



MEMORANDUM

To: CMAP committees
From: CMAP staff
Date: June 19, 2017
Re: Alternative Futures: Transformed economy

As part of ON TO 2050 development, CMAP is undertaking an “alternative futures” planning process focusing on exogenous factors that are largely beyond the control of any one entity, including CMAP and our regional partners. These factors include the environment, consumer preferences, technological advancements, and macroeconomic trends.

Based on research and feedback from stakeholders, CMAP envisions five different futures for the region, imagining life in 2050 where...

- Climate change impacts have intensified.
- More people have chosen walkable communities.
- The economy has transformed.
- Innovations have enhanced transportation.
- Public resources are further constrained.

The Alternative Futures planning exercise, which draws upon ongoing CMAP work and ON TO 2050 products, will inform the agency's phase of broad public engagement in spring and summer 2017. CMAP will identify the key macro-level drivers shaping each future and their potential impacts. With written and interactive materials, staff will depict the imagined futures' effects on residents and businesses. With the assistance of committees, CMAP will also propose strategies to help mitigate potential negative outcomes and capitalize on opportunities that might arise. At the end of the futures phase, staff will emphasize crosscutting strategic actions and policies that will help the region thrive across a wide range of possible outcomes.

This memo, the fifth in a series, will focus on a future in which accelerating technological advancements transform the regional economy and contribute to continued economic stratification. Such changes would have major implications for key CMAP focus areas,

including economic and workforce development, land use, transportation, governance, and community development. For the purposes of this exercise, CMAP imagines a future in which economic policies and programs have struggled to deal sufficiently with either the evolving technology and needs of industry or the region's decreasing economic mobility. While change is perennial, this memo imagines that these changes will occur at an accelerated scale, scope, and speed from previous economic transformations. The transformed economy future acknowledges that, as of 2017, the large-scale shift to a service-based economy has already occurred. This future builds on existing trends and research but does not intend to predict or imagine unforeseen technologies and trends.

By 2050, technological advancements have transformed regional employment, consumption, and global competitiveness—creating both an economic triumph for the region and a personal tribulation for many workers. The region's industry clusters have captured new productivity gains and achieved global competitive advantage from technological advances, while facing a relative scarcity of skilled labor. New technologies have also exacerbated growing skills and employment gaps as computerization has extended into more cognitive domains and non-routine, middle-skill occupations. At the same time, it has become increasingly challenging to acquire sufficient education and new skills to adapt to technological advances. These trends affect all workers, limiting individuals' ability to work and leading to greater displacement and economic polarization among the employed. Climbing the economic ladder has grown increasingly difficult for most residents, and many are at risk of falling out of the middle class. Historically marginalized communities suffer from deepened negative outcomes in educational attainment, employment levels, and income. High-skill, high-income residents make up a larger portion of residents within the urban core. As the resource-rich urban core becomes more expensive, poverty is concentrated in urban and suburban areas with limited access to services, transportation options, or employment.

Primary driver: accelerated technological change

In 2050, the application of new technological advancements in most occupations and across all skill levels has increased productivity and output, as well as transformed workers' daily tasks.

The scope of what technology can do continues to expand, building on advances in artificial intelligence, machine learning, advanced materials, and the automation and digitalization of services.¹ A significant share of tasks -- across almost every occupation and skill level -- already has the potential for some degree of automation using currently demonstrated technology.²

¹ Brynjolfsson, Erik, and Andrew McAfee. *Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy.* Brynjolfsson and McAfee, 2012.

² Manyika, James, Michael Chui, Mehdi Miremadi, Jacques Bughin, Katy George, Paul Willmott, and Martin Dewhurst. "A future that works: automation, employment, and productivity." McKinsey Global Institute, 2017.



Machines and computerization have historically been confined to repetitive, heavy, and hazardous routine tasks on factory floors and storing and organizing data. Technological advancements have extended this trend into tasks that require situational adaptability, visual/language recognition, and in-person interaction.³ By 2050, computer systems would perform a wide range of non-routine and cognitive tasks -- such as driverless trucking, legal research and writing, online education, and diagnosing diseases.⁴ The Chicago region could also see widespread productivity and output growth as technology enables businesses to reduce errors, increase output, and improve quality and speed beyond current capabilities.⁵

In 2050, businesses and individual consumers come to expect just-in-time, customized goods from around the world. Increasingly complex supply chains extend globally and employers access a worldwide workforce.

Advancements in production and logistics serve evolving industry and consumer demand. Households would increasingly prefer more on-demand, experience-oriented or individualized services, and customizable products that differ widely from the mass marketing and large format retail of past growth periods. Industrial customers would increasingly purchase supplies in customizable batch orders with shorter turnarounds between design and production; reliability would remain necessary for just-in-time supply chains.⁶ Many of these trends have already begun to reshape the consumer market, such as the shift of household and business consumption growth towards online commerce. Economic globalization continues to expand, and cross-border movements of people, goods, services, knowledge, and capital increase, fueled by improvements in technology, faster and more reliable shipping, a growing global consumer base, and greater foreign competitiveness. Regional firms may also increasingly employ a worldwide, distributed workforce enabled by improved telecommunication technology and improved access to education in emerging economies.

Meanwhile, the region's population and workforce have become older and more diverse.

Declining birthrates, outmigration, decline in international immigration, an underperforming regional economy, poor state and local fiscal conditions, and economic growth abroad has led to

³ Cheremukhin, Anton. "Middle-skill jobs lost in U.S. labor market polarization." Federal Reserve Bank of Dallas *Economic Letter* 9, 2014.

⁴ Frey, Carl Benedikt, and Michael A. Osborne. "The future of employment: how susceptible are jobs to computerisation?" *Technological Forecasting and Social Change* 114, 2017: 254-280.

⁵ Manyika et al. "A future that works: automation, employment, and productivity."

⁶ Chicago Metropolitan Agency for Planning. Metropolitan Chicago's Manufacturing Cluster: A Drill-Down Report on Innovation, Workforce, and Infrastructure, 2013. <http://www.cmap.illinois.gov/economy/industry-clusters/manufacturing>.



stagnant population growth in the Chicago region.⁷ Current projections show these trends continuing and even expanding into 2050 unless economic growth trends strengthen substantially.⁸ The regional workforce is aging rapidly as people continue to live longer, delay or reduce childbearing, and retire later in life. The region is also projected to become more racially and ethnically diverse in 2050.

Major impacts: working in the transformed economy of 2050

In 2050, technology continues to drive long-term structural changes in the economy by transforming employment, increasing productivity, and constricting job growth in some industries. New, unforeseeable economic opportunities have emerged for both businesses and individuals. The resulting requirement to rapidly and continually acquire new skills exacerbates barriers to entrance and mobility for some workers.

How we work

Technological advancements promise to transform the future of work in sectors ranging from retail and warehousing to finance and healthcare. Technology has already transformed manufacturing, transportation and logistics, accommodation and food, and retail trade services. Other advancements could become prevalent in everyday life. For example, healthcare professionals and insurance brokers may come to rely more heavily on advanced computing to make decisions.⁹

Most occupations, at all skill levels, should anticipate widespread changes as technological changes reallocate workers' time and tasks.¹⁰ Employment levels would slow in some existing industries and decline in others. Increased productivity from technology and delayed retirement could also contribute to steeper competition, particularly for routine-intensive occupations, such as occupations consisting of tasks following well-defined procedures with speed, efficiency, and reliability to a minimum acceptable standard.¹¹ Many jobs would likely

⁷ Chicago Metropolitan Agency for Planning. "Population change in the CMAP region," 2016. http://www.cmap.illinois.gov/about/updates/policy/-/asset_publisher/U9jFxa68cnNA/content/population-change-in-the-cmap-region.

⁸ Chicago Metropolitan Agency for Planning. *Demographic Shifts: Planning for a diverse region*, 2017. <http://www.cmap.illinois.gov/onto2050/snapshot-reports/demographics>.

⁹ Manyika et al. "A future that works: automation, employment, and productivity."

¹⁰ Dabla-Norris, Ms Era, Mr Si Guo, Mr Vikram Haksar, Minsuk Kim, Ms Kalpana Kochhar, Kevin Wiseman, and Aleksandra Zdzienicka. *The new normal: A sector-level perspective on productivity trends in advanced economies*. International Monetary Fund, 2015.

¹¹ Acemoglu, Daron, and David Autor. "Skills, tasks and technologies: Implications for employment and earnings." *Handbook of labor economics* 4, 2011: 1043-1171.



refocus on those non-routine, interactive tasks that are less susceptible to computerization -- e.g., intuition and caring tasks that require social aptitude and adaptability.¹² These advances have already displaced some workers and led to rapid declines in jobs as brokers, telemarketers, insurance underwriters, and clerks.

However, technological advancements would replace relatively few jobs entirely, as many workers in occupations vulnerable to automation perform a variety of other interactive tasks that remain difficult to computerize.¹³ Instead, advancements would augment jobs where workers exercise discretion in unpredictable or creative environments. For example, real-time information about individuals' needs would enhance teaching, elder and healthcare, hospitality, and creative industries. Likewise, managerial decision-making would become more efficient as firms increasingly use big data and sub-fields of artificial intelligence.¹⁴ In addition, new, unforeseeable types of work would arise. Technology-enabled innovations would likely also create new jobs overseeing and modifying automated processes as nearly every organization finds applications for the new advancements.

Skills we need

In 2050, workers would be required to interact adeptly and collaboratively with technology to accomplish a wide range of tasks. Workers would need higher levels of literacy and numeracy, as well as the ability to anticipate, identify, and solve problems. Production and service occupations would require more soft skills -- in particular, strong verbal and written communication skills -- as technical competency become a basic requirement for most workers.¹⁵ This trend is already happening: nearly all job growth since 1980 has occurred in occupations with relatively high requirements for social skills -- e.g., flexibility, judgment, social intelligence, and teamwork.¹⁶ Tighter integration with technology could free up time for workers to focus more fully on problem-solving, creative, or non-computerized activities.¹⁷

Training would become a lifelong requirement for workers to remain competitive, especially as many residents continue to work later in life. Higher levels of post-secondary training could be necessary to compete for available job openings, and accelerated technological change could require additional training throughout a career. Despite being more skilled, jobseekers could see declining returns to education at the post-secondary level and fewer opportunities to get the training required. With a standardization of skills and greater expectations for transferrable

¹² Deming, David J. *The growing importance of social skills in the labor market*. No. w21473. National Bureau of Economic Research, 2015.

¹³ Arntz, Melanie, Terry Gregory, and Ulrich Zierahn. "The risk of automation for jobs in OECD countries: A comparative analysis." *OECD Social, Employment, and Migration Working Papers* 189, 2016.

¹⁴ Manyika et al. "A future that works: automation, employment, and productivity."

¹⁵ *Ibid.*

¹⁶ Deming. *The growing importance of social skills in the labor market*.

¹⁷ Frey, C. and M. Osborne. "The future of employment: how susceptible are jobs to computerisation?"



credentials, employers could decide to hire new workers with the skills they require, rather than investing in training. The continued rise of independent contract workers via online platforms may also exacerbate this trend of training being decoupled from the workplace. This trend is already underway: national research has found a decline in the percent of workers receiving employer-sponsored or on-the-job training.¹⁸

If training is a requirement for continued employment, access to affordable, quality education and continued training would become a deciding factor in residents' quality of life and financial security. Likewise, access to the Internet and other technologies would remain critical for educational attainment, continuous learning, and job hunting. Higher minimum training requirements would create barriers for a growing share of residents who do not have adequate access to advanced and continuous education. With the burden of post-secondary training shifted even further onto individuals and households, the low-income and entry-level workers in particular would face challenges in meeting the cost of workforce readiness. Many residents in the Chicago region -- especially those in economically disconnected areas¹⁹ or communities experiencing disinvestment -- would face the combined effects of declining returns to high school-level education and declining investments in employer-sponsored training. Specifically, socioeconomic data shows that black and Hispanic residents have lower educational attainment rates than the regional average.²⁰ Maximizing the human capital of all communities -- especially those with large shares of persons of color expected to see the largest increases in population -- would be critical for broader economic growth.

What we produce

By 2050, advancements in production, information technology, and logistics will likely transform the types of products and services available to customers in order to satisfy evolving industry and consumer demand. Some goods may also become more affordable to produce and purchase. However, a growing majority of workers and businesses would focus on meeting greater demand for services and experiences enhanced by these technologies. With an older, more diverse customer base, the economy could see significant increases in the demand for entertainment, hospitality, education, and elder care.²¹

Technological advancements and the region's transportation network would provide opportunities for growth. By 2050, trade growth and increased global movement of goods could bring new expansion and export opportunities to businesses located in the region, which

¹⁸ Council of Economic Advisers. *Economic Report of the President*, 2015. http://www.nber.org/links/cea_2015_erp.pdf

¹⁹ Economically disconnected areas refer to neighborhood tracts that have real median household incomes less than sixty percent of the Chicago regional median by household size, and either high-minority populations or low levels of English proficiency relative to regional averages.

²⁰ Chicago Metropolitan Agency for Planning, *Demographic Shifts: Planning for a diverse region*, February 2017. <http://www.cmap.illinois.gov/onto2050/snapshot-reports/demographics>.

²¹ Bureau of Labor Statistics, "[Workforce growth in community-based care: meeting the needs of an aging population](#)," *Monthly Labor Review*, December 2016.



would remain the critical North American shipping node. Manufacturing, logistics, transportation, business services, and other sectors would have an opportunity to improve performance, offer new products and services, and achieve competitive advantage.

The Chicago region's diverse economy offers the opportunity to grow in emerging areas and increase its relative concentration in multiple key industry clusters, particularly those selling products and services in markets outside of the region. Such traded clusters have an outsized potential to grow the region's economy. With increasing foreign competition, future economic growth would primarily occur in specialized industry clusters equipped to compete globally -- notably those in technology- and knowledge-intensive industries.²² The region could grow higher-end manufacturing to accommodate an expanded market for on-demand, high quality, complex, and customized products amid declining cost advantages of producing such goods overseas.

In 2050, the region's innovative capacity would continue to drive economic growth. The ability to create new products, processes, and services would remain critical to meet demand for them, as well as to increase reliability in on-demand and just-in-time delivery, and customization. New, smaller businesses could emerge by using innovative business models, such as digital matching services or distributed small-scale local manufacturing.²³ Innovators and entrepreneurs with access to new, lower-cost tools and technologies could operate at a much smaller scale and offer products or services once reserved for well-established firms.

Where we work and live

Technology would also influence where residents work. Demand for suburban large-format office parks could continue to decrease as shared workspaces, telecommuting, and more flexible work schedules become more common. Many residents, particularly high-income earners, would continue to live in close proximity to job centers and amenities in densely populated communities, contributing to cost-of-living increases in urban areas. Low- and moderate-income earning residents, on the other hand, would be more likely to live in outlying communities with suboptimal transit connections to job centers or the central business district. Many of these workers would need to own cars or take long, circuitous transit routes in order to reach employment opportunities. As the population changes, older and more diverse population groups may also hold varying preferences and face different challenges in housing, transportation, employment opportunities, and other factors that impact quality of life.

The Chicago region would remain an integral freight hub for North America because of its diverse industry make up, central location, extensive transportation network, multimodal connections, and workforce. The area's vast, multimodal freight network would continue to

²² Porter, Michael E. "Location, competition, and economic development: Local clusters in a global economy." *Economic development quarterly* 14, no. 1,2000: 15-34.

²³ Hagel III, John, John Seely Brown, Duleesha Kulasooriya, Craig Giffi, and Mengmeng Chen. "The future of Manufacturing-Making things in a changing world." *Deloitte University Press* 9, 2015.



underpin the complex supply chains extending nationally and globally. Large-scale warehousing and distribution facilities would continue to locate on the edge of the region, where land availability can accommodate large facilities. These buildings would be larger than current standards, with higher ceilings, more mezzanine floors, and numerous truck bays for large volumes of smaller shipments delivered daily.²⁴ Smaller facilities equipped with better data to predict consumer demand and advanced logistics could increasingly locate near population centers.

On-demand delivery, flexible work schedules, and innovations in technology (e.g., automated vehicles, intelligent transportation systems) could also alter traffic patterns and transportation needs. Congestion would likely continue due to increased freight delivery to households and businesses. When it does occur, the economic cost of congestion would rise as reliability and predictability disrupt the business value of customized and just-in-time supply chains.²⁵

What we learn

Real median household income in the Chicago metropolitan area declined 4.5 percent during 1989-2015 -- a downward trend that long-running structural changes could extend and quicken in the transformed economy.²⁶ Several key drivers could depress wages and contribute to further economic stratification -- including a higher share of the population working longer, slow employment growth due to increased productivity, and the relative decline in demand for middle-skill workers. The creation of new, unforeseeable occupations and the potential for increased demand could offset these pressures to some degree. The critical factors for many residents would be the availability of such jobs, ability to reach employers, and skills required for these new opportunities.

Among these labor market shifts, accelerated technological change and globalization may hit wages hardest by exacerbating the existing trends towards labor market polarization -- with employment growth occurring primarily in high-income and low-income occupations, accompanied by an erosion of those in the middle. Research has shown that the distribution of jobs by skill level has shifted since 1980 as the number of jobs requiring medium levels of skill has shrunk and that such polarization has intensified since the 1990 (see figure below).²⁷

²⁴ Chicago Metropolitan Agency for Planning, "Impacts of national industrial development trends on the Chicago region," 2015. http://www.cmap.illinois.gov/about/updates/-/asset_publisher/UIMfSLnFfMB6/content/impacts-of-national-industrial-development-trends-on-the-chicago-region.

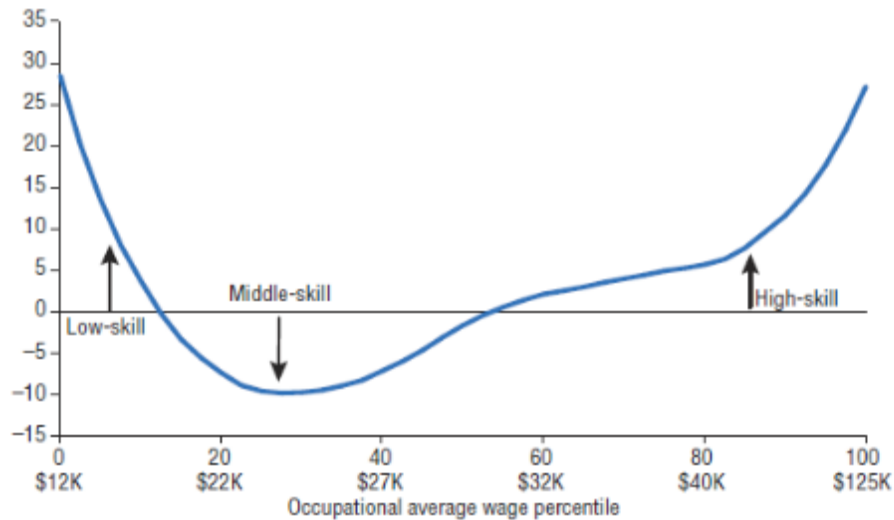
²⁵ Stalk Jr., George, and Petros Paraniakas, "Is your supply chain ready for the congestion crisis?" *Harvard Business Review*, June 22, 2015. <https://hbr.org/2015/06/is-your-supply-chain-ready-for-the-congestion-crisis>.

²⁶ Chicago Metropolitan Agency for Planning. Regional Economic Indicators: Real Median Household Income, 2016. <http://www.cmap.illinois.gov/economy/regional-economic-indicators>.

²⁷ Autor, David, and David Dorn. "The growth of low-skill service jobs and the polarization of the US labor market." *The American Economic Review* 103, no. 5 (2013): 1553-1597.



Figure 1 Percentage change in employment share in United States, 1980 to 2005



NOTE: Dollar amounts are annual income in 2004 dollars.

The 2001 and 2007-09 recessions in particular drove economic stratification via the relative loss of middle-skill, middle-income jobs, when the economy failed to recover such jobs in the following expansions.²⁸ While other middle-income opportunities could exist in the future for those with sufficient skills training, even a temporary shift into lower-skilled service occupations could become self-reinforcing and permanent. For example, workers without the time or access to retrain for other occupations may not be able to recover fully once displaced. In particular, employees of small- and mid-sized businesses may require additional support in accessing training and upskilling programs. Such companies often lack the internal capacity or resources to support improved math, reading, and technology proficiency or train for higher-level skills among their workers.²⁹

Major impacts: disproportionately impacted communities

In 2050, communities have uneven access to opportunities generated by a transformed economy. Soaring barriers to entry, loss of middle-skill jobs, and declining prosperity in once-stable communities combine to create drag on many residents' economic mobility. High-poverty

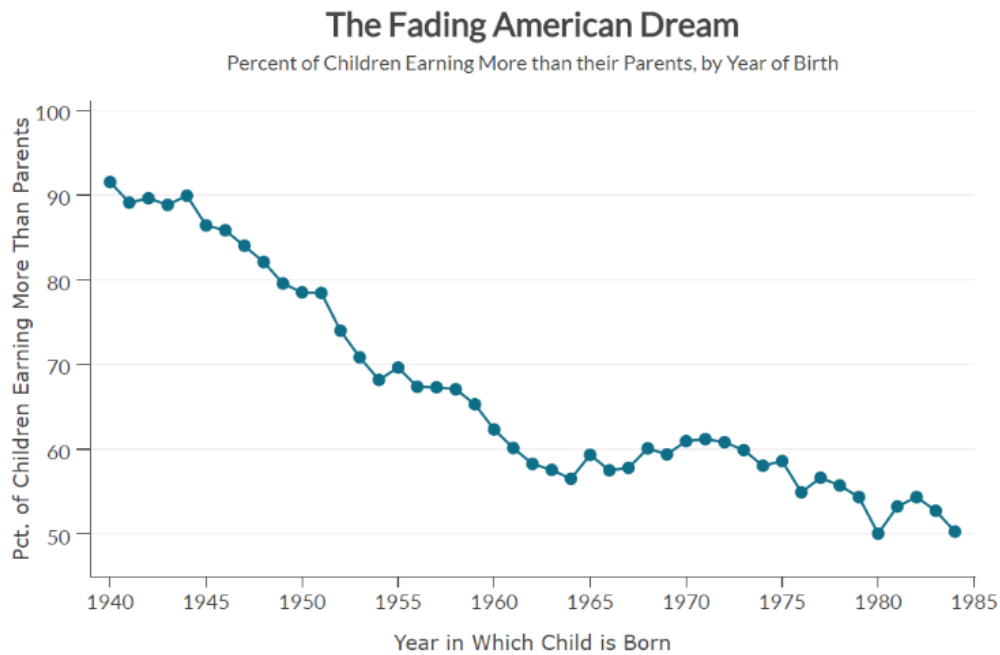
²⁸ Cheremukhin, A. "Middle-skill jobs lost in US labor market polarization." See also Jaimovich, Nir, and Henry E. Siu. *The trend is the cycle: Job polarization and jobless recoveries*. No. 18334. National Bureau of Economic Research, 2012.

²⁹ Berson-Shilock, A. "Foundation skills in the service sector: understanding and addressing the impact of limited math, reading and technology proficiency on workers and employers." National Skills Coalition, 2017.



areas that have historically struggled to connect to the regional economy fall even further out of the mainstream.

For many workers in the Chicago region, the transformed economy could mean higher educational requirements for fewer middle-skill, middle-wage jobs in occupations dramatically different from those of the past. Opportunities would likely remain plentiful for those residents with access to training and the other keys to upward economic mobility. Due to increased difficulty in finding and keeping good jobs, fewer people would be able to achieve an equivalent or higher standard of living than their parents or to keep pace with the rising cost of housing, education, and other factors of household financial security. Research already shows that fewer than half of millennials -- those who will be nearing the current age of retirement in 2050 -- are expected to earn more than their parents did at age 30.³⁰



Source: Chetty, Raj and Nathaniel Hendren et al. "The Fading American Dream: Trends in Absolute Income Mobility Since 1940," National Bureau of Economic Research, 2016.

As this trend continues in a transformed economy, today's young adults may work later in life to mitigate lower lifetime earnings and the resulting limited retirement assets. The trend could be compounded for demographic groups that currently earn less than other workers in the same occupations and industries.

Not every resident would be equally positioned to cope and adapt to this future. The combined impacts of labor market effects, upskilling, and depressed wage growth would fortify barriers

³⁰ Chetty, Raj and Nathaniel Hendren et. Al. "The Fading American Dream: Trends in Absolute Income Mobility Since 1940," National Bureau of Economic Research, 2016. http://www.equality-of-opportunity.org/papers/abs_mobility_paper.pdf



to entrance, job security, and upward economic mobility for all workers. Economic stratification could worsen most among the lower skilled and those coming from already economically disconnected areas, areas that are especially impacted by economic and racial inequality. Today, the Chicago region is one of the most stratified regions in the U.S. by income, race, and ethnicity, and the disproportionate impacts of this future would widen the gap.³¹ Families who are forced to move frequently because of economic or housing instability can risk damaging their children's educational attainment and development.³²

In this future, high-quality jobs, good schools, and other amenities could continue to concentrate in higher capacity municipalities, creating greater difficulty for lower-income families to climb the economic ladder. Communities with an insufficient or unstable tax base would face increasing fiscal challenges that diminish municipal capacity and lead to insufficient resources, including public services, infrastructure, and quality education. These conditions negatively affect students' educational outcomes and schools' ability to deliver the higher quality education and services required for unemployed and underemployed residents to participate in the economy.³³

A growing body of research underscores how greater income inequality and segregation exert a negative influence on regional economic growth.³⁴ Without resources to invest in education or skills acquisition, residents in economically disconnected areas cannot advance, stifling innovation, entrepreneurship, and the movement of new businesses to the region.³⁵ Over time, these drains on productivity and employment growth would limit the region's competitiveness. In turn, such stratification could curtail individual and aggregate prosperity -- even in high-capacity municipalities experiencing many benefits of the transformed economy. By 2050, regional economic competitiveness and sustained economic growth would depend on ensuring access to opportunities for all residents.³⁶

³¹ Grabinsky, Jonathan, and Richard V. Reeves. "The most American city: Chicago, race, and inequality." Brookings Institution, 2015. <https://www.brookings.edu/blog/social-mobility-memos/2015/12/21/the-most-american-city-chicago-race-and-inequality/>

³² Grade-school children with more than two school moves are 2.5 times more likely to repeat a grade, and adolescents who experience school moves are 50 percent more likely not to graduate from high school. Cutts, Diana et al. "US Housing Insecurity and the Health of Very Young Children", *American Journal of Public Health*, 2011. <https://www.ncbi.nlm.nih.gov/pubmed/21680929>

³³ Cunningham, Mary, and Graham McDonald, *Housing as a Platform for Improving Education Outcomes among Low-Income Children*, Urban Institute, 2012. <http://www.urban.org/sites/default/files/publication/25331/412554-Housing-as-a-Platform-for-Improving-Education-Outcomes-among-Low-Income-Children.PDF>.

³⁴ Metropolitan Planning Council and Urban Institute, *The Cost of Segregation*, 2017. <https://www.metroplanning.org/uploads/cms/documents/cost-of-segregation.pdf>

³⁵ Organisation for Economic Co-operation and Development, "Economic Policy Reforms 2016: Going for Growth Interim Report," 2016. <http://dx.doi.org/10.1787/growth-2016-en>; Brookings Metropolitan Policy Program, "MetroMonitor: Tracking growth, prosperity, and inclusion in the 100 largest U.S. Metropolitan areas," 2016. <https://www.brookings.edu/wp-content/uploads/2016/07/MetroMonitor.pdf>.

³⁶ Benner, Christ and Manuel Pastor. *Equity, Growth, and Community: What the Nation Can Learn from America's Metro Areas*, California: University of California Press, 2015. <http://dx.doi.org/10.1525/luminos.6>



Strategies to prepare for a transformed economy

CMAP and partners can undertake a number of strategies and actions now to prepare for a future economy transformed by accelerated technological change. These actions aim to ensure future opportunity for all residents. Many of GO TO 2040's recommendations -- coordinating workforce and economic development efforts, improving education quality and access, enhancing the commercialization of research -- serve to improve the region's economic competitiveness, and CMAP continues to advocate strongly for these existing recommendations. Below are additional strategy areas for CMAP and partners to consider in response to the economy's changing needs and technological advances. These strategies are described in more detail in related CMAP strategy papers and research (see Attachment). Each broad strategy may include questions for stakeholders that will help CMAP to better understand preferences or message the issues or solutions. These questions may be included in future surveys to stakeholders.

1. Align education and workforce development with the changing workplace

In this future, workplaces would increasingly expect employees to have both the technical and soft skills necessary to leverage technology in creative and unpredictable environments. To compete in the labor market, the Chicago region's residents would need additional post-secondary training to enter the workforce, continuous training later in life, and training with a renewed emphasis on soft skills. The region's education and workforce development systems will need additional coordination and collaboration with industry to better prepare workers for those activities that technological advancements will augment, not replace.

CMAP and partners should emphasize investments in the human capital of all communities, especially those least prepared to adapt to the transformed economy, as a primary driver of broad, robust, and sustained prosperity in the region. To that end, educators, training providers, and industry should re-examine how technology could reconfigure and deepen work we do today, as well as what set of skills should be priorities for investment. Industry and institutional partners should help to ensure that policymakers and jobseekers alike understand the importance of such skills as problem solving, conflict resolution, team collaboration, and social intelligence.

Many institutions have an important role to play in providing remedial education and on-the-job trainings that teach basic skills in math, reading comprehension, and computer use in the context of a specific occupation. Public-private partnerships could enable mid-sized or smaller firms to retrain workers. Although no single strategy can meet the needs of all job seekers, greater coherence and collaboration within and across the complex education and workforce development systems could ensure that workers at every skill level can enter and stay in the workforce. In particular, major investments are required in lower capacity municipalities, economically disconnected areas, and communities experiencing disinvestment, where



historically marginalized populations already struggle to access high quality education and economic opportunities. Their participation in and contribution to the region's economy is critical to ensuring economic growth and prosperity for all residents.

Key questions about this strategy:

- What are the most promising methods to utilize the region's existing human capital?
- What represents the best opportunity for local collaboration in workforce readiness?
- What are the most important investments to ensure workers are able to succeed in the future economy?

2. Support further growth and concentration in traded clusters

In this future, the region's concentration of diverse industry clusters could further enhance our competitiveness in the global marketplace. Yet, delivering on this potential would require industries to harness the benefits of technological change and to employ a deep pool of skilled workers. Stronger, more adaptive support for traded clusters -- such as transportation and logistics, business services, and metalworking technology -- could capitalize on opportunities to further grow and concentrate the regional economy.

CMAP and partners could play a key role in convening coalitions around traded industry clusters to organize regional strategies. Metropolitan Chicago could enhance sector strategies such as the Chicago Metro Metals Consortium or the recently established Chicagoland Food and Beverage Network and identify other sector-based opportunities. CMAP, specifically, can help to improve the region's understanding of the unique land use, transportation, and workforce needs of growing clusters in the region. Partners could pursue strategies such as increasing market research efforts, identifying existing export relationships, conducting foreign trade missions, and helping small- and medium-sized businesses create export plans. Likewise, meeting the clusters' skilled workforce needs would require coordinated and collaborative training programs tailored to specific industry demand. Finally, the Chicago region has a major interest in pursuing rapid technology adoption in its major industry clusters to support business innovation and capture competitive advantages. Coalitions of industry stakeholders could lead efforts to connect regional businesses to their respective innovation ecosystems and to prepare their organizations for technological change.

Key questions about this strategy:

- What regional strategies would be most important to support the specialized industries that provide our region with a competitive advantage?
- How can local governments and economic developers better coordinate and collaborate to achieve regional economic development goals?

3. Modernize the region's transportation network

In 2050, economic growth will continue to depend on a reliable, modern transportation network for people and goods. Current public revenue streams are inadequate to provide the necessary transportation investments for roads, transit, or the freight network, and investments are not



necessarily coordinated with regional economic development efforts. As a result, the region must advance performance-based programming practices to account for passenger, freight, and industry needs, as well as pursue new funding concepts such as vehicle miles traveled fees, new freight user fees, or public-private partnerships. Ensuring high quality transit would be particularly necessary for lower income residents who need affordable modes of transportation that connect jobs, homes, and amenities.

The importance of the region's freight network will only grow in an economy that increasingly emphasizes just-in-time shipments, agile supply chains, and global trade. As a result, the region must invest in a modern, multimodal freight network in order to ensure its economic position. These investments must untangle the region's -- some of the nation's -- worst road and rail chokepoints, while also providing the necessary operations, technology, and capacity improvements to accommodate future freight volumes. Truck routes and permitting requirements should be reviewed and harmonized across local jurisdictions. Improvements are also needed to fully capitalize on the region's extensive freight infrastructure, provide better connections between freight modes, and reduce adverse community impacts of goods movement. The region should focus freight and warehousing uses in already-developed communities, capitalizing on existing transportation and utility infrastructure, as well as access to an appropriate workforce. Local governments should pursue best practices for zoning and development, ensuring that freight-related land uses can both function efficiently and serve as good neighbors to the community.

Key questions about this strategy:

- What actions are most critical for maintaining, modernizing, and enhancing the Chicago region's transportation network?
- How can planning for the freight system be improved to reduce negative community impacts and improve freight flow throughout the region?

4. Ensure efficient, responsive governance in the region

While future innovations would offer new business opportunities and performance benefits, regional competitiveness in the global marketplace depends on state, regional, and local conditions and policies. Primarily, state and local governments must stabilize budgets, modernize the tax code, and pursue greater coordination to be more resilient to economic shifts while providing adequate revenues to maintain and enhance services.

In order to gain competitive advantage on a global scale, CMAP and partners should create a regional strategy to coordinate local economic development efforts across jurisdictions and reduce intraregional competition. Specific strategies would include anti-poaching agreements, revenue and information sharing, coordinated business attraction and retention initiatives, and prioritized multijurisdictional infrastructure investments. Where appropriate, consolidation of local governments could improve governance, reduce overhead costs, and increase the efficiency and quality of service delivery. These cost savings would free up resources for infrastructure and other initiatives that would support skilled workers and businesses.



In this future, communities that are most responsive and resilient to change would be the most competitive. The subsequent changes to land use and development patterns from changing consumer patterns would ultimately effect local revenues, particularly for communities dependent on sales tax as their major source of revenue. Ensuring a balanced mix of revenue types would help communities better respond to market fluctuations, and make it easier for communities to determine land use decisions based on their livability goals. The state's tax code can be modernized by expanding the sales-tax base to include additional services, phasing out the assessment classification in Cook County, and other strategies that align tax policies with regional and local economic development goals. Doing so would help to ensure that all communities in the region are better equipped to be competitive.

Key questions about this strategy:

- What public resources are most important to ensure efficient, responsive governance in the region?
- What strategies would be most useful for local governments to enhance collaboration?

5. Promote economic and process innovation

In a future with accelerated technological change, the region would need to better capture the opportunities and economic returns of innovation to fuel growth. A stronger culture of innovation could couple with existing resources to support the development of new ideas, processes, and products. In particular, current institutions, programs, and policies could be tailored to support viable startup and young companies attempting to scale. Supports range from technical assistance to improving access to financing. The region would also benefit from stronger investments in human capital, which will always be the source of next-generation ideas and the hardest regional asset to replicate.

CMAP and partners should expand regional programs and investments that foster the experimentation and creativity that lead to innovation. Strategically encouraging regional industry clusters with potential for highest growth would help to prioritize regional infrastructure and workforce investments that attract businesses and skilled workers. The Chicago region should also foster high rates of research and development investments, technology commercialization among existing businesses, and creation of new businesses. CMAP and partners could encourage the formation of industry centers or networks that offer concentrated services tailored to small- and medium-sized enterprises lacking access to their innovation ecosystems and financing.

CMAP and partners should also use performance-based approaches whenever possible in the development and evaluation of plans, policies, and programs regarding economic development. These approaches identify performance goals and synthesize data and stakeholder feedback to reflect market feasibility as well as the changing nature of work and consumption. More robust, accessible information systems could serve both transparency and evaluation efforts. Both the public sector and businesses would require access to data sources concerning education,



workforce needs, business outcomes, regional industry trends, and the performance of public policies and programs. CMAP and partners should also identify and communicate additional metrics and data sources for tracking innovative capacity in the regional economy. Further encouraging investment and market incentives that align with broader policy objectives (e.g., inclusive growth) could serve to maintain the region's comparative advantage, promote innovative industries, and attract under-performing sectors of major industry clusters.

Key questions about this strategy:

- What policies, programs, and investments can be expanded or put into place to foster innovation that provide our region with a competitive advantage?
- What actions can address challenges and shift policy to spur more innovative activity? Which entities should be engaged?

6. Support municipal capacity and quality of life

The benefits and burdens of the transformed economy would affect communities in different ways, with the most negative effects accruing to places unable to provide adequate education, a safe and high quality of life, easy access to work and school, and other connections to an increasingly technologized, competitive economy. While education and public safety are beyond CMAP's purview, factors related to place -- like municipal capacity, housing security, and commute type and duration -- deeply affect educational outcomes and job stability. Investments that improve municipal capacity and vibrancy -- especially in disinvested or economically disconnected areas -- could help to create environments more conducive to learning, mitigate negative effects, and provide better access to core needs and services.

Potential avenues for improving the resiliency of low-capacity municipalities in a transformed economy could include reforms to state tax policy as discussed above; providing capacity building training and technical assistance for planning from agencies like CMAP; identifying opportunities among neighboring communities to conserve resources by sharing or consolidating services; and targeting development in areas already served by infrastructure and municipal services. Along with continuing to make the case for significant investment, strategies like these could free up resources for investments in communities that raise competitiveness and quality of life, thus attracting businesses and workers while creating environments more conducive to individual and family well-being.

Key questions about this strategy:

- What strategies should CMAP and its partners employ to increase the capacity of municipalities to provide core services to economically disconnected areas?
- How can local and regional planning improve all communities' and residents' abilities to participate in the economy and achieve a high quality of life?

7. Pursue inclusive growth

In a transformed economy where workers least prepared to compete for jobs face rising barriers to entry, special attention should be paid to creating opportunities for all individuals,



businesses, and communities to participate in the economy. By complementing growth resulting from the adoption of advanced technologies with targeted efforts to make sure those benefits are shared broadly, the region would be able to achieve more robust and sustained growth by 2050 and beyond.

Strategies to promote inclusive growth in the transformed economy would need to cut across every sector, focusing on ways for the region to keep workers across all classes, races, ethnicities, and geographies economically engaged and competitive. Failing to do so would not only damage the region's potential for growth by constricting the pool of skilled labor, it could also exacerbate an uneven distribution of benefits and drawbacks from the transition to the transformed economy.

Support for both workers and communities would be necessary to promote better connections between high-poverty, high-minority communities and the benefits of an increasingly technology-intensive economy. Key strategies to promote inclusive growth in the transformed economy include:

Focusing regional economic development efforts on industries that offer pathways to upward mobility. Efforts to increase regional coordination on economic development should also place emphasis on developing those industry clusters that provide jobs with lower barriers to entry, opportunities to acquire new skills and training, and options for workers to advance over time. Keeping these pathways open will help to defer some of the polarizing effects of the transformed economy.

Link economically disconnected areas to jobs and educational opportunities. In programming limited transportation dollars, the region should identify and prioritize projects that help workers reach jobs with upward mobility and high quality training. CMAP and transportation partners should examine criteria for future programming to identify and improve these connections.

Reinvest in disinvested areas. To compete in this future, communities would need well-maintained and modernized infrastructure, a good quality building stock, strong services, and the staff and financial capacity to address each of these areas well. Special efforts should be made in this future to identify unique solutions for persistent vacancy, direct planning and infrastructure resources to disinvested communities, and build local resident and municipal capacity.

Support affordable housing, especially in areas with access to transit. In a transformed economy, some individuals and households would struggle to access to opportunities and maintain financial security. Communities should seek to provide high quality, affordable housing options to these residents, especially in locations with strong access to transit. Stable housing for low- and moderate-income families would be particularly important to addressing disparities in educational attainment and job readiness.



Together, strategies like these would help the region grow more inclusively, greatly expanding options for all workers and communities to benefit in the transformed economy.

Key questions about this strategy:

- What are major barriers to ensuring affordable housing for families?
- How can we ensure the region's prosperity is widely shared in 2050?
- What kinds of connections or supports are most important to help workers access opportunity, both today and in the future?

Next steps

Following committee review and feedback, staff will finalize this memo and share its findings and strategies with the public. The memo will be accompanied by an interactive online survey (MetroQuest) that will allow residents to learn about and select preferences for strategies to prepare for a transformed economy. In addition, CMAP has developed interactive kiosks illustrating the key features of a future with a transformed economy. The kiosks are hosted at various locations throughout the region and are available as online videos. Both the kiosks and the MetroQuest site will be used during an intensive public engagement period beginning in July 2017.

Four other potential futures for the region are also being explored. These futures will be oriented around what the region would be like if climate change impacts intensified; if public resource are diminished; if significant technological advances enhance transportation; and if more people chose walkable, mixed-use communities. These futures will also be accompanied by interactive kiosks and MetroQuest platforms. Staff will develop a final memo highlighting cross-cutting solutions featured across each of the five futures. These solutions will inform strategies recommended in ON TO 2050, which will be completed in October of 2018.



Attachment: Related CMAP products by strategy

Strategy	Related CMAP ON TO 2050 snapshots and strategy papers
1. Align education and workforce development with the changing workplace	Human capital, innovations, and clusters
2. Support further growth and concentration in traded clusters	Clusters, innovation, regional economic development
3. Modernize the region’s transportation network	Transportation system funding concepts, transit modernization, highway operations
4. Ensure efficient, responsive governance in the region	Tax policies and land use trends, municipal capacity, asset management
5. Promote economic and process innovation	Human capital, innovations, and clusters, regional economic development
6. Improve municipal capacity and housing security	Municipal capacity, tax policy and land use, reinvestment and infill
7. Promote inclusive growth	Inclusive growth, housing supply and affordability, reinvestment and infill

