Caltrain, Golden Gate Transit and SFMTA to those making less than twice the federal poverty level.<sup>172</sup>

### Examples

Means-based transit pricing has been implemented in the following North American cities and regions:

- **King County, Washington (Seattle)** has operated the ORCA LIFT program since 2015. ORCA LIFT offers a flat fare equivalent to a 45 percent discount for individuals making less than double the federal poverty line. The discount is accessible through a personalized ORCA LIFT card.<sup>173</sup>
- **Toronto** started the Fair Pass Discount Program in April 2018. Residents enrolled in the Ontario Disability Support Program or Ontario Works Program for households with financial need can receive a 12-month Fair Pass discount equivalent to a 33 percent for a single ride or 21 percent for a monthly pass. The discount is accessible through a personalized PRESTO card.<sup>174</sup>
- The **Portland metropolitan area** Trimet transit agency started offering state residents making less than double the federal poverty line discounted fares of 50 percent to 72 percent in July 2018. The discount is accessible through a personalized Hop card.<sup>175</sup>
- **New York City** will launch Fair Fare in 2019. Residents living at or below the federal poverty line will be able to purchase half-priced 7-day and 30-day unlimited MetroCards.<sup>176</sup>

### Potential Impact

Means-based transit pricing in North America has shown promising results so far. The ORCA LIFT (Seattle) program has enrolled 75,000 people since its inception in 2015.<sup>177</sup> In its first month of launching, the Trimet (Portland) program enrolled 1,500 people.<sup>178</sup> In its first three months, Presto (Toronto) enrolled 22,000 people and was well on its way to meeting their goal of 36,000 by the end of 2018.<sup>179</sup> The swiftness with which low-income riders have enrolled for benefits indicates the interest in and need for means-based transit pricing.

The effectiveness of means-based transit pricing may be dependent on how simple the program is to use. In Toronto, four months after launching, only half of enrolled riders actively used their cards. Requirements such as a \$10 minimum balance may be barriers to accessing the discount.<sup>180</sup> Other considerations like the preference for cash over credit cards in some low-income communities should be part of the process of designing programs.

### Primary Guiding Principles

This strategy primarily achieves Horizon's **CONNECTED** and **DIVERSE** Principles. Means-based pricing for low-income workers would better connect communities to the region and help workers from all backgrounds, abilities, and ages access the Bay Area's economic opportunities.



Photo - Noah Berger

## STRATEGY L3 : Office Development Limits in Jobs-Rich Communities With Little Housing Development

### Overview

Between 2010 and 2018, the Bay Area added 750,000 jobs and just over 100,000 housing units, contributing to the long-standing housing affordability challenge of the region. Those jobs were not distributed evenly in the region but heavily concentrated in a few communities, exacerbating the challenges related to housing and infrastructure provision. The heavy concentration of jobs and job growth in a few Bay Area communities in the region has spillover effects on housing markets and traffic flows well beyond local borders. While programs like CASA focus on improving the housing supply, the jobs / housing imbalance can also be addressed from the other side of the equation: through capacity for employment. While it would be both impractical and undesirable to cap jobs directly, a regional program could be developed to incentivize local jurisdictions to plan for greater balance and to more systematically consider impacts on neighboring jurisdictions when planning for corporate campuses. This can be addressed through direct limits on nonresidential building, through impact fees charged for new nonresidential construction or through a head tax on employees in areas with a heavy imbalance of jobs over housing supply. The point is not to limit jobs per se but to seek a closer coupling of housing and non-residential development. A secondary purpose is to avoid each city in the region adding their own cap or tax program and to seek a more regional approach to the issue, offering conversation, coordination, and predictability for all parties.

### Examples

Examples illustrate various ways development and sometimes jobs themselves are regulated, in some cases for the purpose of capping the rate of growth while in others, a fee is levied to fund infrastructure needs or affordable housing related to expected growth.

- San Francisco also has a Jobs-Housing Linkage fee which applies to nonresidential development of over 25,000 square feet. A square footage fee is assessed on these developments, which is for the purpose of creating affordable housing. The developer

may contribute the sum (or land of equivalent value) to housing developers for the purpose of building affordable units, pay an in-lieu fee to the city or combine the two. All fees paid to the city are deposited in the Citywide Affordable Housing Fund.<sup>181</sup>

- The City of San Francisco has an **Office Development Annual Limit Program** that places annual quotas on office space annually to "ensure a manageable rate of new development and to guard against typical 'boom and bust' cycles, among other goals."<sup>182</sup> Some 950,000 square feet is available for permitting annually, with banking of any unpermitted space carried over to the next year, and 75,000 reserved annually for projects of 50,000 square feet, or less. The city currently has a negative balance of pending large projects by several million square feet, and a positive balance for projects of 50,000 square feet or smaller.
- The Palo Alto City Council, in the face of citizen opposition to growth, voted to reduce the existing office cap of 1.7 million square feet per year to 850,000 square feet annually. The cap would apply to construction through 2030.<sup>183</sup>
- Voters in Mountain View in 2018 passed a "head tax" with a sliding scale in relation to the size of a company in terms of employees. The revenue is slated to be used for predominantly transportation projects, with a small portion for housing development.<sup>184</sup>

### Potential Impact

Measures as varied as those described here can have a variety of impacts on the rate at which jobs grow and on the jobs/housing balance. If applied in a scattered way, one city's loss of development may be another city's gain, leading to regulatory arbitrage. A more coordinated approach is preferable to a piecemeal one. Careful analysis would be needed to limit both commercial rent inflation, which could shift the types of businesses that locate where the caps exist. The strong market for San Francisco's limited office space, for example, presents challenges for lower margin businesses and can lead to displacement of those businesses to lower rent parts of the city or out of the city entirely.

Fees imposed on new square footage begin to address the marginal costs of a new square foot of space, but this fee is an indirect tax on the employer. A head tax or gross receipts tax is a much more direct tax on employers, but

has the disadvantage that it taxes jobs even as automation itself may be a reflection of the tax system favoring investments in capital over labor. Depending on the specific approach taken, transportation impacts may be favorable or the opposite if jobs on the margins are moved from low- to high- vehicles miles traveled (VMT) locations.

### Primary Guiding Principles

The effects of this approach on Horizon Guiding Principles would depend on how it was applied. If revenues collected are invested in affordable housing and homeless programs, it would address the **AFFORDABLE** Principle, but at the risk of reducing **DIVERSE** businesses. If the program succeeds in slowing growth and congestion, it could address **HEALTHY** and **CONNECTED** goals.

## STRATEGY L4 : Employment Incentives in Transit-Rich Areas

### Overview

The Plan Bay Area Priority Development Area (PDA) program<sup>185</sup> encourages densifying housing and mixed-use development close to transit, offering support for planning and some transit-related funding for improvements. The One Bay Area Grant (OBAG) program<sup>186</sup> awards project funding in PDAs with a preference to cities and counties that have approved new housing construction and are planning for the amount of housing allocated through the state/regional Regional Housing Need Allocation. The emphasis on housing is consistent with the concern that the price of housing and lack of supply close to job centers is increasing VMT, as households move outward to find affordable housing. Yet a study by the Public Policy Institute of California in 2011 pointed out that the concentration of jobs near transit is an important factor in encouraging transit ridership, concluding that "strategies to encourage density in California must focus at least as much on employment density as on residential density."<sup>187</sup>

The proposed program would integrate employment densification incentives into the PDA program, with an emphasis on locations close to transit that currently have very low-employment densities or where

employment transitions may otherwise lead to reductions in the number of jobs near transit.

### Examples

- The Puget Sound Regional Council evaluated different approaches to land use around transit in "Transit-Supportive Densities and Land Uses."<sup>188</sup> They identified a threshold of 100,000 jobs to make light rail an effective transportation hub. They also conclude that "Transit-supportive residential and mixed-use neighborhoods are important, but not sufficient to provide the high ridership for the transit system" and propose a guiding principle to promote employment growth at station areas in transit corridors.
- The Transportation Policy Plan of the Twin Cities Metropolitan Council includes Centers of Activity where the plan sets policies on activity levels in areas along transitways. They have identified a density of 7000 people, jobs and students within a half-mile to make the transit investment cost-effective.<sup>189</sup>
- A Brookings briefing paper, "Where the Jobs Are: Employer Access to Labor by Transit," identifies the percent of jobs close to transit in metropolitan areas across the country, finding particularly high rates already in the San Francisco and San Jose areas, although coverage is higher in central cities than in suburbs. Yet the typical job is accessible to a much smaller share of the labor force, particularly in suburban areas (in the suburban San Francisco-Oakland region, jobs are accessible to only 21 percent of residents). The study points to increasing jobs and transit in more suburban locations in order to increase access of employers to workers and access of workers to jobs.
- Tysons Corner, Fairfax County, Virginia, is an example of a suburban location where transit investments, city and county planning efforts, and participation of major developers are creating a suburban transit-oriented urban center that includes substantial job-related investment.<sup>190</sup> The plan built on the anticipation of four new Metro stations in Tysons in 2014, while jobs are projected to outpace population growth in both the county and Tysons Corner.<sup>191</sup>

## Potential Impact

The proximity of jobs to transit is likely to increase the use of public transit for commuting and to consequently reduce vehicle miles traveled. The strategy could also be used to encourage the concentration of employment in some suburban areas closer to housing. The plan is most likely to succeed if transit providers, regional and local planners, and developers work together to target areas where achieving cost-effective levels of density are feasible. It would be essential to carefully evaluate the level of demand that could be generated by employers for the site and accessibility to the range of employees sought by potential employers. In addition, a number of studies have shown that automobile access improves the ability of low-income households to find employment.<sup>192</sup> This approach should be coordinated with a broader set of programs to increase accessibility for lower income households.

## Primary Guiding Principles

This strategy is primarily oriented to Horizon's **CONNECTED** and **HEALTHY** Principles, improving transit access to jobs by increasing job density and thus reducing VMT. It will be more effective for principles beyond these two if program development addresses the potential for using a range of travel modes to improve opportunities for lower income households as well as employer access to lower- and middle-wage workers.

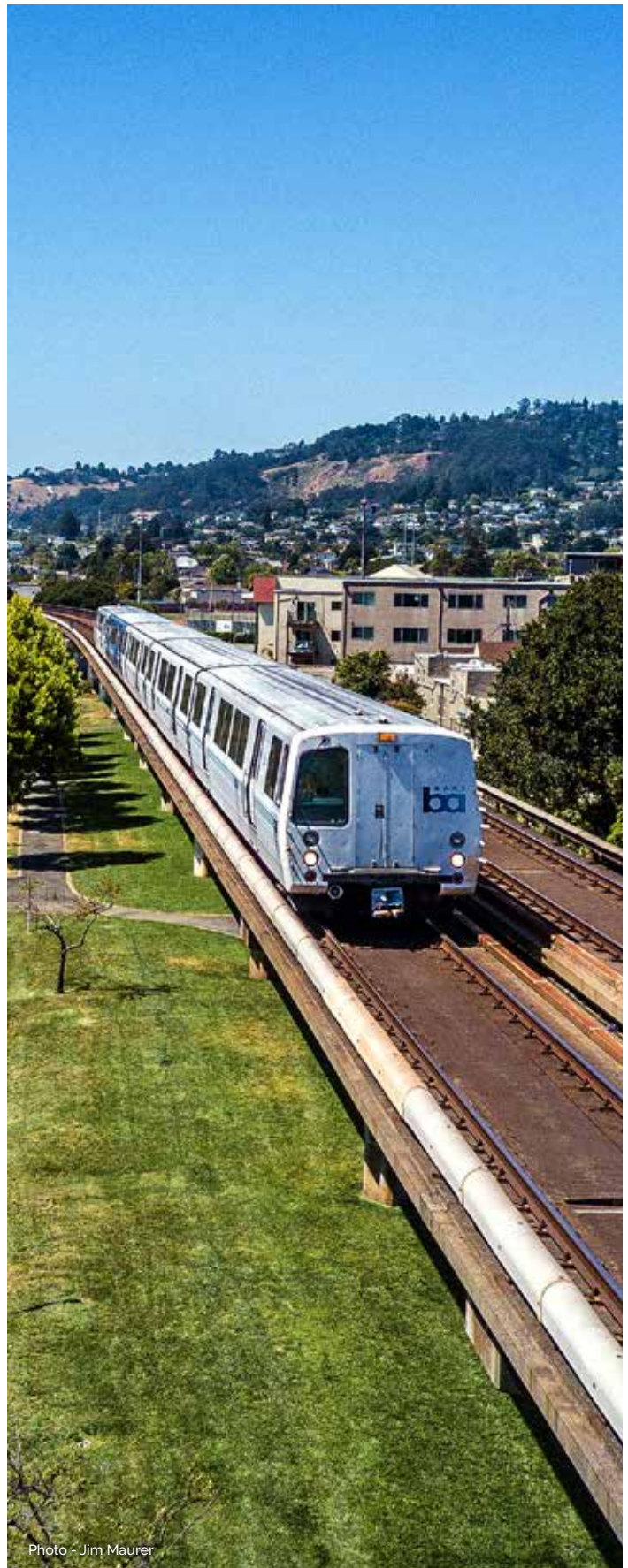


Photo - Jim Maurer



## THE PATH FORWARD

The Bay Area economy has been the envy of many regions because of its innovative capacities for regenerating itself as economic cycles have come and gone and left many other regions with considerable challenges as their economies transition. The Bay Area is a large, diverse and complex region spanning a large geographic area, with subregions with distinctly different local economies within the larger whole. The many different communities in the region are positioned differently and will face the challenges of the future differently. The big question is, how do we as a region embrace innovation and even automation of tedious tasks, but support the region's labor markets and communities during transitions—some fast, some probably slow and almost not noticeable? Automation

has extraordinary potential if we can harness it for the betterment of the people, but it requires a more proactive labor market policy than we have been used to seeing, at a time when the organizational structure has shown significant splintering.

The next step of the Horizon process, Futures, will test the strategies introduced in this and other Perspective Papers against a variety of potential political, technological, economic and environmental challenges that would impact the lives of Bay Area residents. MTC and ABAG are currently working with stakeholders and the public to prioritize these strategies for further evaluation in the long-range planning process. Ultimately, it will require the coordinated effort of many stakeholders to ensure the Bay Area remains a great place to live in the future—both in booms and busts.

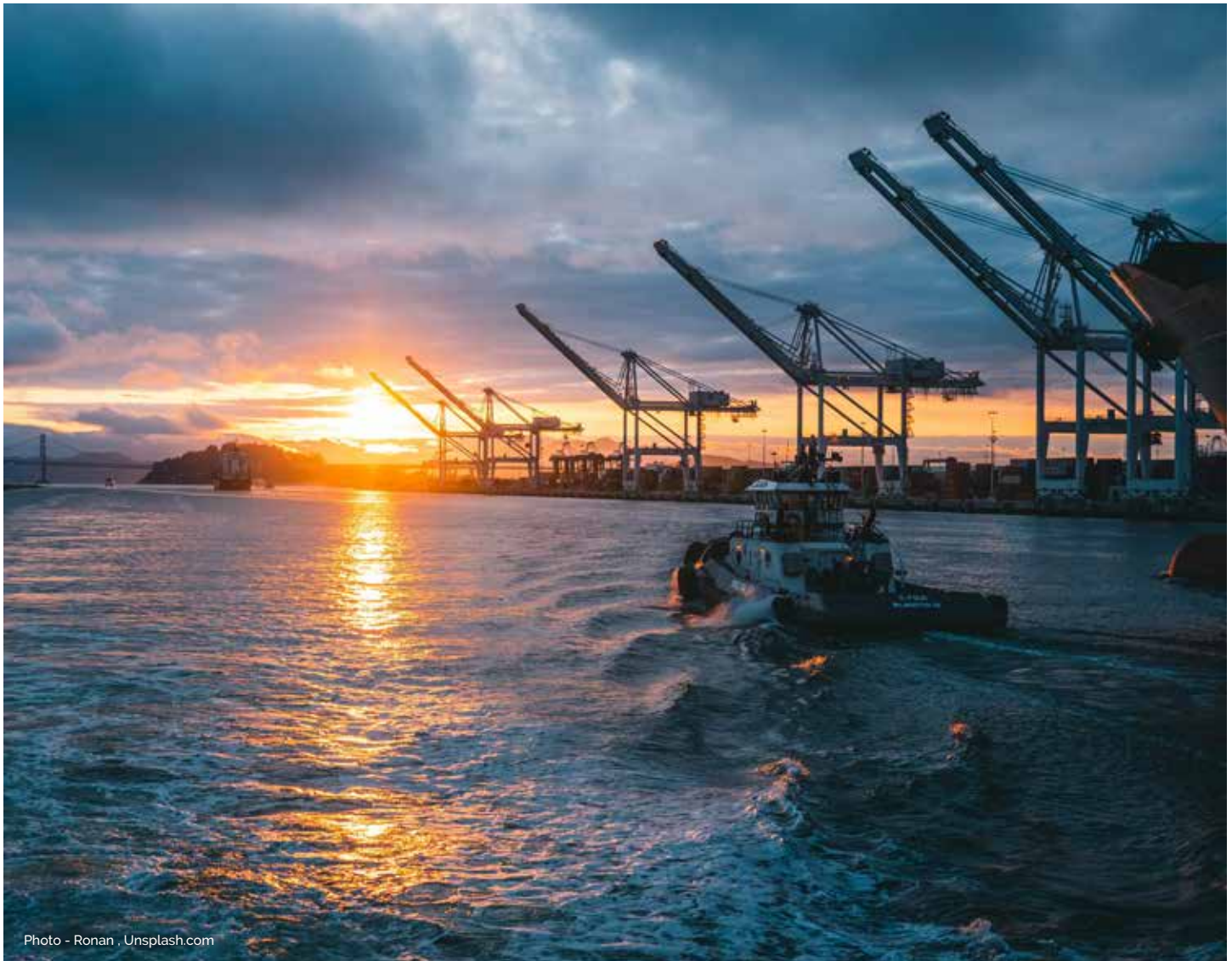


Photo - Ronan , Unsplash.com

## ENDNOTES

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- 1 ManpowerGroup, 2018 Talent Shortage Survey (Milwaukee, WI: ManpowerGroup, 2018) <[https://go.manpowergroup.com/hubfs/TalentShortage 2018 \(Global\) Assets/PDFs/MG\\_TalentShortage2018\\_lo 6\\_25\\_18\\_FINAL.pdf?t=1539619732255](https://go.manpowergroup.com/hubfs/TalentShortage%2018%20(Global)%20Assets/PDFs/MG_TalentShortage2018_lo%206_25_18_FINAL.pdf?t=1539619732255)>.

---

- 2 Barclays, *Global Autos & Auto Parts: Industrie 4.0 Vs. Tesla's 'Lights Out'?*, April 2018.

---

- 3 David H. Autor, 'Why Are There Still So Many Jobs? The History and Future of Workplace Automation', *Journal of Economic Perspectives*, 29.3 (2015), 3-30 <<https://doi.org/10.1257/jep.29.3.3>>.

---

- 4 Job titles from <https://www.techrepublic.com/article/21-weird-tech-job-titles-of-the-future/>

---

- 5 AnnaLee Saxenian, *Regional Advantage : Culture and Competition in Silicon Valley and Route 128* (Cambridge Mass.: Harvard University Press, 1994).

---

- 6 Per data from BLS QCEW.

---

- 7 Bay Area Council Economic Institute, *Reinventing Manufacturing: How the Transformation of Manufacturing Is Creating New Opportunity for California* (San Francisco, CA: Bay Area Council Economic Institute, April 2016).

---

- 8 Leena Rao, 'From Its Beginnings In A Denmark Loft, Zendesk's Steady Rise To The Top Of The Helpdesk Heap', 2013 <<https://techcrunch.com/2013/11/16/from-its-beginnings-in-a-denmark-loft-zendesks-steady-rise-to-the-top-of-the-helpdesk-heap/>> [accessed 25 February 2019].

---

- 9 Bay Area Council Economic Institute.

---

- 10 Emily Badger, 'San Francisco Restaurants Can't Afford Waiters. So They're Putting Diners to Work', *New York Times*, 25 June 2018 <<https://www.nytimes.com/2018/06/25/dining/san-francisco-restaurants-service.html>> [accessed 4 March 2019].

---

- 11 The Economist, 'Why Startups Are Leaving Silicon Valley', *The Economist*, 30 August 2018 <<https://www.economist.com/leaders/2018/08/30/why-startups-are-leaving-silicon-valley>> [accessed 2 September 2018].

---

- 12 Kai-Fu Lee, *AI Superpowers: China, Silicon Valley, and the New World Order* (Boston, MA: Houghton Mifflin Harcourt, 2018) <<https://books.google.com/books?id=KdVHDwAAQBAJ>>.

---

- 13 EMC Research, The 2017 Bay Area Council Poll - Resident Exodus Release (San Francisco, CA, 2017) <<http://documents.bayareacouncil.org/bacp17exoduspoll.pdf>>.

---

- 14 A location quotient is the ratio of industry share of total economic activity (usually measured by jobs) in a local area to the industry share of total activity in the larger reference economy. A location quotient of 1 means the share of jobs in a given sector is the same for the local area and the reference area, in this case the United States. For example, a sector would have a location quotient of 1 if the sector comprises 10 percent of regional jobs, and also 10 percent of U.S. jobs. If it had twice the share of the national concentration, it would have a location quotient of 2.

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- 15 That the growth rate is fairly modest is because the sector includes telecommunications services which has lost jobs.

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- 16 Tech sector definitions at the six digit level obtained from US Census Bureau's Census Explorer, [https://www.census.gov/censusexplorer/naics\\_codes\\_used.xls](https://www.census.gov/censusexplorer/naics_codes_used.xls)

- 17 It is probable that some of the shift could also be a classification artifact, as some tech firms have transitioned from manufacturing more to design and prototyping, with a globally distributed supply chain.
- 
- 18 ManpowerGroup.
- 
- 19 Mean wages tend to be higher than median wages and are more subject to distortions due to high-wages at the top.
- 
- 20 IBM CEO Ginni Rometty, quoted in World Economic Forum, 'Future of work: 5 top insights from Davos experts', <https://www.weforum.org/agenda/2019/01/future-of-work-tk-top-trends-from-davos/> [accessed 29 January 2019], Pontefract, D. (2019, April 6). See also IBM's Artificial Intelligence Strategy Is Fantastic, But AI Also Cut 30% Of Its HR Workforce. Forbes. Retrieved from <https://www.forbes.com/sites/danpontefract/2019/04/06/ibms-artificial-intelligence-strategy-is-fantastic-but-ai-also-cut-30-of-its-hr-workforce/%2350b43ac1126a>
- 
- 21 Kevin Baker, 'The Future of Work, a History', Politico Magazine, February 2018.
- 
- 22 Lee.
- 
- 23 World Robotics 2018 Industrial Robots (International Federation of Robotics, 2018) <[https://ifr.org/downloads/press2018/Executive\\_Summary\\_WR\\_2018\\_Industrial\\_Robots.pdf](https://ifr.org/downloads/press2018/Executive_Summary_WR_2018_Industrial_Robots.pdf)>.
- 
- 24 *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies* (New York, NY: W.W. Norton & Co, 2014).
- 
- 25 Lawrence Mishel and Josh Bivens, *The Zombie Robot Argument Lurches On* (Washington, D.C., May 2017) <<https://www.epi.org/files/pdf/126750.pdf>>.
- 
- 26 Domonoske, C. (2019, April 30). *Even In The Robot Age, Manufacturers Need The Human Touch*. Retrieved from <https://www.npr.org/2019/04/30/717233058/even-in-the-robot-age-manufacturers-need-the-human-touch>
- 
- 27 "The Tax Cuts and Jobs Act of 2017 was criticized for encouraging more robots but not necessarily the investment in workers and job creation. Daron Acemoglu, a labor economist at MIT, referring to the differential treatment of investments in labor and capital, said that "the problem is when you subsidize heavily the adoption of machines instead of people" it amounts to putting the thumb on the scale towards further automation." See Arnold, C. (2017, December 17). Tax Bill Favors Adding Robots Over Workers, Critics Say. Retrieved from <https://www.npr.org/2017/12/08/569118310/tax-bill-favors-adding-robots-over-workers-critics-say>
- 
- 28 James Manyika, Michael Chui, and others, *A Future That Works: Automation, Employment, and Productivity* (McKinsey Global Institute, 2017).
- 
- 29 Mark Muro and others, *Digitalization and the American Workforce* (Washington, D.C.: Brookings Institution, 2017).
- 
- 30 David Rotman, 'How Technology Is Destroying Jobs', MIT Technology Review, 116.4 (2013).
- 
- 31 Yuval Noah Harari, 'The Rise of the Useless Class', Ideas.Ted.Com, 24 February 2017 <<https://ideas.ted.com/the-rise-of-the-useless-class/>>.
- 
- 32 Frank Levy and Richard J. Murnane, *The New Division of Labor: How Computers Are Creating the Next Job Market* (New York, NY & Princeton, NJ: Russel Sage Foundation & Princeton University Press, 2012) <[https://books.google.com/books?id=PRhCNqnyX\\_8C](https://books.google.com/books?id=PRhCNqnyX_8C)>.
-

- 33 David Beede, Regina Powers, and Cassandra Ingram, *The Employment Impact of Autonomous Vehicles* (Washington, D.C.: U.S. Department of Commerce, Economics and Statistics Administration, August 2017) <[https://www.commerce.gov/sites/commerce.gov/files/migrated/reports/Employment\\_Impact\\_Autonomous\\_Vehicles\\_0.pdf](https://www.commerce.gov/sites/commerce.gov/files/migrated/reports/Employment_Impact_Autonomous_Vehicles_0.pdf)> [accessed 8 June 2018].
- 
- 34 Data tabulated from Bureau of Labor Statistics Occupational Employment Survey, MSA level data.
- 
- 35 See <https://www.lawgeex.com/AlvsLawyer/>
- 
- 36 Fei Jiang and others, 'Artificial Intelligence in Healthcare: Past, Present and Future', *Stroke and Vascular Neurology*, 2.4 (2017), 230–43 <<https://doi.org/10.1136/svn-2017-000101>>.
- 
- 37 Metz, C. (2019, February 5). *Making New Drugs With a Dose of Artificial Intelligence*. New York Times, p. B1. Retrieved from <https://www.nytimes.com/2019/02/05/technology/artificial-intelligence-drug-research-deepmind.html>
- 
- 38 David H. Autor, F. Levy, and Richard J. Murnane, 'The Skill Content of Recent Technological Change: An Empirical Exploration', *The Quarterly Journal of Economics*, 118.4 (2003), 1279–1333 <<https://doi.org/10.1162/003355303322552801>>.
- 
- 39 Autor, D. H., Levy, F., & Murnane, R. J. (2003). "The Skill Content of Recent Technological Change: An Empirical Exploration." *The Quarterly Journal of Economics*, 118(4), 1279–1333. <https://doi.org/10.1162/003355303322552801>
- 
- 40 *The Fourth Industrial Revolution* (New York, NY: Crown Business, 2017) <<https://books.google.com/books?id=GVEkDQAAQBAJ>>.
- 
- 41 'The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market', *American Economic Review*, 103.5 (2013), 1553–97 <<https://doi.org/10.1257/aer.103.5.1553>>.
- 
- 42 Per BLS OES data for the main MSAs in the Bay Area.
- 
- 43 Sergio P Firpo, Nicole M. Fortin, and Thomas Lemieux, *Occupational Tasks and Changes in the Wage Structure*, February 2011 <<http://ftp.iza.org/dp5542.pdf>>.
- 
- 44 Carl Benedikt Frey and Michael A. Osborne, 'The Future of Employment: How Susceptible Are Jobs to Computerisation?', *Technological Forecasting and Social Change*, 114 (2017), 254–80 <<https://doi.org/10.1016/j.techfore.2016.08.019>>.
- 
- 45 Melanie Arntz, Terry Gregory, and Ulrich Zierahn, 'Revisiting the Risk of Automation', *Economics Letters*, 159 (2017), 157–60 <<https://doi.org/10.1016/j.econlet.2017.07.001>>.
- 
- 46 Erik Brynjolfsson, Xiang Hui, and Meng Liu, 'Artificial Intelligence Can Transform the Economy', *Washington Post*, 18 September 2018 <[https://www.washingtonpost.com/opinions/artificial-intelligence-can-transform-the-economy/2018/09/18/50c9c9c8-bab8-11e8-bdc0-90f81cc58c5d\\_story.html?utm\\_term=.6e98580e4fa4](https://www.washingtonpost.com/opinions/artificial-intelligence-can-transform-the-economy/2018/09/18/50c9c9c8-bab8-11e8-bdc0-90f81cc58c5d_story.html?utm_term=.6e98580e4fa4)> [accessed 13 March 2019].
- 
- 47 (2017)
- 
- 48 We match this with ACS PUMS data on Standard Occupational Classification codes, pooling three years from 2014–2016 to get a sufficient sample. Where the PUMS occupational coding is too broad (ending with 'XXX') we collapse occupational risk at the three digit level and assign to the person record.
-

- 49 Public Use Microdata Areas (PUMAs) are census-designated statistical geographic areas of around 100,000 people. The nine-county Bay Area is divided into 55 PUMAs.
- 
- 50 Thomas Bock, *The Future of Construction Automation: Technological Disruption and the Upcoming Ubiquity of Robotics*, *Automation in Construction*, 59 (2015), 113–21 <<https://doi.org/10.1016/j.autcon.2015.07.022>>.
- 
- 51 ManpowerGroup.
- 
- 52 Mark Muro, Robert Maxim, and Jacob Whiton, *Automation and Artificial Intelligence: How Machines Are Affecting People and Places* (Washington, D.C.: Brookings Institution, January 2019) <<https://www.brookings.edu/research/automation-and-artificial-intelligence-how-machines-affect-people-and-places/>>.
- 
- 53 U.S. Government Accountability Office, *Contingent Workforce* (Washington, D.C.: US Government Accountability Office, 20 April 2015).
- 
- 54 The Department of Labor gives an overview of key laws concerning worker protections enforced by the agency <https://www.dol.gov/general/aboutdol/majorlaws>
- 
- 55 Jim Stanford, *The Resurgence of Gig Work: Historical and Theoretical Perspectives*, *Economic and Labour Relations Review*, 28.3 (2017), 382–401 <<https://doi.org/10.1177/1035304617724303>>.
- 
- 56 Calculated from Current Population Survey ASEC, 1962–2018, via IPUMS-USA, University of Minnesota, [www.ipums.org](http://www.ipums.org).
- 
- 57 David Weil, *The Fissured Workplace: Why Work Became So Bad for So Many and What Can Be Done to Improve It* (Cambridge, MA and London, UK: Harvard University Press, 2014).
- 
- 58 Paul Oyer, *The Independent Workforce in America*, 2018 <[https://s3-us-west-1.amazonaws.com/adquiro-content-prod/documents/paul\\_oyer\\_the\\_independent\\_workforce\\_in\\_america.pdf](https://s3-us-west-1.amazonaws.com/adquiro-content-prod/documents/paul_oyer_the_independent_workforce_in_america.pdf)>.
- 
- 59 Ellen Sheng, *“Silicon Valley’s Dirty Secret: Using a Shadow Workforce of Contract Employees to Drive Profits”*, October 2018.
- 
- 60 These data were tabulated from BLS data at the state level from the Occupational Employment Survey. See OES Research Estimates by State and Industry, retrieved from [https://www.bls.gov/oes/current/oes\\_research\\_estimates.htm](https://www.bls.gov/oes/current/oes_research_estimates.htm)
- 
- 61 Bureau of Labor Statistics. (2019). Table 9. Healthcare benefits: Access, participation, and take-up rates, private industry workers, March 2017. Retrieved January 30, 2019, from <https://www.bls.gov/ncs/ebs/benefits/2017/ownership/private/table09a.htm>
- 
- 62 Stanford.
- 
- 63 Annette Bernhardt and Sarah Thomason, *What Do We Know About Gig Work in California? An Analysis of Independent Contracting* (UC Berkeley Center for Labor Research and Education, June 2017) <<http://laborcenter.berkeley.edu/what-do-we-know-about-gig-work-in-california/>>.
- 
- 64 Bureau of Labor Statistics. (2018). Table 4. Median years of tenure with current employer for employed wage and salary workers 25 years and over by educational attainment, sex, and age, January 2018. Retrieved December 13, 2018, from <https://www.bls.gov/news.release/tenure.t04.htm>
- 
- 65 Gina Neff, *Venture Labor: Work and the Burden of Risk in Innovative Industries, Acting with Technology* (Cambridge, MA and London, UK: The MIT Press, 2012) <<https://doi.org/10.7551/mitpress/9780262017480.001.0001>>; Alex Rosenblat, *Uberland: How Algorithms Are Rewriting the Rules of Work* (Oakland, CA: University of California Press, 2018) <<https://books.google.com/books?id=zxJtDwAAQBAJ>>.
-

- 66 A common distinction is between labor platforms, where giggers share their work, and capital platforms, where they share their assets (such as a home or vehicle), with requirements set by the platform for the vintage of vehicles allowed on the platform Rosenblat.
- 
- 67 See <https://www.theverge.com/2013/5/23/4352116/taskrabbit-temp-agency-gig-economy>
- 
- 68 US Government Accountability Office.
- 
- 69 Eli Dourado and Koopman Christopher, *Evaluating the Growth of the 1099 Workforce*, 2015.
- 
- 70 Katharine Abraham and others, *Exploring Differences in Employment between Household and Establishment Data* (Cambridge, MA, March 2009) <<https://doi.org/10.3386/w14805>>.
- 
- 71 They recently revised the number, and conclusion downwards, acknowledging overestimating the count and growth. See <https://www.theatlantic.com/ideas/archive/2019/01/gig-economy-isnt-really-taking-over/580180/>
- 
- 72 Gerald Friedman, 'Workers without Employers: Shadow Corporations and the Rise of the Gig Economy', *Review of Keynesian Economics*, 2.2 (2014), 171–88 <<https://doi.org/10.4337/roke.2014.02.03>>.
- 
- 73 Rosenblat.
- 
- 74 Rosenblat.
- 
- 75 *From Federal Worker to Uber Driver: Odd Jobs to Make Ends Meet in the Shutdown*, <https://www.nytimes.com/2019/01/22/us/government-shutdown-moonlighting-uber.html>
- 
- 76 Aaron Smith, *Gig Work, Online Selling and Home Sharing* (Washington, D.C.: Pew Research Center, 2016).
- 
- 77 Bernhardt and Thomason.
- 
- 78 Diana Farrell, Fiona Greig, and Amar Hamoudi, *The Online Platform Economy in 2018: Drivers, Workers, Sellers, and Lessors* (Washington, D.C.: JPMorgan Chase Institute, September 2018).
- 
- 79 While suggestive, these data shouldn't be taken as an indication of full-time drivers, merely that they have at least \$1,000 revenue from doing so, and that they reported it to the IRS. Also of note, these data are by place of residence; the actual number of drivers in the region may be larger as some drivers come from outside the Bay Area.
- 
- 80 Karen Kosanovich, 'A Look At Contingent Workers', BLS Spotlight on Statistics, 2018.
- 
- 81 Miranda Dietz, *Temporary Workers in California Are Twice as Likely as Non-Temps to Live in Poverty: Problems with Temporary and Subcontracted Work in California* (UC Berkeley Center for Labor Research and Education, August 2012) <[http://laborcenter.berkeley.edu/pdf/2012/temp\\_workers.pdf](http://laborcenter.berkeley.edu/pdf/2012/temp_workers.pdf)>.
- 
- 82 Kosanovich.
- 
- 83 Bernhardt and Thomason.
- 
- 84 Kosanovich.
- 
- 85 James Manyika, Susan Lund, Jacques Bughin, and others, *Independent Work: Choice, Necessity, and the Gig Economy* (San Francisco, CA: McKinsey Global Institute, October 2016).
- 
- 86 Kosanovich.
- 
- 87 Oyer.
- 
- 88 Dietz.
-

- 89 David Rolf, Shelby Clark, and Corrie Watterson Bryant, *Portable Benefits in the 21st Century: Shaping a New System of Benefits for Independent Workers* (Washington, D.C.: Aspen Institute, 2016) <[https://assets.aspeninstitute.org/content/uploads/files/content/upload/Portable\\_Benefits\\_final2.pdf](https://assets.aspeninstitute.org/content/uploads/files/content/upload/Portable_Benefits_final2.pdf)>
- 
- 90 Frey and Osborne.
- 
- 91 Steven Ruggles and others, IPUMS USA: Version 8.0 [Dataset] (Minneapolis, MN, 2018) <<https://doi.org/10.18128/D010.V8.0>>.
- 
- 92 Shrimali, B. P., DuMez, J., & Abbi, S. (2019). *At What Cost? Student Loan Debt in the Bay Area*. Retrieved from <https://www.frbsf.org/community-development/publications/community-development-research-briefs/2019/april/student-loan-debt-in-the-bay-area/>
- 
- 93 Frey and Osborne.
- 
- 94 Enrico Moretti, 'Does New York Still Have a Future in Tech?', *New York Times*, February 2019.
- 
- 95 Richard Florida, "The Economic Geography of Talent," *Annals of the Association of American Geographers*, 92 (4: 743-755).
- 
- 96 The Economist.
- 
- 97 David E. Dowall, 'Back Offices and San Francisco's Office Development Growth Cap', *Cities*, 4.2 (1987), 119-27 <[https://doi.org/10.1016/0264-2751\(87\)90065-5](https://doi.org/10.1016/0264-2751(87)90065-5)>.
- 
- 98 Cynthia A. Kroll, 'Suburban Office Markets and Regional Employment Growth: The San Francisco Bay Area's 680 Corridor', *Berkeley Planning Journal*, 1.1 (1984), 122-30 <<http://escholarship.org/uc/item/9zh3r6ck.pdf>> [accessed 12 December 2012].
- 
- 99 Robert Cervero and K-L Wu, 'Polycentrism, Commuting, and Residential Location in the San Francisco Bay Area', *Environment and Planning A*, 29.5 (1997), 865-86 <<https://doi.org/10.1068/a290865>>.
- 
- 100 R Florida and P Adler, "The Patchwork Metropolis: The Morphology of the Postindustrial Divided City," *Journal of Urban Affairs*, 40 (5: 609-624)
- 
- 101 Elizabeth Kneebone, *Job Sprawl Revisited: The Changing Geography of Metropolitan Employment*, Metro Economy Series (Washington, D.C.: Brookings Institution, 2009).
- 
- 102 Elizabeth Kneebone, *Job Sprawl Stalls: The Great Recession and Metropolitan Employment Location*, Metropolitan Opportunity Series (Washington, D.C.: Brookings Institution, 2013).
- 
- 103 Bruce Katz and Julie Wagner, *The Rise of Innovation Districts: A New Geography of Innovation in America* (Washington, D.C., May 2014) <<http://www.brookings.edu/~media/Programs/metro/Images/Innovation/InnovationDistricts1.pdf>>.
- 
- 104 A. B. Jaffe, M. Trajtenberg, and R. Henderson, 'Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations', *The Quarterly Journal of Economics*, 108.3 (1993), 577-98 <<https://doi.org/10.2307/2118401>>; Saxenian; Michael Storper and Anthony J. Venables, 'Buzz: Face-to-Face Contact and the Urban Economy', *Journal of Economic Geography*, 4.4 (2004), 351-70 <<https://doi.org/10.1093/jnlecg/lbh027>>.
- 
- 105 Gilles Duranton and Diego Puga, 'The Growth of Cities', ed. by Philippe Aghion and Steven N. Durlauf, *Handbook of Economic Growth*, 2 (2014), 781-853 <<https://doi.org/10.1016/B978-0-444-53540-5.00005-7>>.
-

- 106 Enrico Moretti, 'Does New York Still Have a Future in Tech?', New York Times, 20 February 2019 <<https://www.nytimes.com/2019/02/20/opinion/amazon-hq2-new-york.html>> [accessed 20 February 2019].
- 
- 107 Natalie Engels, Kristin Quiroz Bayona, and Lexi Harmon, 'Tech Trends of 2016: Campus Coworking', GenslerOnWork, 2016 <<http://www.gensleron.com/work/2016/10/3/tech-trends-of-2016-campus-coworking.html>> [accessed 15 February 2019].
- 
- 108 Ashok Deo Bardhan and Cynthia A. Kroll, *Services Export Opportunities for California—A Preliminary Assessment*, November 2006 <<https://escholarship.org/content/qt31hgk79j/qt31hgk79j.pdf>>.
- 
- 109 Phil Shapira, "The Crumbling of Smokestack California," Institute of Urban and Regional Development Working Papers, University of California Berkeley, 1984
- 
- 110 Gillam Campbell and Rich Thompson, *Urban Logistics: Multistory Warehouses*, 2019 <<https://www.us.jll.com/content/dam/jll-com/documents/pdf/research/americas/us/am-research-urban-logistics.pdf>> [accessed 11 April 2019].
- 
- 111 Personal interview, architecture firm, San Francisco 2019
- 
- 112 Stephane Kasriel, 'Cities Are Killing The Future Of Work (And The American Dream)', 2018 <<https://www.fastcompany.com/40517126/cities-are-killing-the-future-of-work-and-the-american-dream>> [accessed 15 February 2019].
- 
- 113 Based on analysis of data from CoStar.
- 
- 114 Calculated using real estate data from CoStar and employment data from Bureau of Labor Statistics, Quarterly Census of Employment and Wages.
- 
- 115 Carine Camors and Alexandre Blein, *The Booming Development of Third Places in Paris Region* (Paris, FR: Paris Region Development and Urban Planning Institute, December 2017).
- 
- 116 Gensler, 2019 U.S. Workplace Survey (San Francisco, CA: Gensler, March 2019).
- 
- 117 Elaine Rossall, Hayley Armstrong, and Christopher Dunn, *Coworking 2018: The Flexible Workplace Evolves* (Cushman & Wakefield, 2018).
- 
- 118 Jones Lang LaSalle, *Coworking's unstoppable market growth*. <https://www.us.jll.com/en/coworking-market-growth>
- 
- 119 Janice Bitters, "Coworking is growing to fill the Bay Area's 'missing middle' for office space — but will it last?" Silicon Valley Business Journal, January 24, 2019, <https://www.bizjournals.com/sanjose/news/2019/01/24/coworking-bay-area-wework-office-space.html>
- 
- 120 Hamanaka, K. (2017, June 6). Sunset Development Looks to Create Downtown for San Ramon. <https://www.bishopranch.com/media-coverage/sunset-development-looks-create-downtown-san-ramon/>
- 
- 121 Kasriel.
- 
- 122 Metropolitan Transportation Commission, Association of Bay Area Governments, and ICF, *Toward a Shared Future: Strategies to Manage Travel Demand* (San Francisco, CA: Metropolitan Transportation Commission, September 2018).
- 
- 123 Ethan Baron, 'Three California Cities OK New Taxes on Tech Firms — Will Others Follow?', Seattle Times, 11 November 2018 <<https://www.seattletimes.com/business/three-california-cities-ok-new-taxes-on-tech-firms-will-others-follow/>>.
-



- 124 Jed D Kolko, *Making the Most of Transit: Density, Employment Growth, and Ridership around New Stations* (San Francisco, CA: Public Policy Institute of California, 2011); Gary Barnes, 'The Importance of Trip Destination in Determining Transit Share', *Journal of Public Transportation*, 8.2 (2005), 1–15.
- 
- 125 Creating an Innovative Mix: What We Can Learn from San Francisco (Issue brief). (2016). New York City, NY: Pratt Center for Community Development., from [https://prattcenter.net/sites/default/files/25\\_kent\\_policy\\_brief\\_final\\_0.pdf](https://prattcenter.net/sites/default/files/25_kent_policy_brief_final_0.pdf)
- 
- 126 Envision San Jose 2040 General Plan. (2011). San Jose, CA: City of San Jose, from <http://www.sanjoseca.gov/DocumentCenter/View/474>
- 
- 127 San Leandro General Plan, Land Use. (2015). San Leandro, CA: City of San Leandro, from <https://www.sanleandro.org/civicax/filebank/blobdload.aspx?blobid=26481>
- 
- 128 James Manyika, Susan Lund, Michael Chui, and others, *Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation* (McKinsey Global Institute, December 2017).
- 
- 129 Manyika, Lund, Chui, and others.
- 
- 130 Block, S. (2018, November 21). Skillful Colorado Announces Skillful West End Project; Pilot Program Seeks to Upskill Rural Talent to Meet Local Business Needs, from <http://skillful.com/blog/skillful-colorado-announces-skillful-west-end-project-pilot-program-seeks-upskill-rural-talent>
- 
- 131 Online Courses & Credentials by Top Educators. Join for Free, from <https://www.coursera.org/>
- 
- 132 Manyika, Lund, Chui, and others.
- 
- 133 Muhlhausen, D. (2017, March 4). So far, federal job-training programs have been outright failures. The Hill. Retrieved from <https://thehill.com/blogs/pundits-blog/economy-budget/323885-thus-far-federal-job-training-programs-have-been-an>
- 
- 134 Manyika, Lund, Chui, and others.
- 
- 135 Engbom, N., Detragiache, E., & Raeli, F. (2015). The German Labor Market Reforms and Post-Unemployment Earnings (Working paper). International Monetary Fund, from <https://www.imf.org/external/pubs/ft/wp/2015/wp15162.pdf>
- 
- 136 Bernick, M. (2018, February 21). Coursera's Bet On The Upskilling Of American Workers. Forbes, from <https://www.forbes.com/sites/michaelbernick/2018/02/21/courseras-bet-on-the-upskilling-of-american-workers/#4072799d5eb2>
- 
- 137 Manyika, Lund, Chui, and others.
- 
- 138 The Aspen Institute, Lifelong Learning and Training Accounts: Helping Workers Adapt and Succeed in a Changing Economy (Washington, DC, May 2018) <<https://assets.aspeninstitute.org/content/uploads/2018/05/Lifelong-Learning-and-Training-Accounts-Issue-Brief.pdf>>.
- 
- 139 The Aspen Institute, Lifelong Learning and Training Accounts: Helping Workers Adapt and Succeed in a Changing Economy (Washington, DC, May 2018) <<https://assets.aspeninstitute.org/content/uploads/2018/05/Lifelong-Learning-and-Training-Accounts-Issue-Brief.pdf>>.
- 
- 140 The Aspen Institute, Lifelong Learning and Training Accounts: Helping Workers Adapt and Succeed in a Changing Economy (Washington, DC, May 2018) <<https://assets.aspeninstitute.org/content/uploads/2018/05/Lifelong-Learning-and-Training-Accounts-Issue-Brief.pdf>>.
-

- 141 The Aspen Institute, Lifelong Learning and Training Accounts: Helping Workers Adapt and Succeed in a Changing Economy (Washington, DC, May 2018) <<https://assets.aspeninstitute.org/content/uploads/2018/05/Lifelong-Learning-and-Training-Accounts-Issue-Brief.pdf>>.
- 
- 142 SkillsFuture - Home, from <http://www.skillsfuture.sg/>
- 
- 143 France: Two years of personal training accounts – a review. (2018, March 28), from European Centre in the Development of Vocational Training website: <http://www.cedefop.europa.eu/en/news-and-press/news/france-two-years-personal-training-accounts-review>
- 
- 144 US Government Accountability Office.
- 
- 145 Rolf, Clark, and Bryant.
- 
- 146 Senator Mark Warner, 'Legislation to Test-Drive Portable Benefit Models Introduced in the House and Senate' (Washington, D.C., 2017) <[https://www.warner.senate.gov/public/index.cfm/pressreleases?ContentRecord\\_id=73DA2EF1-FD4E-4397-9B7C-D24B1843A29A](https://www.warner.senate.gov/public/index.cfm/pressreleases?ContentRecord_id=73DA2EF1-FD4E-4397-9B7C-D24B1843A29A)> [accessed 21 March 2019].
- 
- 147 About SAGAFTRA. Retrieved from <https://www.sagaftra.org/about>
- 
- 148 Natalie Foster, Greg Nelson, and Libby Reder, Portable Benefits Resource Guide (Washington, D.C.: Aspen Institute, 2016) <<https://www.aspeninstitute.org/publications/portable-benefits-resource-guide/>>.
- 
- 149 Freelancers Union. About Freelancers Union 2018. Retrieved from <https://www.freelancersunion.org/about/>
- 
- 150 Health Care Security Ordinance. Retrieved from <https://sfgov.org/olse/health-care-security-ordinance-hcso>
- 
- 151 SF City Option. Retrieved from <http://sfcityoption.org/>
- 
- 152 CalSavers Retirement Savings Program. Retrieved from <https://www.treasurer.ca.gov/scib/>
- 
- 153 State Initiatives 2018: New Programs Begin Implementation While Others Consider Action. Retrieved from <https://cri.georgetown.edu/states/>
- 
- 154 Draft House Bill 2812 (2017) obtained from <http://lawfilesexternal.wa.gov/biennium/2017-18/Pdf/Bills/House%20Bills/2812.pdf#page=1>
- 
- 155 Kauffman, J. (24, October 2017). City's health care initiative shows success, but questions remain. San Francisco Chronicle. Retrieved from <https://www.sfchronicle.com/restaurants/article/City-s-health-care-initiative-shows-success-12300530.php>
- 
- 156 California Secure Choice: Market Analysis, Feasibility Study, and Program Design Consultant Services (Rep.). (2016). CA: Overture Financial LLC., from <https://www.treasurer.ca.gov/scib/report.pdf>
- 
- 157 <http://www.vta.org/getting-around/tamien-child-care-center>
- 
- 158 Wong, F., & Holmberg, S. (2016). Wage Insurance in an Era of Non-Traditional Work (Tech.). Washington, DC: The Aspen Institute, from <https://www.aspeninstitute.org/publications/wage-insurance-era-non-traditional-work/>
- 
- 159 Wong, F., & Holmberg, S. op. cit.
- 
- 160 Wandner, Stephen. Wage Insurance as a Policy Option in the United States. Working paper. W.E. Upjohn Institute, 17 Jan. 2016, from <http://www.upjohn.org/sites/default/files/pdf/wage-insurance.pdf>
-

- 161 Wong, F., & Holmberg, S., op. cit.
- 
- 162 Rhodes, E. (2017). Basic Income Project Proposal. Y Combinator Research, from <https://static1.squarespace.com/static/599c23b2e6f2e1aeb8d35ec6/t/59c3188c4c326da3497c355f/1505958039366/YCR-Basic-Income-Proposal.pdf>
- 
- 163 Our Vision for SEED: A Discussion Paper. Stockton, CA: Stockton Economic Empowerment Demonstration, from [https://static1.squarespace.com/static/59d55793268b96ccff4ff70e/t/5bfc32db032be4911026b12d/1543254764860/SEED-Discussion-Paper-Updated-11\\_26\\_18.pdf](https://static1.squarespace.com/static/59d55793268b96ccff4ff70e/t/5bfc32db032be4911026b12d/1543254764860/SEED-Discussion-Paper-Updated-11_26_18.pdf)
- 
- 164 US Office of the Assistant Secretary for Planning and Evaluation. (1983). Overview of the Final Report of the Seattle-Denver Income Maintenance Experiment. <https://aspe.hhs.gov/report/overview-final-report-seattle-denver-income-maintenance-experiment>. Website accessed January 16, 2019.
- 
- 165 Cain, Glen G. and Douglas A. Wissoker. (1987/1988) "Do income maintenance programs break up marriages?"
- 
- 166 A reevaluation of SIME-DIME." Focus. Institute for Research on Poverty, University of Wisconsin-Madison. 10 (4).
- 
- 167 Forget, E.L. (2011). The town with no poverty: the health effects of a Canadian Guaranteed Annual Income Field Experiment. *Canadian Public Policy*, 37 (3), 283-306.
- 
- 168 La Cocina | San Francisco Incubator Kitchen, from <https://www.lacocinasf.org/>
- 
- 169 Bronx Business Bridge Incubator, from <https://www.nycedc.com/program/bronx-business-bridge-incubator>
- 
- 170 PHILLYiHUB: The seed of the entrepreneurial ecosystem, from <http://mtairyusa.org/phillyihub/>
- 
- 171 Phillips, J. (2018, July 10). La Cocina's Tenderloin food hall takes a step forward, from <https://www.sfchronicle.com/insidescoop/article/La-Cocina-s-Tenderloin-food-hall-takes-a-step-13064264.php>
- 
- 172 Teglovic, J. (May 24). 5/23 MTC Meeting Wrap-Up: Commission Offers Support for Proposed BART TOD Policy, Approves Pilot Program Offering Fare Discounts for Low-Income Transit Riders. Bay Area Metro: The Bay Link, from <https://blog.bayareametro.gov/posts/523-mtc-meeting-wrap-commission-offers-support-proposed-bart-tod-policy-approves-pilot-program>
- 
- 173 Lindblom, M. (2015, February 11). Discount fares for low-income bus riders will be offered. *The Seattle Times*, from <https://www.seattletimes.com/seattle-news/discount-fares-for-low-income-bus-riders-will-be-offered/> ; ORCA LIFT, from <https://kingcounty.gov/depts/transportation/metro/fares-orca/orca-cards/lift.aspx>
- 
- 174 The City of Toronto's Fair Pass Discount Program. Retrieved from [https://www.ttc.ca/Fares\\_and\\_passes/Passes/Fair\\_Pass\\_Discount\\_Program.jsp](https://www.ttc.ca/Fares_and_passes/Passes/Fair_Pass_Discount_Program.jsp)
- 
- 175 Altstadt, R. (2018, January 24). TriMet moves forward on launch of low-income fare program aimed for July 1, 2018. *TriMet News*, from <http://news.trimet.org/2018/01/trimet-moves-forward-on-launch-of-low-income-fare-program-aimed-for-july-1-2018/>
- Introducing a Low-Income Fare. Retrieved from <https://trimet.org/lowincome/>
- 
- 176 Evelly, J. (2018, November 19). Half-Priced MetroCard Program Will Launch in '19, But With Limits. *City Limits*, from <https://citylimits.org/2018/11/19/half-priced-metrocard-program-will-launch-next-year-but-with-limits/>
- 
- 177 Schmitt, A. (2018, October 26). The Movement for More Equitable Transit Fares. *StreetsBlog USA*, from <https://usa.streetsblog.org/2018/10/26/the-movement-for-more-equitable-transit-fares/>
-

- 178 York, T. (2018, August 8). Riders on a low-income sign up for big savings after TriMet's Honored Citizen program expansion. TriMet News, from <http://news.trimet.org/2018/08/riders-on-a-low-income-sign-up-for-big-savings-after-trimets-honored-citizen-program-expansion/>
- 
- 179 Spurr, B. (2018, August 15). Half of new discount TTC passes for low-income residents are going unused. The Star, from <https://www.thestar.com/news/gta/2018/08/15/half-of-new-discount-ttc-passes-for-low-income-residents-are-going-unused.html>
- 
- 180 Spurr, B., op. cit.
- 
- 181 City of San Francisco. Development Impact Fees. <https://sf-planning.org/impact-fees> ; and City of San Francisco. SEC. 413. JOBS-HOUSING LINKAGE PROGRAM; HOUSING REQUIREMENTS FOR LARGE-SCALE DEVELOPMENT PROJECTS. <http://library.amlegal.com/nxt/gateway.dll/California/planning/>
- 
- 182 City of San Francisco. Office Development Annual Limitation Program. <https://sf-planning.org/office-development-annual-limitation-program> . Accessed January 22, 2019.
- 
- 183 Gennady Sheyner. July 30, 2018. Palo Alto lowers the cap on office development: City Council adopts citizen initiative to revise Comprehensive Plan. Palo Alto Weekly
- 
- 184 Mountain View 'Head Tax' Targeting Google, Tech Poised To Pass. (2018, November 7). CBS SF. Retrieved from <https://sanfrancisco.cbslocal.com/2018/11/07/mountain-view-measure-p-head-tax-tech-google/> and Baron, E. (2018, November 11). Three California cities OK new taxes on tech firms — will others follow? Seattle Times. Retrieved from <https://www.seattletimes.com/business/three-california-cities-ok-new-taxes-on-tech-firms-will-others-follow/>
- 
- 185 <https://mtc.ca.gov/our-work/plans-projects/focused-growth-livable-communities/priority-development-areas>
- 
- 186 <https://mtc.ca.gov/our-work/fund-invest/investment-strategies-commitments/focused-growth/one-bay-area-grants>
- 
- 187 Jed Kolko. February 2011. Making the Most of Transit: Density, Employment Growth, and Ridership around New Stations. Public Policy Institute of California. San Francisco. Page 33.
- 
- 188 Transit-Supportive Densities and Land Uses. A PSRC Guidance Paper (February 2015). Puget Sound Regional Council. Seattle. See pp. 24 and 28 for points that follow.
- 
- 189 <https://metro council.org/communities/planning/TOD/Planning-Fundamentals/Density-Diversity-Design.aspx>
- 
- 190 <https://www.fairfaxcounty.gov/tysons/comprehensive-plan>
- 
- 191 Stephen S. Fuller, John McClain. 2008. "Forecasts for Tysons Corner to 2050." George Mason University Center for Regional Analysis. Prepared for Fairfax County.
- 
- 192 See for example E. Blumberg and G. Pierce. 2014. "A Driving Factor in Mobility? Transportation's Role in Connecting Subsidized Housing and Employment Outcomes in the Moving to Opportunity (MTO) Program." Journal of the American Planning Association. 80 (1: 52-66); Q. Shen and T.W. Sanchez. "Residential location, transportation, and welfare-to-work in the United States: A case study of Milwaukee." Housing Policy Debate. 16 (3-4: 393-431)
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