

The Future of Work

Fourth Regional Plan Roundtable

February 26, 2015

Roundtable Objective

Identify strategies for the region's economy, infrastructure and communities that allow the region to address emerging trends in how and where we work.

Key Questions

- ▶ Which emerging trends will have the greatest effect on the region's economy and settlement patterns?
- ▶ What are the most likely scenarios for the future of work that the Fourth Plan should anticipate and address?
- ▶ What are the implications for economic development, housing, transportation, communications, community design and the environment?
- ▶ What are the most promising strategies for addressing these implications?

Overview

The ubiquitous application of digital technologies in both business and everyday life has coincided with equally striking change in jobs, income and the nature of work itself. While we have seen an explosion of new products, services and efficiencies in recent decades, the same time period has coincided with slower job and income growth. Industries that traditionally provided many quality job opportunities are in decline, while some of the most innovative businesses of today produce relatively few jobs. Some employees connect to work and workplaces in novel ways, while spaces to work, live and play are being joined, reconfigured and required to meet the needs of a changing economy and workforce.

As a result, metropolitan regions, including the New York region, may be facing the biggest transformation to the spatial organization of work since the development of the interstate system and the expansion of early telecommunications in the mid-20th century. Over the next twenty-five years, global regions like the New York metropolitan area will need to be creative and proactive to maintain their competitive edge. Telecommuting, economic shifts, and emerging industries could upend the traditional settlement and commutation patterns. Changing rhythms of work as well as climate change may require more flexibility and adaptability from our infrastructure. As more occupations become vulnerable to partial or total automation, the wage gap between the highly educated and everyone else could grow unsustainably wide. And at the same time, the integration of these technologies into daily life has the potential to reduce social and economic inefficiencies and support a more sustainable way of life.

This briefing paper provides an overview of emerging trends and what implications these trends may hold for the Fourth Regional Plan, through the lens of the future of work.

The Pace of Change and the Productivity Gap

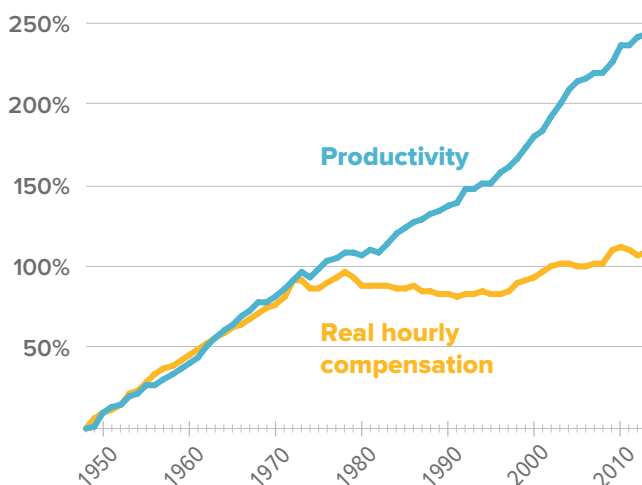
Technology has a profound impact on the way we live, work, and play. The proliferation of internet and communications technologies, alongside the disruption of entire industries – from hotels and taxis to global investment banking – suggests that even industries that once seemed insulated from significant change, like health care and law, are encountering an uncertain and challenging future.

The largest driver of this uncertainty and change is the marked decline in the cost and footprint of computing power, alongside exponential growth in technical capabilities. This allows technology to be used in an ever increasing range of activities, while increasing incentives to replace labor with technology.

There is a wide range of opinions among economists, scientists and business leaders about how technology is changing the economy, the extent to which non-technological forces are involved and whether we are headed toward a future of widespread prosperity and quality of life or a future where a shrinking number of the highest-skilled reap most of the benefit.

One fact that is undisputed, however, is the widening gap between productivity and wages. From the 1940s to the early 1970s, productivity, jobs and wages rose in tandem, providing steady gains in real income for a growing middle class. But recent decades have seen a fundamental split between productivity, job growth and wages. Between 1975 and 2011, productivity increased by 73%. But wages for non-supervisory and production employees, representing 70% of all employees, increased by only 11% during the same time period. After a peak in the late 1990s, median household income has been dropping nationwide, marked by a stark increase in income inequality throughout the nation.

Change in real hourly compensation versus productivity since 1948



Source: Economic Policy Institute analysis of Bureau of Labor Statistics employment and wage data and unpublished Bureau of Labor Statistics productivity data

It's Not Just Technology

Change does not occur in a vacuum or because of a single trend. The demographic, cultural and political context in which new technologies emerge also affects what economic impact they have. Many explanations are offered for the growing gap between productivity and wages. One driver is globalization, which shifted large swaths of manufacturing jobs, long considered a backbone of social mobility and economic prosperity, overseas. Another explanation focuses on the erosion of labor protections, wages, work stability and benefits throughout the workforce. Following the recovery from the Great Recession, where strong GDP growth is accompanied by generally stagnant jobs and wages, another explanation has emerged. Some, like Brynjolfsson and McAfee, argue that technological innovation has accelerated to the point where it is leaving many behind, making more skills redundant without creating new and different jobs in their place.¹

One argument, made by economists Claudia Goldin and Lawrence Katz, is that there is a race between technology and education – and that technology is winning.² When wages and incomes rose, Americans made impressive gains in high-school and college attainment, meeting demand for new skills created by technological advance. As those gains dwindled, so did the average income.

The supply of labor and skills was influenced by the entry of baby boomers and women into the labor market. As the baby boomers retire and as the number of women in the workforce plateau, new workers trained for future jobs will need to be sourced from a comparatively smaller pool of potential workers.

Opportunities and Risks for Cities and Regions

“As cities and work patterns evolve together, urban landscapes shift and redefine our culture, urban fabric and the way that we use energy, technology and real estate.”

— Peter J. Miscovich, “How Smart Work Will Transform Our Cities,” from *The Enterprise City*, ed. Richard Kadzis, 2014.

Since the beginning of the Industrial Revolution, the changing nature and organization of work has left its mark on the spatial organization of cities and regions. The industrial model of the early-20th century gave rise to a growing working class concentrated in dense urban areas. After World War II, the advent

¹ Erik Brynjolfsson and Andrew McAfee, *Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*, January 2012

² Claudia Goldin and Lawrence Katz, *The Race between Education and Technology*, 2008.

of large companies with increasing demand for administrative workers – alongside the rise of the automobile – prompted the creation of a suburban middle class. The nine-to-five workday and its attendant daily commute became the organizing principles from which all other spatial planning occurred.

By the 1990s, there was widespread belief that novel forms of information technology would lead to another wave of decentralization and the decline of cities. Instead, these innovations reinforced the role of global metropolitan regions as control centers for complex business networks and as magnets for talent. Within regions, urban centers began to retain and attract both people and businesses, while suburban growth slowed.

Fifteen years into the 21st century, the restructuring of work offers both challenges and opportunities for the New York metropolitan region and its residents. Global regions are likely to continue attracting talent and capital, but the environment could be even more competitive – not only from top-tier cities like London and Shanghai. Other places that make the right investments in both digital and traditional infrastructure and in the education of their citizens can begin to challenge leading regions. Regions that harness data and technology to improve their energy systems, support new businesses, address stagnant wages and inequality and invest in flexible and resilient infrastructure will be the ones that prosper.

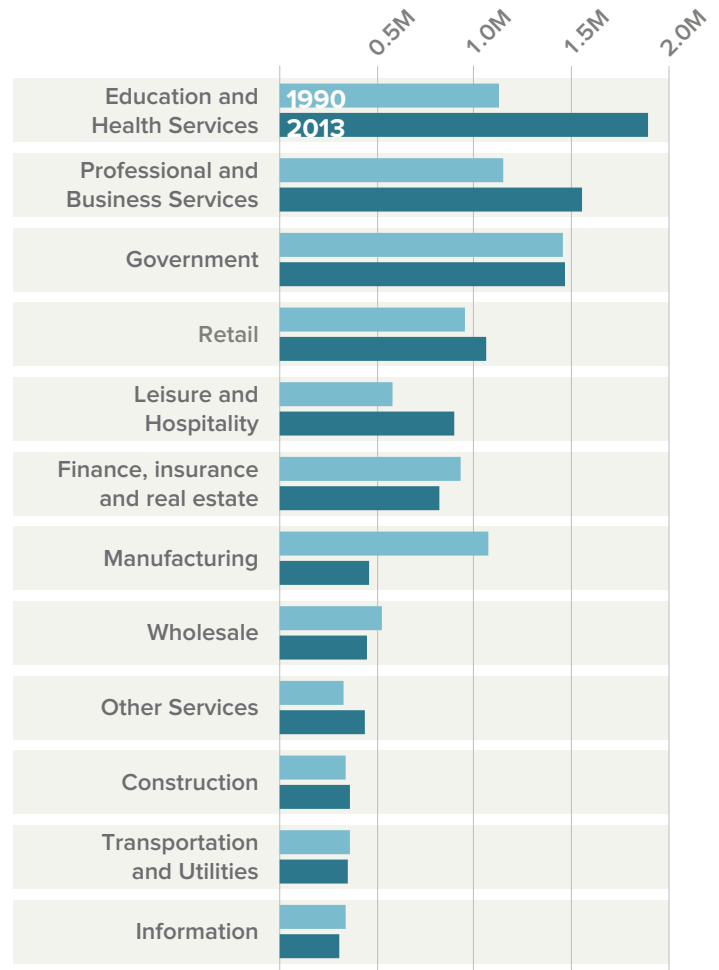
How We Will Work

Trends in job growth by industry, work hours and job tenure reflect the nationwide productivity gap. The number of occupations at risk of further automation is high. We do not know what new occupations will emerge to replace those which will be lost. What is certain is that any new jobs are likely to require new and more diverse education and skills.

Much of the job growth in the region in recent decades has been in low paying industries.

Most of the job growth in our region between 1990 and 2013 has been in education, health care and services, where wages were relatively low in 2012. Manufacturing, historically a key source of living-wage occupations for the working class, lost more than half of its jobs. A recent resurgence in urban manufacturing, though promising, has not yet reached a significant scale.³ The sole sector in the region with relatively higher wages where employment has increased was in professional business services.

Number of Jobs by Sector in the New York Metropolitan Region



Source: Bureau of Labor Statistics

There are fewer middle-skill, middle-income jobs, and fewer stable, full-time jobs.

Over the last thirty years, job growth has been concentrated in low-skill and high-skill jobs. The trend is even more pronounced in downstate New York and northern New Jersey, particularly for lower-middle skill jobs found in industrial and clerical sectors.

As employment has become more polarized and segmented, the income gap has also increased, driven primarily by relatively strong wage growth for the highest paid workers.⁴

Alongside reductions in job tenure, new kinds of work also appear to reinforce long-term trends toward contingent labor: part-time jobs, self-employment, and contract work have outpaced the growth in full-time jobs for years.⁵ This phenomenon is likely driven more by employer than worker preference, given that demand for full-time jobs increased threefold compared to demand for part-time jobs during the same period.⁶

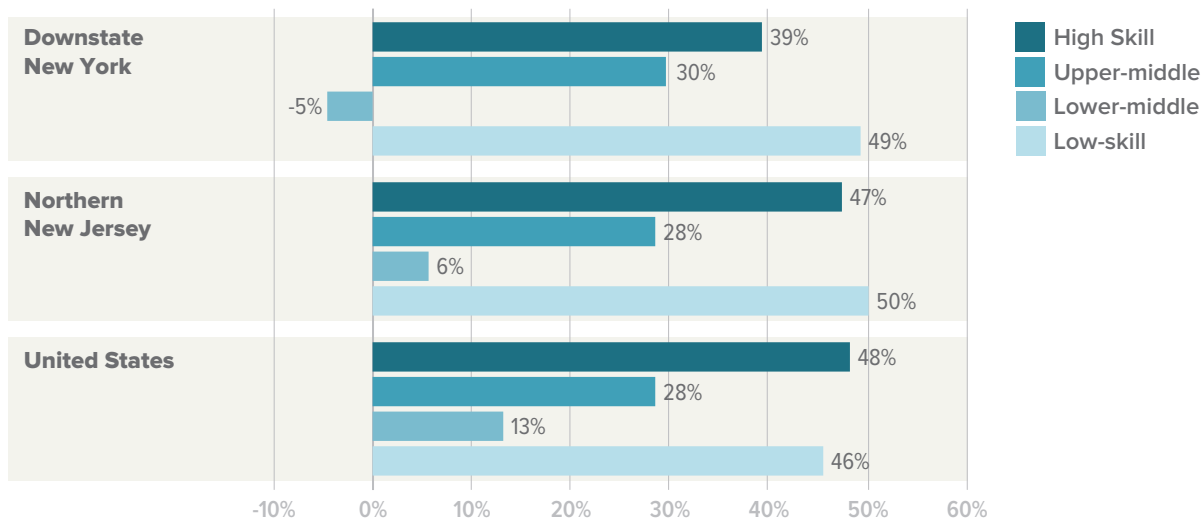
⁴ Abel & Deitz, *Job Polarization and Rising Inequality – in the Nation and in the New York – Northern New Jersey Region*, 2014

⁵ Current Population Survey, Bureau of Labor Statistics

⁶ Current Population Survey, Bureau of Labor Statistics

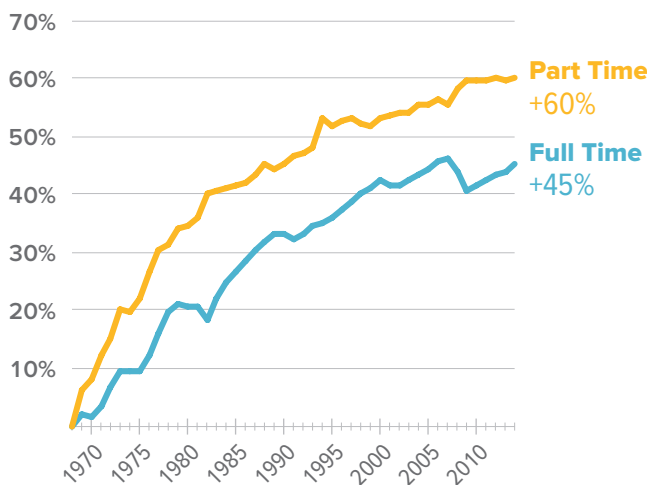
³ Bowles & Giles, *New Tech City*, 2012

Percent Change in Number of Jobs by Skill, 1980 - 2010



Source: based on New York Federal Reserve calculations and Bureau of Labor Statistics Data

Percent Change in Full Time vs. Part Time Employment in the United States from 1968



Source: Bureau of Labor Statistics

These trends are likely to continue. Advanced logistics platforms have the ability to break up what used to be a single-service job, like design or maintenance, into a slew of tasks that can be done by multiple people, at different times and places. Service providers that utilize this model are capturing market share from less efficient industries, while disrupting the regulatory environment that surrounds them.⁷ This can be boon for some employees, allowing more flexibility and control. But for others, it can mean reduced job security and wages, often in sectors with relatively low wages.⁸

The New York region has not been as affected by the national decline in entrepreneurship.

Nationally, the number of new businesses increased by only 1.5% between 2002 and 2012, part of a long-term trend of decline in entrepreneurship. The New York metropolitan region saw an increase of 5% in number of businesses during the same period, reflecting the region's dynamic nature. How well the region accommodates and encourages these businesses' longevity and expansion is the question for the future.⁹

Automation could displace a high share of current occupations, with the number and types of new jobs difficult to predict.

An often-cited estimate is that as many as 45% of U.S. jobs are at risk of automation, fueling dire predictions that suggest the end of work as we know it. Applying this analysis to the New York region, we find that five-million jobs are at risk, representing around half of all jobs in the region.¹⁰ The occupational categories with the most number of jobs at risk are primarily low- and middle-skill work – services, sales, administration and management. However, nearly all categories have some jobs at risk.

Yet, this analysis does not account for the job-creation effects of technology. These effects are more difficult to predict and are most likely to occur where there is high demand for new products and services and where technology creates the need for complementary skills that are difficult to automate.

Potential new jobs may also be found in the management of technological change, where the implementation of new technologies that are increasingly complex requires more employees for a longer time than skeptics predict. Additionally, should technology make it more economical to fulfill local needs with local production and services, there is potential for new job growth in manufacturing and related maintenance and distribution jobs.

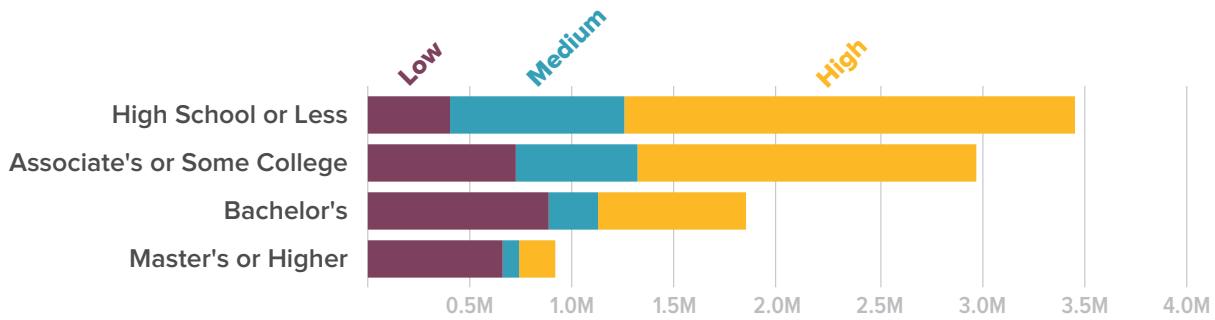
⁷ Manjoo, *Uber's Business Model Could Change Your Work*, January 2015

⁸ Singer, *In the Sharing Economy, Workers Find Both Freedom and Uncertainty*, August 2014

⁹ U.S. Census Business Dynamics Statistics

¹⁰ Frey & Osborne, *The Future of Employment: How Susceptible are Jobs to Computerisation?*, September 2013

Education Level of Jobs by Level of Risk of Automation, New York region



Source: RPA Calculations based on Bureau of Labor Statistics data and the risk categorization created by Frey & Osborne, 2013

Who Will Be Working

The region's workforce in 2050 will be more diverse than it is today, with more tech-savvy and urban-oriented generations replacing retiring baby boomers.

The region is aging and becoming more diverse.

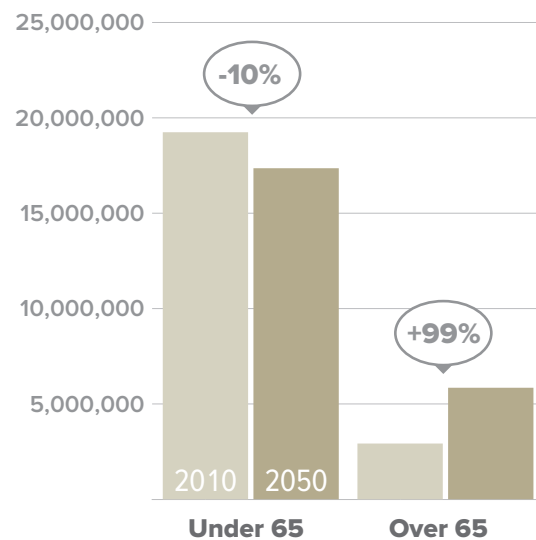
With people living longer, having fewer children, and having children later, the region overall is aging. In the New York region, assuming there is no in-migration or out-migration, natural growth alone will see the population of those 65 and older double from 2.9 million to 5.8 million, while at the same time the number of those under 65 will drop by 10%.

A majority of the region's residents under forty are non-white, while only 40% of the region's residents over forty are non-white. As such, by 2050, the region is likely to become far more diverse, even without the high levels of immigration of recent decades.

Education levels have risen, but not enough to match the changing demands of the economy.

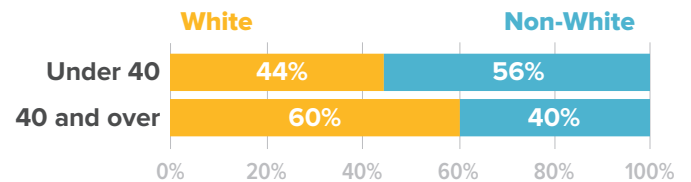
Recent decades have seen an increase of nearly 60% in the share of the region with a college education.¹¹ A college education alone does not guarantee economic security, but those with a college education within any age group still fare much better compared to those without. However, the path to college depends on school performance and in the region, living in low-income, non-white neighborhoods are still determinants of education outcomes.¹² The importance of having a strong and adaptable education is only likely to rise; those lacking a college degree are far more likely to work in jobs that are at high risk of automation.

Change in Number of Seniors in the New York Region, 2010 to 2050, Accounting for Natural Growth Only



Source: U.S. Census and RPA calculations

Non-White Share Of Population For Those Under And Over 40



Source: U.S. Census

¹¹ U.S. Census 1990 and American Community Survey 2010.

¹² RPA, *Access to Education*, 2014

Where We Will Work

Businesses are using space differently, with a focus on interaction and stimulating creativity. Space needs per employee are decreasing and co-working spaces are proliferating to meet the needs of growing numbers of freelancers and others who don't need to make daily trips to a corporate office.

As digital infrastructure minimizes the need for paperwork and as knowledge industries allow workers to access their tasks and be managed from anywhere, businesses are revising their space needs. Instead of having rows of individual offices, many businesses are reorganizing themselves around a denser arrangement of workers and a wider variety of shared spaces and amenities designed to improve productivity, efficiency, healthfulness and a sense of place.¹³

Another driver of increasing worker density and open floor plans is the increase in real-estate prices in some of the most attractive business centers. One global survey found that office space per worker decreased from 225 square feet per worker in 2010 to 150 square feet in 2015. The emphasis on interaction in the workplace has been felt in large and small businesses alike, followed by an increase in the number of co-working spaces in urban centers around the world that support a growing network of freelance and start-up employees, as well as traditional workers.¹⁴



Source: Phil Whitehouse / CC 2.0

The locational preferences of businesses are changing, with mixed-use downtowns increasingly attractive to certain kinds of businesses.

Traditionally, industry clusters have been important drivers of any region's wealth creation, allowing businesses to share customers, workforces, suppliers, infrastructure and knowledge. Paradoxically, the need for physical proximity to enable interaction and support is growing for many functions even as more work becomes networked and distributed.

Nationally, the number of jobs in dense, mixed-use core areas and similar second-tier districts has increased.¹⁵ Some are in innovation districts, where anchor institutions such as universities support the growth of start-up companies, commercial applications, and support activities. These tend to be transit accessible, dense and with strong broadband infrastructure. They are often found in downtowns or industrial areas near downtowns, but can also be found in suburban or ex-urban industrial parks.¹⁶

Recent job growth in the New York region has overwhelmingly gone to the densest areas.

The New York region has always been ahead of its peers in the creation of robust downtowns, with 63% of all regional jobs in the core and adjacent high-density areas. Overall, the trend shows signs of continuing. Between 2002 and 2011, suburban areas in the region lost jobs. However, the region's highest-density areas, including much of Manhattan, downtown Brooklyn, and parts of Jersey City and Hoboken, as well as the centers of dense downtowns, drove the vast majority of job growth.¹⁷

Physical space may become superfluous for certain businesses.

Not all trends necessarily suggest the importance of density. Technology is changing where we work by introducing new ways for people or businesses to purchase and receive goods and services. The internet has enabled businesses to sell anything from books to pets online – and this expansion of the market to a national or global scale has upended the physical presence of reselling industries like bookstores, office supplies, and groceries.¹⁸ At the same time, just-in-time delivery has its own spatial footprint. Businesses will shift their supply chains and distribution centers to provide quicker service to major metropolitan areas, while the mass movement of goods and services throughout the region will change the way we plan for our transportation system.¹⁹ Alongside the ability of businesses to decentralize and offload non-essential tasks to contractors, more and more businesses could end up being entirely virtual.

Connecting People And Work

Convenience, preference and cost are driving increasing transit ridership numbers, but transit patterns may be shifting.

Young professionals are choosing to use transit more than previous generations. The decision to embrace transit stems from convenience and price and, for some, the desire to reduce their impact on the environment.²⁰ This is likely to be part of the

¹³ United States General Services Administration, *Innovative Workplaces: Benefits & Best Practices*, 2006

¹⁴ Deskmag, *3rd Global Co-working Survey*, 2012

¹⁵ Levy & Gilchrist, *Downtown Rebirth: Documenting the Live-Work Dynamic in 21st Century U.S. Cities*, 2012

¹⁶ Katz & Wagner, *the Rise of Innovation Districts*, May 2014.

¹⁷ Preliminary RPA analysis based on Longitudinal Employer-Household Dynamics data adjusted by the Current Employment Survey

¹⁸ Austen, *The End of Borders and the Future of Books*, November 2011

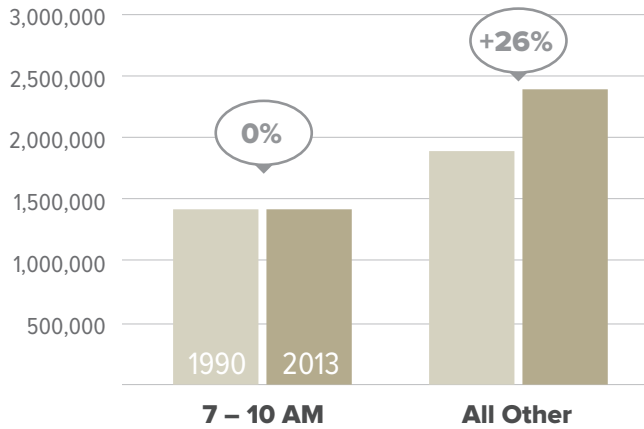
¹⁹ Manjoo, *I Want It Today*, July 2012

²⁰ American Public Transportation Association, *Millennials & Mobility*, 2013

reason that subway ridership in New York City is at its highest in decades – and that driving in the three states is down, overall.²¹

One of the strongest signs of the changing nature of work can be found in the evolving rhythm of the morning and evening commute. A growing share of people commute into Manhattan outside of the standard 7-10 AM morning peak. Weekend, reverse commutes, and non-Manhattan travel are also increasing. This trend in off-peak travel indicates an increased diversity of work schedules within the labor market. It could also suggest that transportation capacity has reached a peak and people are spilling into off-peak hours.

Number of People Entering Manhattan During Morning Peak Period

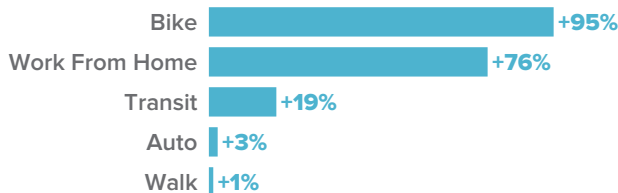


Source: HubBound

More people are working at home, telecommuting and working alternative work schedules.

More people are selecting different transit modes in the New York region – and the number of those who worked from home increased by 76% between 1990 and 2010. This growth was even higher outside of Manhattan.

Change in Means of Transportation 1990-2010



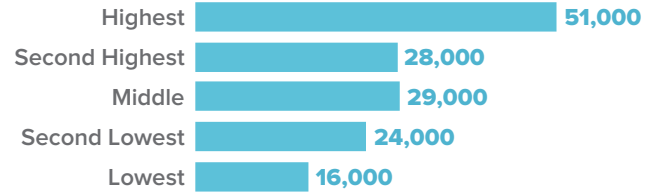
Source: U.S. Census

However, there is significant segmentation in those who work from home. Workers in the top income quintile are three times more likely to work from home, compared to those in the bottom income quintile. Nationally, many of those who usually work from an office frequently telecommute, but this is far more likely to represent an increase in the overall work hours of certain high-skill jobs rather than solely a shift in where they work.²²

²¹ RPA, *State of the Region's Transportation*, 2014

²² Noonan & Glass, *The Hard Truth About Telecommuting*, 2012

Number of Workers who Work from Home by Income Quintile, New York Region



Source: U.S. Census

Telecommuting is enabled by the increase in devices which allow people access to the internet, but the digital infrastructure is distributed unevenly.

Access to information networks no longer requires a physical connection or a large device. About a third of households in the region have a broadband mobile plan.²³ Common instruments like thermostats and health-monitoring equipment will likely be networked in the near future.²⁴ People are also using hand-held devices and networks to access traditional services like banking, medicine and education.

However, all of this information depends on the ability of infrastructure to move it. While most of the region has at least advertised access to broadband at reasonable speeds, access to the highest speeds needed by emerging industries is limited. Internet with an advertised download speed of 1 gigabit per second and higher is available in some, but not all, of Manhattan and somewhat haphazardly throughout the rest of the region.²⁵

Private on-demand transportation services are already here, and driverless car technology is advancing.

Physical and digital mobility are intersecting in the form of on-demand transportation. Several services are successfully competing against established industries by allowing customers to utilize digital infrastructure to augment their access to services, like taxis. By demonstrating the power and convenience of on-demand transportation logistics, emerging industries are illustrating how innovations like driverless cars and automated drones could reshape how we move goods, people and information.

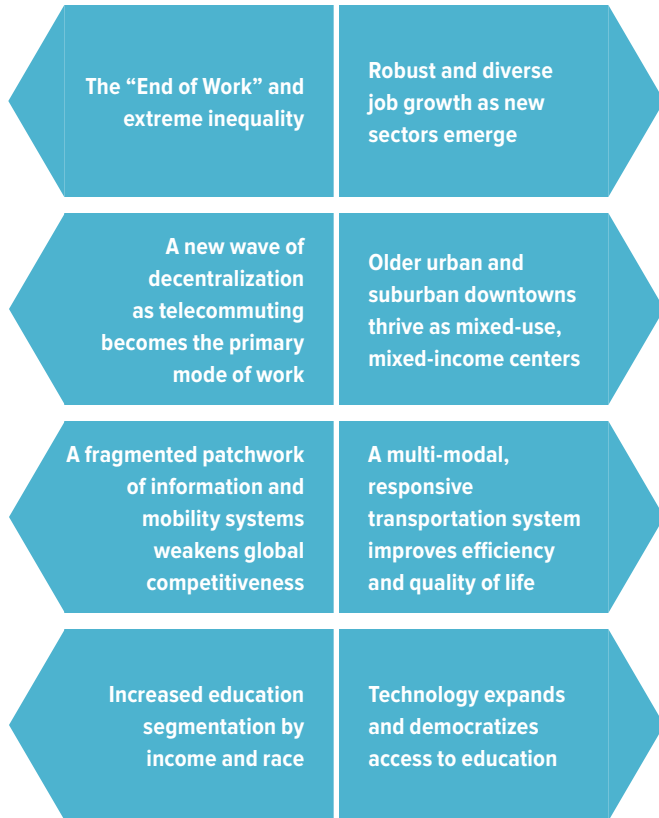
²³ American Community Survey 2013

²⁴ The Economist, *The Business World is divided between Optimists and Pessimists*, January 2015

²⁵ The National Broadband Map, 2013

Implications for The Fourth Regional Plan

There are many possible futures of work, depending not only on the pace of technological change and its interactions with globalization and demography, but also with the policy choices made nationally and locally. The following summarizes propositions in the form of two opposing options along a similar theme. These are intended to be illustrative, outlining both the need to embrace uncertainty and the wide-range of implications to be addressed by urban planning and policy.



While many of the drivers are national and international, the issues include local and state education and fiscal policies, alongside traditional planning for built and natural environments. Effective responses are required at a regional level to ensure that residents and businesses can seize the advantages of technological change, while mitigating its impacts on income stagnation and inequality. The questions of what jobs will be available, how and where people will be working and how we connect people, goods and information affect every part of the Fourth Regional Plan.

The following are a list of broad implications to frame our discussion:

- ▶ **Both global and intraregional connectivity are critical.** The businesses of the future will expect multiple levels of connectivity – interpersonal in the workplace, physical via transportation, and virtual via communications technology.

Maintaining both the virtual and transportation infrastructure to improve inter-city connections will be an essential part of a globally competitive region.

- ▶ **Integrated systems planning is vital for regions as well as businesses.** Infrastructure systems, especially transportation, communications and energy, will need to be planned seamlessly to address complex changes in how people and businesses interact.
- ▶ **Information is already a critical infrastructure and should be planned as such.** Investments in broadband and other aspects of the information infrastructure need to be prioritized and coordinated alongside other infrastructure investments.
- ▶ **Flexibility and resilience need to be priorities in planning for places and systems.** Industry and consumer needs are likely to change more rapidly than buildings, neighborhoods and infrastructure. Greater reliance on technology, as well as the increasing threat of climate change, will also increase vulnerability to disruption from power outages and systems failures.
- ▶ **Economic development in diverse sectors is needed to stem the decline of middle-income jobs.** With traditional career ladders upended and income inequality rising, support for high-quality employment opportunities in multiple sectors should be a key priority. No one solution will be sufficient, and multiple approaches, from urban manufacturing and distribution to the support of neighborhood entrepreneurship will be needed.
- ▶ **Housing and land use planning should support improved educational access and outcomes, especially for low-income and minority residents.** Improving educational outcomes will be even more critical for future jobs. Housing and land use policies can support that objective by fostering economically and racially integrated neighborhoods that lead to better schools and educational attainment.
- ▶ **The region should maximize its urban and transit advantages to create more choices for living, working and playing in its downtowns and neighborhoods.** The region can build on its in-place infrastructure and network of mixed-use downtowns of various types and densities. These are the places that attract creative and technology businesses and their workforce, but will need to be retrofitted to meet changing needs and preferences.