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FINAL REPORT

Future of Work: Scenario Planning for COVID-19 Recovery

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16. Abstract <p>The COVID-19 pandemic caused widespread lockdowns across the world in early 2020, with major implications to spatial and temporal commuting patterns as a result of increased work from home (also known as telework) activities. There has been a high degree of uncertainty on what work from home impacts will persist in the future. In this report, we first conduct a thorough review of news articles, published reports, and peer-reviewed literature to summarize telework trends. We also use scenario planning to bring together ten experts from academia, public sector, industry, and commercial real estate in two 1.5-hour long workshops to discuss the impacts of telework on transportation, housing, commercial real estate, and land use.</p> <p>In our article review, we find that in the first few months of the pandemic, companies were more optimistic toward telework, but in summer 2020, several large tech companies signaled that they were interested in maintaining significant office presences in downtown locations. Surveys of white-collar workers indicated that employees were more likely to prefer remote work, compared to employers who wanted employees to return to the office. This finding is confirmed by industry experts in the scenario planning workshops, who said that companies must adopt flexible remote work policies to retain talent at their organizations. As companies shift toward more remote work options, this has implications on spatial and temporal commuting patterns, including commute mode choice, and implications for non-work travel. Flexible work policies could lead to varying travel demand by day of the week and time of day, which could lead individuals to prefer driving a personal vehicle over taking public transit. However, there are opportunities to increase active transportation mode share to serve short non-work trips in urban areas. Meanwhile, public transit service models will need to evolve to serve more off-peak trips and more trips in low-density suburban areas. Experts in the scenario planning exercise identified several avenues of future research, including studying long-term impacts of hybrid work policies, analyzing changes in public transit use by time of day and trip purpose, and assessing impact of pricing policies on transportation use. Next steps for this research include using findings from the scenario planning exercise to inform the scenario inputs to a travel demand model for the Chicago metropolitan area.</p>			
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Executive Summary

The COVID-19 pandemic caused widespread lockdowns across the world in early 2020, with major implications to spatial and temporal commuting patterns as a result of increased work from home (also known as telework) activities for white-collar employees. Shifts to work from home have caused broad impacts on spatial and temporal commuting patterns, economic activity in central business districts, commercial real estate, and housing location choice. In this research, we first conduct an extensive review of news articles, grey literature, and peer-reviewed literature to summarize telework (and work from home) trends, including both employer and employee preferences for remote work, as well as impacts on vehicle miles traveled (VMT), economic recovery, and commercial real estate. We then use scenario planning to bring together experts from academia, public sector, industry, and commercial real estate to discuss and estimate the impacts of work from home on transportation, housing, and land use.

From the literature review, we found that changes to remote work during the COVID-19 pandemic has led to significant decline in public transit commute trips. During the early months of the pandemic, VMT decreased across all states in the U.S., but by March 2021, VMT had largely rebounded, with 37 states experiencing an overall increase in VMT compared to the pre-pandemic baseline. Meanwhile, temporal travel patterns have also changed, as analysis of hourly travel in U.S. cities has shown the lack of a morning rush hour peak and flattening of evening hour peak.

Surveys of employers have shown that preferences toward remote work have shifted over the course of the pandemic. While employers were optimistic about remote work in the first few months of the pandemic, by the end of 2020 and in early 2021, large companies were signaling renewed interest in in-person work, with companies such as Facebook, Google, and Amazon purchasing office space in downtown areas. At the same time, surveys of workers showed less interest in returning to in-person work. On average, employers expect employees to be in the office at least three days per week, while employee surveys indicate that employees would prefer to work remotely the majority of the time. Increases in COVID-19 cases due to new variants (e.g., Delta, Omicron) resulted in employers delaying or modifying return to office plans at the end of 2021. The continued changes to company policies and return to office plans, as well as differences between employer and employee preferences, highlight the uncertainty of the future of work during and after the COVID-19 pandemic.

To address these uncertainties about the future of work, we employed scenario planning to bring together experts on transportation, commercial real estate, and industry trends. To design the scenario planning exercise, we first convened a steering committee with five faculty members from the University Transportation Center (UTC) on Telemobility. The steering committee met between May and August 2021 and developed the following focal question to guide the discussion in the scenario planning workshops:

What will travel demand and spatial patterns look like for public transit and automobile travel in the “next normal,” given changes to in-person work, in the next three to five years?

The steering committee also developed and refined four possible scenario worlds with varying degrees of employer policies regarding remote work (rigid vs. flexible) and office locations (centralized vs. decentralized). An overview of these scenario worlds is shown in Figure ES 1 below. Note that these scenarios are primarily focused on impacts to white-collar employees.

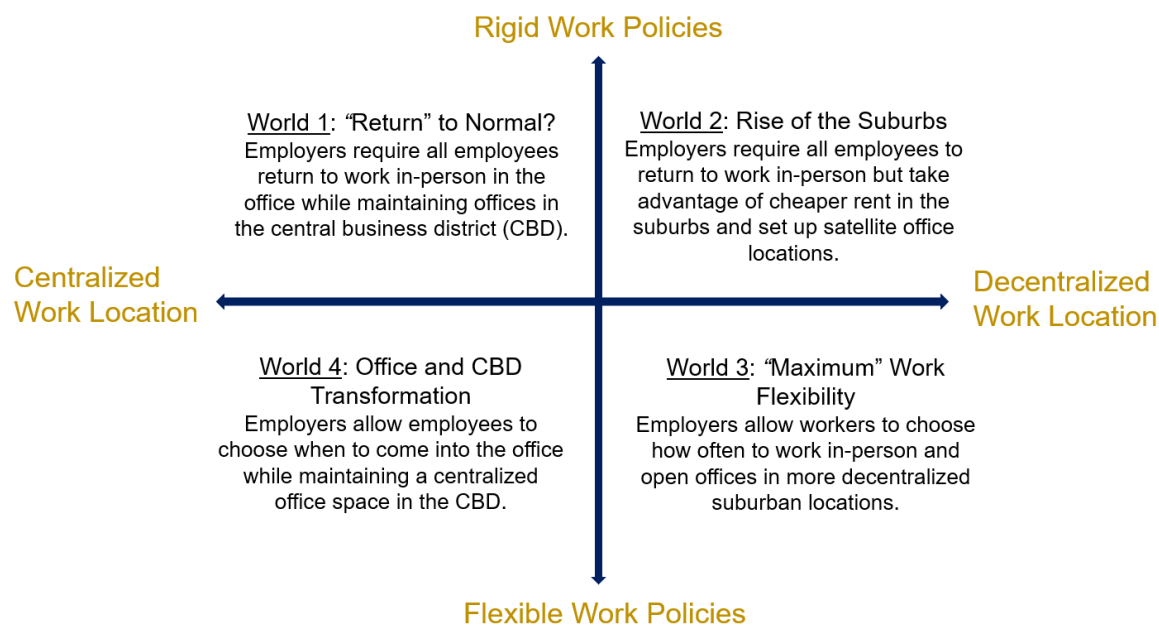


Figure ES 1: Overview of Scenario Worlds

We then convened two 1.5-hour scenario planning workshop sessions in March 2022 with ten experts from academia, public sector, industry, and commercial real estate and four faculty members from the Telemobility UTC to discuss the impacts of work from home on public transit, auto travel, housing, and land use in urban and suburban contexts. We also asked workshop participants to assess the likelihood of each scenario world to occur in the “next normal.” The key takeaways from the two workshops are summarized below:

Overall takeaways:

- **Maximum flexibility:** Experts agreed that any company requiring full-time in-person work would be at a competitive disadvantage in the race for talent. Moving forward, most workplaces will offer white-collar employees a hybrid of in-person and remote work options.
- **Uncertainty around office locations:** Experts were uncertain whether companies would maintain office presences in the CBD or decentralize workplaces to suburban areas in the next three to five years.
- **CBD transformation is likely:** Workshop participants agreed that the nature of offices would change to take advantage of increased remote work, and this could lead to changes in the CBD (e.g., conversion of office space to residential or other uses).

Transportation takeaways:

- **Changes to non-work travel:** More flexible work policies will impact non-work travel and may result in spatial and temporal changes in travel demand, such as more non-work trips taking place in urban areas and during the day.

- **Opportunities to increase active transportation mode share:** With more non-work trips taking place in urban areas and during the day, there are opportunities to shift short, non-work trips in high-density urban areas to active modes (e.g., walking, biking).
- **Need for innovation in public transit funding and operations:** Increased flexibility in work policies poses an existential threat for public transit and exposes the need for public transit agencies to evolve and find new funding mechanisms and operating strategies.

Given the impacts that work from home policies and preferences have on spatial and temporal travel patterns, experts suggested the following policy options to maximize social and environmental benefits.

- **Set clear guidelines for flexible work policies:** Employers should consider requiring in-person work on specific days per week, a strategy which offers employees flexibility to work from home while mitigating some the impacts of work from home on travel demand (e.g., public transit use).
- **Implement travel demand management (TDM) strategies:** Flexible work policies will result in varying travel demand by day of the week (e.g., fewer commutes on Mondays and Fridays) and time of day (e.g., more non-work trips during the day), which could result in higher congestion compared to pre-COVID travel patterns. TDM strategies can mitigate the impacts of variable travel demand and can be used to induce modal shifts away from single-occupancy vehicles toward public transit.
- **Develop more flexible public transit:** Public transit services must innovate and become more flexible to better serve off-peak hours and suburban locations, as these times of day and locations are where experts presume to see an increase in trips with more flexible work policies, while at the same time accounting for potentially lower demand during peak periods. Existing examples of public transit agency partnerships with microtransit services are one potential strategy to increase public transit flexibility.
- **Densify suburban areas:** As the suburbs continue to grow and develop, increasing reliance on private vehicle use will increase greenhouse gas emissions and congestion. Land use policies that support increasing density and transit-oriented development can reduce private vehicle use in suburban areas.
- **Expand walking and biking infrastructure:** Increases in short, non-work trips taken during the day present an opportunity to shift these trips toward active modes. Expanding walking and biking infrastructure in cities and suburbs (e.g., wider sidewalks, new bike lanes) can encourage more use of active modes. Companies can also support active modes by installing facilities such as bike racks or showers in office locations.

These two workshops focused on the impacts of work from home in urban and suburban areas. The results from these workshops will be used to inform regional transportation modeling efforts in the Chicago metropolitan area as a next step. Future work could explore the impacts of work from home in other urban and suburban areas, as well as in rural contexts.

Introduction

The COVID-19 pandemic caused widespread lockdowns across the world in early 2020. As a result, employees who could complete their work remotely (primarily white-collar workers) were asked to work from home (also known as telework). In the two years since the pandemic began, shifts to work from home for white-collar workers have caused broad impacts on spatial and temporal commuting patterns, economic activity in central business districts, commercial real estate, and housing location choice. Yet, there has been a high degree of uncertainty on what work from home impacts will persist in the future.

In this research, we use a scenario planning approach to bring together experts from a wide range of disciplines to imagine different scenario worlds and outcomes thereby allowing experts to explore a range of possible alternatives and assumptions and build consensus around key ideas. In this scenario planning exercise, we brought together ten experts from academia, public sector, industry, and commercial real estate and four faculty members from the University Transportation Center (UTC) on Telemobility in two workshops in March 2022 to discuss and estimate the impacts of work from home on public transit, auto travel, housing, and land use in urban and suburban contexts in the next three to five years. We also asked industry representatives about the likelihood of each scenario world for their company or industry. The findings from the scenario planning workshops will be used to inform regional scenario-based modeling efforts in the Chicago metropolitan area and can also help guide policymakers as they consider how to approach future transportation issues in the face of changes to the nature of work.

In this report, we first conduct a literature review of news articles, grey literature, and peer-reviewed literature on work from home trends and employer and employee preferences for remote work. We then describe the scenario planning process, including introducing the four scenario worlds in more detail, summarize our findings on the transportation and land use impacts in each scenario world, along with the likelihood of that scenario world occurring, and conclude with future research directions and next steps.

Literature Review

Since the COVID-19 pandemic resulted in worldwide lockdowns in early 2020, there has been a high degree of uncertainty on which work from home impacts will persist. We conducted a review of news articles, published reports, and peer-reviewed literature to summarize work from home trends, including both employer and employee preferences for remote work. In this section, we begin with background on overall vehicle miles traveled (VMT) trends during the pandemic, economic recovery scenarios after the pandemic, and commercial real estate trends. We then provide an overview of employer preferences for telemobility, changes to the labor market and hiring processes, and conclude with employee preferences and recent impacts of COVID-19 variants.

Background: VMT Trends

With more employees working remotely, there are fewer people commuting to their office, resulting in changes to VMT and spatial and temporal travel patterns. In a survey of U.S. adults from July to October 2020 (n=7,613), researchers estimated the transportation impacts of continued remote work, finding that less frequent commuting would reduce car commute kilometers by 15% and that public transit commute trips would decline by 40% (Salon et al., 2021). Survey findings indicate that the decline in car commute kilometers is due to less frequent commuting and not because fewer people would choose to commute

by car. However, the decline in public transit commute trips does occur partially due to public transit commuters shifting to other transportation modes. Of the total decline in public transit commute trips, 40% can be attributed to respondents shifting to commute by car, while 10% is due to respondents shifting to commute by other modes.

Analysis of mobile location data revealed the impacts of the pandemic on overall VMT (*Measuring a Year of Pandemic Travel: Where Next?*, 2021). Widespread lockdowns across the United States initially led to a significant reduction in VMT in March and April 2020 compared to January and February 2020. More recent analysis found that VMT in March 2021 has rebounded to 2% above the pre-pandemic baseline from February 2020. While the extent of VMT recovery varied between states, 37 states saw an overall increase in VMT in March 2021 compared to pre-pandemic levels. This rebound in VMT occurred despite a higher percentage of workers working remotely compared to before the pandemic,¹ which indicates that changes in VMT may not be entirely dependent on reduced commuting due to work from home measures. In fact, prior research has found that telecommuters in the U.S. have longer (i.e., distance) daily work trips and non-work trips compared to non-telecommuters (Zhu et al., 2018). The authors attribute this finding to the fact that telecommuters may choose to live in locations further away from work and non-work destinations (e.g., grocery stores, medical services, schools, etc) (Zhu et al., 2018).

Despite VMT rebounding to pre-pandemic levels, analysis of hourly travel in some U.S. cities indicates that temporal travel patterns have changed during the pandemic. In five major U.S. metro areas (Chicago, New York, Dallas, Los Angeles, and San Francisco), rush hour peaks have shifted, with the lack of a morning rush hour peak and flattening of the afternoon hour peak (*Measuring a Year of Pandemic Travel: Where Next?*, 2021). Prior research on remote workers provides an explanation for the change in rush hour behavior. Stiles & Smart (2020) analyzed American Time Use Survey data from 2003 to 2017 to show that full and part-time teleworkers are more likely to avoid peak hour travel in the morning than in the evening. However, in some U.S. cities, for example Orlando and Tampa, peak rush hour travel has returned to pre-pandemic levels, with no change in morning or afternoon rush. Trends in these cities are a warning sign that changes to travel patterns as a result of the pandemic may not persist, and that encouraging shifts in rush hour travel or decreases in VMT will require policy intervention.

Background: Economic Recovery

As the pandemic recedes and restrictions on travel and essential businesses loosen, there are two primary scenarios for economy recovery. Statements from the U.S. Federal Reserve at the beginning of 2021 indicated that inflation has increased faster than expected, as the consumer demand for goods and services rebounded faster than supply (Smialek, 2021). The Fed anticipates two scenarios, one with high inflation and one with low inflation. In the high inflation scenario, economists predict that stimulus money from the federal government, along with higher savings rates during the pandemic, will discourage workers from returning to the labor market (Leonhardt, 2021). As a result of lower labor supply, wages will increase, leading to price increases. In this scenario, the persistent effect of lower labor supply could

¹ A survey of about 600 senior managers in U.S. firms found that approximately 10% of employees worked remotely in 2019, compared to 64% in January 2021 (Altig et al., 2021).

cause an inflationary spiral, which would compel the Fed to raise interest rates more quickly. In the past, rapid interest rate increases have caused economic recessions.

On the other hand, Leonhardt (2021) argues that economists have consistently overestimated the risks of inflation in the past. Jerome Powell, the chairman of the Federal Reserve, also points at evidence that the modern American economy tends to restrain inflation to allay fears of the high inflation scenario. In the low inflation scenario, considered more likely by officials in the Federal Reserve and in the Biden administration, prices will move back to normal as the economy continues to re-open. The end of federal stimulus and government spending will also slow down economic growth and restrain inflation.

Background: Commercial Real Estate

Changes to the nature of work have also been reflected in commercial real estate markets. As more employees work from home, the need for office space has temporarily decreased. This is reflected in decreases in office rents in cities across the world in Q1 2021 compared to Q1 2020. However, there are early signs of recovery, as some markets, such as Paris, Berlin, and Seoul, have seen office rents increase in Q1 2021 compared to Q1 2020 (CBRE Research, 2021). In the long-term, there are signs that the demand for office space has increased. Commercial real estate agents have reported increases in client engagement, touring activity, and number of tenants seeking space (CBRE Research, 2021). Employer surveys support this theory; in surveys conducted in June 2020 (n=120) and December 2020 (n=133), over 50% of executives expect to increase office space in the next three years due to social distancing requirements (*When Everyone Can Work from Home, What's the Office For?, 2020*).

The impacts of the pandemic on office rents differed based on geographic location. In the U.S., office rent markets in large coastal cities have been more heavily affected than in other cities, such as Atlanta, Denver, and Dallas (CBRE Research, 2021). Within cities, office rents have fallen more in areas with high-density than areas with low- or medium-density (Ramani & Bloom, 2021). Surveys (n=1,600) and interviews (n=1,350) conducted with company executives reveal that some companies are considering moving from a consolidated office model to a hub-and-spoke system, where satellite offices in suburban areas replace a single headquarters in an urban area (PwC & The Urban Land Institute, 2020). As one example, the sporting goods company REI put their new headquarters in Seattle up for sale and announced that future headquarters would be located in multiple regions across the U.S. (*REI Co-Op to Pursue Sale of Headquarters, Embrace Distributed Work Model, 2020*).

Employer Preferences for Telemobility

In our analysis of news article and other literature on telemobility, we found that employer preferences for remote work shifted over the course of the pandemic. Companies were largely optimistic about remote work for the first few months of the pandemic. Articles from The New York Times, NPR, and USA Today spoke about the potential of permanent work from home and signs that companies were embracing remote work. An executive at DocuSign told The New York Times in May 2020 that remote work would have a positive impact of productivity because employees would no longer lose time to commuting (Streitfeld, 2020). Also in May 2020, NPR reported that Facebook planned to hire more remote workers, with CEO Mark Zuckerberg stating that he expected half of all Facebook employees to work remotely in the next five to ten years (Bond, 2020). Other tech companies, including Twitter and Square,

announced that employees could work from home indefinitely (Bond, 2020). Indefinite work from home policies were not unique to the tech sector. Nationwide Insurance, a company based in Columbus, Ohio, closed five regional offices, allowing thousands of employees to permanently work from home (Berliner, 2020).

In the summer and fall of 2020, however, tech companies began purchasing office space in downtown areas again, signaling a renewed interest in maintaining a significant office presence. In August 2020, Facebook signed a 730,000 square foot lease on office buildings in Manhattan, which could potentially triple the number of Facebook employees in New York City (Haag, 2020a). This move by Facebook joins additional office space acquisitions by Google, Amazon, and Apple, all made during 2020 (Haag, 2020b). The real estate moves made by these tech companies in New York City indicates an interest in maintaining an in-person office presence in the city.

In the early months of 2021, there have been even more indications that employers want employees to return to the office at least part-time, which suggests that the early days of optimism about permanent telework may be in the past. A survey of about 600 managers at U.S. companies found that from May 2020 to January 2021, companies were more willing to try hybrid models of work, where employees split their time between working at the office and at home (Altig et al., 2021). However, these managers still expect the vast majority of their employees (over 70%) to work in person full-time after the pandemic, with less than 10% of employees allowed to work remotely full-time (Altig et al., 2021). Meanwhile, a survey conducted with 100 global executives from December 2020 to January 2021 found that 87% of executives were planning for hybrid remote and in-office work, with only a small percent of executives (only 3%) planning for fully remote work post-COVID, and only 10% planning for employees to be in the office full-time (Alexander, Cracknell, et al., 2021). These employer surveys show a desire to eventually return to full-time in-person work, with hybrid in-person and remote models dominating during the transition and recovery period after the pandemic.

Companies have a varied concept of what hybrid work models might look like. In a survey of 180 major employers in New York City, 63% of employers are planning a hybrid work model where employees will be required to be in the office three days per week, while 25% of employers will require employees to work in person full time and only 4% will allow employees to telework full-time. Remote work plans also vary based on the number of total employees at the company; small companies (with less than 500 employees) expect a larger share of employees to be back in the office than large companies (more than 5000 employees). This survey also found that employers lowered their expectations for in-person work as the pandemic has persisted; in August 2020, employers expected that 54% of employees would be working in-person by July 2021; by May 2021, this number had decreased to 29%, indicating that the return to the office has occurred more slowly than expected. However, between August 2020 and May 2021, employers have also increased their confidence in the timeline to return employees back to the office, with 97% of companies stating that they knew when to expect most employees to be working in-person again (Partnership for New York City, 2021).

Changes to Labor Market and Hiring Processes

In addition to developing plans to return employees to the office, employers have made changes to hiring processes to keep pace with changes to the labor market. A survey of 231 human capital professionals in

April 2021 found that employers are more willing to hire remote workers, as long as these workers can still occasionally work in person (Steemers et al., 2021). Before the pandemic, 48% of employers were not willing to hire remote employees at all, compared to 13% of employers in April 2021. Additionally, before the pandemic, only 7% of employers were willing to hire fully remote workers located anywhere in the US, which increased to 25% of employers in April 2021. In terms of recruitment, respondents reported slightly more difficulty recruiting qualified workers in professional or office organizations compared to before the pandemic, and much more difficulty recruiting workers in industry and manual services (Steemers et al., 2021). This may point at either continued discomfort with in-person work or the impact of receiving federal stimulus money that has reduced the willingness of workers to re-enter the workforce.

In response to difficulties with hiring, in a survey of 100 global executives in December 2020 and January 2021, most organizations reported making changes to their hiring processes (Alexander, Cracknell, et al., 2021). Among organizations that reported higher productivity levels during the pandemic, 41% stated that they had fundamentally rethought or reimagined their hiring processes and 53% moved in-person hiring activities or events to a remote format (Alexander, Cracknell, et al., 2021). An article from The New York Times states that companies are thinking more expansively about who is qualified for a job and are more willing to take a chance on applicants with an unconventional background (Irwin, 2021). An analysis of job listings indicates that the share of positions with the description “no experience necessary” has increased by 66% compared to 2019. Meanwhile, the share of positions offering a signing bonus has doubled, pointing at the increased financial incentives offered by employers to entice more workers. Data from the Bureau of Labor Statistics show that while the number of job openings decreased sharply in 2020, the number of job openings in 2021 is the highest it has been in 20 years. At the same time, the number of workers quitting has also increased to the highest level since 2008. Irwin (2021) argues that these data indicate that workers may feel more emboldened to quit or find another job if employers are not flexible enough on remote work.

Employee Preferences

There have been numerous surveys on the preferences of employees for remote work. Compared to employers, it appears that employees have a higher preference for continuing to work from home. The Survey of Working Arrangements and Attitudes (SWAA) shows how work from home preferences have shifted throughout the pandemic, with preference for remote work increasing among respondents through 2020 and 2021 (Barrero et al., 2021). The SWAA has been collected monthly from May 2020 to July 2021 with approximately 2,000 to 4,000 respondents per month. In May 2020, 24% of respondents wanted to work remotely five days per week. By November 2020, the share of respondents who wanted to work fully remote increased to 30%, and between November 2020 and July 2021, the share of respondents desiring full-time remote work remained between 28% and 33%. Meanwhile, in May 2020, 39% of respondents wanted to return to in-person work five days per week, a percentage that decreased to between 23% and 30% in late 2020 and early 2021 (Barrero et al., 2021).

In contrast to employers who largely expect employees to be in the office the majority of the time (i.e., at least three days per week), employee surveys indicate that employees want to work remotely the majority of the time. The SWAA from July 2021 found that 51% of respondents wanted to work from home three or more days per week (Barrero et al., 2021). A survey of U.S. office workers from June and December

2020 (n=1,200) found that similar shares of office workers preferred working remote at least three days per week (59% in June 2020 and 55% in December 2020) (*When Everyone Can Work from Home, What's the Office For?*, 2020). A global survey of 209,000 workers in 190 countries conducted from October to November 2020 found that 58% of respondents wanted to work from home at least three days per week (Strack et al., 2021). This survey also found global differences in preferences for remote work. Enthusiasm for remote work was highest in developing countries, including parts of Africa. Enthusiasm for remote work was also high for the U.S., with 35% of respondents indicating that they would be happy to work from home permanently, and the U.S. was the highest ranked developed country overall in terms of preference for remote work. A survey of corporate and government employees around the globe (n=5,043) found that 53% of workers wanted to work from home at least three days per week, and that work from home preference was highest in the U.S., Australia, and Latin America, with fewer workers preferring remote work in Asia and Europe (Alexander, De Smet, et al., 2021).

The contrast between employee and employer preferences for remote work may result in some conflict over what the future of work looks like. The SWAA found that employer desire for in-person work (60% of employers) is much higher than employee desire for in-person work (around 30% to 35% of employees). In fact, the desire for remote work is so strong that respondents are willing to accept an average pay cut of 7% for the option to work from home two to three days per week after the pandemic ends (Barrero et al., 2021). A survey of 1,000 US adults in May 2021 found that 39% of respondents would consider quitting if their employers were not flexible about remote work (Melin & Egkolfopoulou, 2021). There are also generational differences in preferences for work from home, with a higher percent of younger adults (49%) stating that they would be willing to quit over remote work policies (Melin & Egkolfopoulou, 2021). Meanwhile, after Apple announced in July 2021 that employees would be required to return to the office three days per week, a group of Apple employees drafted a letter to senior leadership requesting a more flexible approach to remote work. In the letter, employees referenced an internal survey of 1,100 employees that found that 68% of respondents stated that lack of location flexibility would cause them to leave the company (Schiffer, 2021).

In a report on the findings from the SWAA, Barrero et al. (2021) argue that remote work will persist for a number of reasons. First, the survey found that the majority of respondents reported better-than-expected work from home experiences and higher productivity when working from home. Widespread work from home policies during the pandemic swept away prior stigmas associated with remote work. Second, the average worker invested 15 hours of time and \$561 in setting up work from home equipment. Employers have also invested resources to improve back-end systems to support remote work. Finally, the authors have found a surge in patents that advance work from home technologies, which they expect will only raise the quality and efficiency of remote work over time.

Impacts of COVID-19 Variants on Return-to-Office Plans

The Delta variant of the coronavirus, led to surge in COVID cases in the U.S. over the summer of 2021, with the Omicron variant surpassing the Delta variant and leading to another surge in cases at the end of 2021 and in early 2022. . In response to the surge in cases from the Delta variant, companies in the tech sector, including Google, Lyft, Uber, and Twitter, postponed return to office plans to October 2021, with Twitter halting reopening plans indefinitely. For some other companies, the Delta variant did not impact

return to office planning, with Facebook and IBM stating that they would continue with their plans to re-open offices in early September (Hirsch & Browning, 2021). Other companies decided to use different methods to protect employees who are working in-person by instituting indoor mask policies (Home Depot, Walmart, Apple) or imposing vaccine mandates (Walmart, Equinox, The Walt Disney Company) (Hirsch, 2021).

In the wake of the Delta surge, it appeared that some companies, notably Google, were more open to flexible work arrangements. In August 2021, Google approved 85% of 10,000 employee work from home and office relocation requests (Bergen, 2021). Meanwhile, the Omicron variant in the winter of 2021-2022 delayed return-to-office plans even further, with most companies tentatively targeting mid-February return dates. However, the uncertainty around return-to-work dates has frustrated some employees; a survey of over 1,000 Americans conducted in late 2021 found that 39% of employees thought that companies should stop making return-to-work policies assuming that the COVID-19 virus would eventually go away (Qualtrics, 2022). Some companies have also changed safety protocols in light of more contagious variants, with companies including Starbucks and Delta Air Lines reducing the isolation period of vaccinated, asymptomatic workers from ten days to five days and changing the definition of “fully vaccinated” to include booster shots. These continued changes to company policies and return to office plans highlight the uncertainty of the future of work during and after the COVID-19 pandemic. We employed scenario planning to explore potential scenarios for the future work with insights from experts on transportation, commercial real estate, and industry trends.

In the next section of this report, we describe the scenario planning process in more detail and summarize our findings on the transportation and land use impacts of telework in each scenario world, and we conclude with future research direction and next steps.

Methodology: Scenario Planning Process

Scenario planning is used by planners and policymakers to prepare for potential impacts and challenges by imagining a set of alternative future scenarios. Engaging a diverse group of experts to participate in scenario planning, by mapping out plausible future scenarios, can help policymakers formulate strategies to respond dynamically to situations with high levels of uncertainty, such as changes to the nature of work given the COVID-19 pandemic.

This scenario planning exercise was loosely based on scenario planning workshops conducted in summer 2020 to guide the short- and long-term recovery of public transit and shared mobility services in the aftermath of the COVID-19 pandemic (see Shaheen and Wong, 2021). We provide an overview of each stage of the scenario planning process in Table 1 below.

Table 1: Overview of Scenario Planning Process

	Phase 1: Steering Committee	Phase 2: Expert Committee	
		<i>Workshop 1</i>	<i>Workshop 2</i>
# of Participants	5	11	11
Goals	<ul style="list-style-type: none"> - Construct focal question - Identify timeframe for analysis - Develop and refine scenario worlds 	<ul style="list-style-type: none"> - Discuss public transit and auto travel demand impacts in each scenario world - Assess likelihood for each scenario world to be the “next normal” 	<ul style="list-style-type: none"> - Discuss how transportation mode shares will change in each scenario world - Assess likelihood for each scenario to occur for employers/industry

Steering Committee

We convened a steering committee comprised of five faculty members from the Telemobility UTC. The steering committee met from May to August 2021 to develop the focal question and timeframe for the scenario planning exercise, as well as the four scenario worlds to explore during the exercise. The full list of steering committee members is in Table 2 below.

Table 2: List of Steering Committee Members

Name	Affiliation
Hani Mahmassani	Telemobility UTC Director; Northwestern: Patterson Transportation Chair / Director, Northwestern University Transportation Center
Sunil Chopra	Northwestern: IBM Distinguished Professor of Operations Management
Pablo Durango-Cohen	Northwestern: Associate Professor of Civil & Environmental Engineering
Joseph Schofer	Northwestern: Professor of Civil & Environmental Engineering / Associate Dean for Faculty Affairs
Susan Shaheen	UC Berkeley: Professor, Energy, Civil Infrastructure & Climate, Transportation Engineering

Based on discussions within the steering committee, we developed and refined the following focal question to guide the scenario planning workshop discussions:

What will travel demand and spatial patterns look like for public transit and automobile travel in the “next normal,” given changes to in-person work?

The steering committee also agreed to focus the discussion on the timeframe of the next three to five years.

To guide the scenario planning exercise, we used a similar methodology detailed in Shaheen et al. (2013). In this methodology, scenario worlds are constructed using two perpendicular axes representing impactful driving forces or external forces that could have significant impacts on the future. Through a series of planning meetings with the steering committee, we selected two key driving forces that would have the greatest impact on work from home behaviors: employer policies regarding remote work (rigid vs. flexible) and office locations (centralized vs. decentralized). We then mapped out four quadrants along these axes, with one scenario world in each quadrant. The four worlds and world vectors are shown in Figure 1 below.

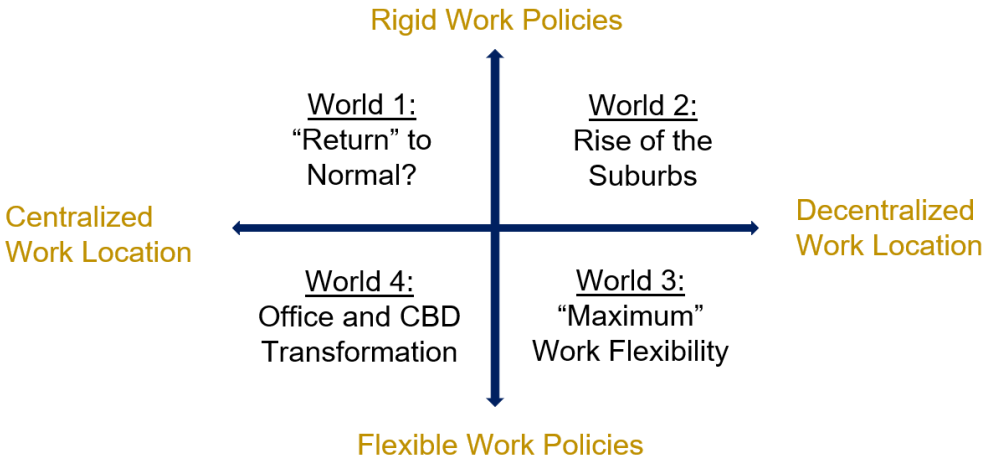


Figure 1: Scenario World Overview

An overview of the scenario worlds is presented in Table 3 below. Note that these scenario worlds focus specifically on impacts for white-collar workers who are able to conduct work activities remotely.

Table 3: Description of four scenario worlds

Scenario World	Description
World 1: "Return" to Normal?	Employers have more rigid policies regarding work from home, providing less flexibility for employees and requiring that all employees return to work in-person in the office. Employers maintain their offices in the central business district (CBD).
World 2: Rise of the Suburbs	Employers maintain strict requirements for employees to return to the office full time. However, employers take advantage of potentially cheaper rent in the suburbs and set up satellite office locations, rather than maintaining a single office space in the CBD.
World 3: "Maximum" Work Flexibility	Employers allow workers to choose how often to come into the office, while at the same time opening offices in more decentralized suburban locations.
World 4: Office and CBD Transformation	Employers allow employees to choose when to work remotely and when to come into the office while maintaining a centralized office space in the CBD.

Expert Scenario Planning Committee

After finalizing the focal question, timeframe, and scenario worlds, we planned two 1.5-hour long scenario planning workshop sessions with experts from academia, industry, public sector, and commercial real estate for Spring 2022. A total of ten experts participated in the sessions, along with four faculty members from the Telemobility UTC. The full list of experts is in Table 4 below.

Table 4: List of Experts in Expert Committee

Name	Organization	Organization Type	Participation
Cecilia Zhang	Macy's	Industry	Workshop 2
Daniel Comeaux	Chicago Metropolitan Agency for Planning	Regional government	Workshop 1 and 2
Karen Laveen	Avison Young	Commercial real estate	Workshop 1 and 2
Kimberly Sass	Wi-Tronix	Industry	Workshop 2
Neil Pedersen	Transportation Research Board	Non-governmental organization (NGO)	Workshop 1 and 2
Patricia Hoffman	Prologis	Industry	Workshop 1
Roger Nober	BNSF Railway	Industry	Workshop 1 and 2
Steven Capecci	Cambridge Systematics	Industry	Workshop 2
Steven Polzin	Arizona State University	Academia	Workshop 1 and 2
Tilly Chang	San Francisco County Transportation Authority	Local government	Workshop 1 and 2
Bret Johnson	Northwestern University	Telemobility UTC	Workshop 1
Hani Mahmassani	Northwestern University	Telemobility UTC	Workshop 1
Joseph Schofer	Northwestern University	Telemobility UTC	Workshop 1 and 2
Amanda Stathopoulos	Northwestern University	Telemobility UTC	Workshop 1 and 2

The first workshop session was held on March 4, 2022, with a group of seven experts from local and regional government, academia, NGOs, commercial real estate, and industry, and four faculty members from the Telemobility UTC. In this session, we introduced the focal question, timeframe, and an overview of the four scenario worlds. Within each scenario world, we provided a sample “persona” or an example of a person who resides in that world including their work, housing, and travel behavior. We used these personas as a tool to immerse workshop participants more fully into each scenario world. We then prompted experts with a series of questions to discuss potential impacts of work from home on housing location choice, commute distance and mode choice, public transit ridership and auto use, changes to non-work travel behavior, and impacts on public transit agency revenue and ridership for each scenario world. At the end of this session, we asked all of the expert participants to estimate the percentage likelihood that this scenario world would occur in the future and discussed what the “next normal” would look like for remote and in-person work.

The second workshop session, held on March 25, 2022, focused on more detailed impacts of work from home on transportation mode share (e.g., drive alone, public transit, walk, bike, and other modes) as well as the likelihood of each scenario world to occur for different companies and industries. For each scenario world, we showed experts the commute mode share for the Chicago metropolitan region in 2019. We then used the polling option in Zoom to ask experts whether they thought mode share for each mode

would be much higher, higher, about the same, lower, or much lower. We discussed the poll results as a group, asking experts to discuss their responses for mode share changes. Building on the discussion of likelihood of scenario worlds from the first workshop, we asked industry representatives about the likelihood of each scenario world to occur for their company or industry. Both workshop sessions focused on the impacts on urban and suburban contexts.

Study Limitations

There are several limitations to this research. First, the workshops focused on transportation and housing impacts only in urban and suburban areas. Given a limited number of participants, we only had representatives from local and regional government agencies in Chicago and San Francisco. Thus, the discussions in the workshops are unlikely to be geographically representative of the entire U.S. Nevertheless, the focus on the Chicago metropolitan area will be useful in further stages of this research in which we will use the findings from the scenario planning workshops to inform travel modeling efforts in the Chicago region.

Second, the industry expert participants largely represented white-collar employers, although two companies (Macy's and BNSF Railway) also employ many workers who are unable to work from home (e.g., retail workers, train operators). As a result, the findings from this scenario planning exercise are mostly limited to impacts on white collar workers or those who have the option to work from home. We did briefly discuss impacts for workers who are unable to work from home, but these considerations were not the focus of the scenario planning exercise.

Finally, due to workshop time constraints, we developed only four scenario worlds along two driving force vectors for the experts to discuss. We attempted to minimize the effect of a small number of scenario worlds by carefully selecting two highly impactful driving forces (office location and remote work flexibility). However, this limits the scope of the findings as it excludes the effects of other factors that may also define what potential future scenarios could look like.

Scenario World Summaries

In the section that follows, we provide a detailed summary of the discussion in each of the four scenario worlds. During the workshops, we organized the discussion around the topics of housing/land use impacts, transportation impacts, and likelihood of each scenario world occurring for companies and industries. The summary for each scenario world is organized into these three key sections: 1) housing/land use, 2) transportation, and 3) likelihood.

Scenario World 1: "Return" to Normal?

In Scenario World 1, employers have rigid policies requiring employees to work in-person and employers maintain an office presence in the CBD.

Housing and Land Use

Although there was an overall trend during the pandemic of households moving to suburban areas in search of more space, our expert participants did not think that this trend would result in significant changes in housing stock allocation in the next three to five years. For example, a planner from the Chicago

Metropolitan Agency for Planning (CMAP) stated that the agency observed during COVID that the average household size (i.e., number of persons per household) decreased in public transit-rich neighborhoods but has not seen any significant vacancies in these neighborhoods. However, it is uncertain whether falling household size will be a long-term trend. Similarly, in San Francisco, some households moved to surrounding counties during the pandemic, but other households took advantage of a brief period of lowered rents to move into the city. This suggests that the demographics of urban and suburban residents may change in the next three to five years, although participants agreed that it was unlikely that cities would become significantly de-populated in favor of suburban areas.

Transportation

One participant thought that since this scenario would be the closest to pre-pandemic in-person work, public transit ridership would also approach pre-pandemic levels. Evidence from the San Francisco region indicates that commuters are already returning to light- and heavy-rail services, although commuter rail services have been much slower to recover. Despite this scenario being the most similar to before the pandemic, two-thirds of expert participants still thought the drive alone mode share would be higher than pre-pandemic levels. This is largely due to the fact that commuters got out of the habit of taking public transit during the pandemic and that perceptions of safety and cleanliness would work against riders' desire to take public transit. Another habit that may have formed during the pandemic is becoming accustomed to a more flexible schedule in terms of timing; one participant stated that employees want to be able to dictate when they go to work and leave for home, which they can achieve with driving alone rather than being tied to a public transit schedule. Nevertheless, two of the participants thought that drive alone mode share would instead be lower due to the growth of younger people in the workforce. Younger generations may be more environmentally conscious and less likely to have a car, instead preferring to commute with modes such as public transit that allow them to be productive during their commute.

Likelihood

None of the experts in the workshops envisioned their company or industry ever going back to a full five day per week in-person strategy, with the exception of employees such as retail workers or train operators who must work in-person. One participant stated that any company with rigid work policies requiring in-person work would be at a severe competitive disadvantage and face difficulties recruiting and retaining employees. In the war for talent, having maximum flexibility indefinitely is a key retention strategy.

Our main takeaways from Scenario World 1 are summarized in Figure 2 below.

Scenario World 1: Main Takeaways




 Housing and Land Use	 Transportation	 Likelihood
<ul style="list-style-type: none"> • No significant redistribution of housing stock • Demographics of city residents may shift toward smaller household sizes 	<ul style="list-style-type: none"> • Closest scenario to return to normal for public transit • But...67% of participants think drive alone mode share will be higher, while 22% think that drive alone will be lower as the workforce gets younger 	<ul style="list-style-type: none"> • Extremely unlikely • Companies with rigid work policies are at a competitive disadvantage in the war for talent

Figure 2: Summary of main takeaways from Scenario World 1

Scenario World 2: Rise of the Suburbs

In this scenario, employers require that employees return to work in-person full-time; however, companies also take advantage of potentially cheaper rents in suburban locations to set up satellite office locations rather than having a single office in the CBD.

Housing and Land Use

Expert participants thought that this scenario would accelerate the pre-pandemic trend of increasing development in suburban areas. One participant noted that he has seen more restaurants opening in the suburbs of Chicago, and another participant agreed that suburbs would try to model the amenities and attractions that make CBDs activity centers. Increasing suburban office locations would also naturally lead to a shift in retail, accommodations, and food service jobs from downtown to suburban locations.

Transportation

In this scenario, participants agreed that lower parking costs in suburban areas and lower levels of public transit service would shift people away from public transit and toward driving alone. Multiple participants thought that this scenario would present an existential crisis for public transit, not just due to lower ridership, but also because of potential losses in sales tax revenue in cities to fund public transit. One participant stated that public transit needed to evolve and innovate to better serve suburban areas, giving examples of microtransit pilots in smaller cities and employer-based shuttles. At the same time, there could be opportunities to increase mode share of active modes such as walking and biking, since suburban office locations would be closer to higher concentrations of residential locations. A representative from commercial real estate stated that she has worked with suburban clients who are including amenities such as showers and bike storage in their office space, which indicates that employers are making alternate commute options more possible for employees.

Likelihood

Expert participants thought that this scenario would be unlikely. Similar to Scenario World 1, any company with rigid work policies would be at a competitive disadvantage. Participants were split on whether this scenario would be more or less likely than Scenario World 1, based on whether companies prefer downtown or suburban office locations. A workshop participant from the commercial real estate sector

recently moved some clients out of suburban sites. She stated that requiring in-person work at a single suburban location can be limiting from an employee recruitment and retention perspective, as employees might not want to travel from another suburb to work at that office if they could find a similar job in their home suburb. As such, some companies encounter difficulties with recruitment in suburban areas. Instead, many companies benefit from a more flexible approach, allowing employees to “do business where they need to do business” through a mix of suburban offices, CBD offices, and other coworking spaces².

Another expert participant gave an example of a company preferring a downtown location. The insurance company Allstate recently sold their suburban campus and acquired a smaller location in downtown Chicago, thereby maintaining a smaller centralized office location for in-person work but overall downsizing office space due to the large percentage of employees continuing to work from home. On the other hand, one participant felt that there are many cities where proximity to downtown does not offer a unique advantage to companies, i.e., the difference between having a city and suburban office location is not significant. In this case, the difference in rent in the city and suburbs may drive employers toward opening offices in the suburbs.

Our main takeaways from Scenario World 2 are summarized in Figure 3 below.

Scenario World 2: Main Takeaways




 Housing and Land Use	 Transportation	 Likelihood
<ul style="list-style-type: none"> • Inner suburbs will increase density and develop more amenities (e.g., high-quality restaurants, other cultural attractions) • Shift in retail, accommodations, and food services jobs to suburbs 	<ul style="list-style-type: none"> • Three-quarters of participants think that drive alone mode share will be higher, public transit mode share will be lower • Opportunities to increase mode share of active transportation • Fundamental nature of public transit will need to evolve 	<ul style="list-style-type: none"> • Extremely unlikely to have any companies taking a rigid approach to in-person work • Suburban office approach works better with multiple suburban locations, rather than a single, suburban location

Figure 3: Summary of main takeaways from Scenario World 2

Scenario World 3: Maximum Work Flexibility

In this scenario world, employers allow employees to choose how often to work in-person while at the same time opening offices in more decentralized suburban locations.

Housing and Land Use

Participants felt that increased flexibility with in-person work and work locations would result in people choosing to move further away from work. Commuting to work in-person fewer times per week may mean that employees are willing to tolerate a longer commute on a less frequent basis.

² A recent article in the New York Times reported that WeWork, a co-working company, saw an increase in members in 2022 compared to 2021, though membership is still lower than pre-COVID levels (Woo, 2022).

The development of suburban office locations in this scenario would have implications on overall office culture, as regional offices would no longer be at a disadvantage compared to a central CBD office. Decentralized work locations and in-person work flexibility would also allow employers to hire from a wider geographic area, changing access to the labor force and increasing the geographic diversity of the workforce. Employers may also be able to lower costs by hiring employees in areas with a lower cost of living. However, two participants cautioned that fully remote positions would be at risk of being outsourced overseas and allowing for greater flexibility with more remote work might actually pose a threat for younger workers.

Transportation

The transportation impacts of this scenario extend to mode shift away from public transit and changes to travel demand based on the day of the week and time of day. Participants agreed that this scenario would have minimum public transit ridership with a “triple threat” of fewer commutes, less congestion and cheaper parking in suburbs, and jobs in suburban locations that are harder to serve with public transit. Furthermore, in a worst-case scenario where employees can choose which days to work in-person, travel demand might be much lower on Monday and Friday while approaching pre-pandemic peak-level travel on days in the middle of the week. In this case, public transit operators would have to provide the same capacity as before the pandemic while receiving less fare revenue. Meanwhile, the decentralization of work would extend to the decentralization of non-work activities, including the flexibility of when non-work trips take place. Increased flexibility with work from home policies could result in more people taking trips during the day and increase the tendency to drive alone if public transit service levels are lower during off-peak periods or if these non-work trips take place in suburban areas with less public transit access. However, one participant noted that there could be opportunities to capture short non-work trips taken during the day with active modes, as the majority of non-work trips have a trip distance of less than three miles.

The significant impacts on travel demand in this scenario led several participants to raise the need for transportation demand management (TDM) strategies. For example, public transit fares could vary during the day or for different days of the week to incentivize or disincentivize travel at different times. Similar to Scenario World 2, in this scenario, public transit agencies need to take action to make public transit a more cost-effective option compared to driving a personal vehicle, especially considering lower parking costs in suburban areas. One participant discussed the cost trade-off between a monthly public transit pass and a monthly parking pass. If employees are no longer commuting to work every day, buying a monthly public transit pass may no longer be the most cost-effective commute option. This is an impact of flexible work policies that public transit agencies need to consider moving forward and could consider options such as multi-trip pricing policies, rather than monthly passes. Changes to commute frequency on public transit also raises the need to seek alternate funding options for public transit outside of fare revenue, such as public good funding through tax revenues.

Likelihood

Participants thought that the scenario worlds with maximum flexibility were very likely to occur, particularly for white-collar workers. Maximum flexibility comes with unique challenges such as conducting hybrid meetings with in-person and online attendees and determining how much in-person

interaction is necessary for effective training and mentorship. Several participants stated that the housing, land use, and transportation impacts in this scenario world were dependent on how much flexibility employers offered, so another challenge in this world is determining how many days of in-person work would be optimal and what days to ask employees to work in-person.

Our main takeaways from Scenario World 3 are summarized in Figure 4 below.

Scenario World 3: Main Takeaways

 Housing and Land Use	 Transportation	 Likelihood
<ul style="list-style-type: none"> • Some people may move further away from work • Impacts depend on level of flexibility offered by employers 	<ul style="list-style-type: none"> • Minimum public transit ridership scenario • Travel demand will vary depending on day of the week • Opportunities to capture short, non-work-related trips with active transportation 	<ul style="list-style-type: none"> • Very likely • Additional challenges with hybrid meetings, training, and mentorship • Could increase geographic workplace diversity

Figure 4: Summary of main takeaways from Scenario World 3

Scenario World 4: Office and CBD Transformation

In this scenario world, employers allow employees the flexibility to decide when to work remotely and when to work in-person while maintaining a centralized office space in the CBD.

Housing and Land Use

In this scenario, many participants thought that the nature of the CBD would change drastically. Even before the COVID-19 pandemic, CBDs were emerging as activity centers not dominated by employment, as evidenced by a large proportion of new construction and conversions in CBDs being residential. Additionally, if employers have some control over what days and which employees work in-person, companies can reduce their office footprint to fit the same number of employees into a smaller office space. Participants suggested two potential impacts of reduced office footprints on CBDs. One potential impact is that large companies that reduce their office footprint could make it cheaper or more feasible for smaller companies to move into the CBD where they were not able to before. As a result, office buildings would still be occupied as before the pandemic, but with different kinds of companies. The second potential impact is that office space and parking garages could be converted to residential or other uses. However, these impacts are context dependent, as downtown conversions would be feasible in some urban contexts but not all of them.

Transportation

Most participants thought that this scenario world could see an increase in mode share for active transportation and public transit, especially for non-work trips. For cities with well-established public transit or active transportation infrastructure, this infrastructure could support transportation modes other than single-occupancy private vehicles for people traveling within the city. One participant thought

that this scenario might actually boost non-car transportation modes. If the CBD shifts away from being an employment center and toward other recreational uses, trip patterns in the CBD could be more dynamic. This participant stated that downtown commuters generally stay at their work location for eight hours and do not travel during the workday, while people traveling to the CBD for recreational reasons will likely travel to multiple locations throughout the day. These trips within the city may be better served with walking, biking, public transit, or shared mobility options such as transportation network companies (TNCs, e.g., Uber or Lyft), compared to driving a personal vehicle. This would also have the effect of changing the nature of public transit trips away from commute-based trips and toward more recreational trips.

Likelihood

Similar to Scenario World 3, the employers in our expert committee thought that scenarios with more flexibility are more likely. Two participants thought that employer decisions would also be impacted by external influences such as public policy or the decision of city officials. For the CBD, city officials can exert some control to incentivize employers to bring employees to the office more often.

Our main takeaways from Scenario World 4 are summarized in Figure 5 below.

Scenario World 4: Main Takeaways


 Housing and Land Use	 Transportation	 Likelihood
<ul style="list-style-type: none"> • CBDs will change drastically, emerge as activity centers no longer dominated by employment • Companies can reduce office footprint in CBD 	<ul style="list-style-type: none"> • Increase mode share of public transit and active transportation • Nature of public transit trips will change, shift away from commute, CBD-oriented trips 	<ul style="list-style-type: none"> • Very likely • Employer decisions might be impacted by external influence of city officials and public policy

Figure 5: Summary of main takeaways from Scenario World 4

Overall Scenario World Likelihood

After discussing the transportation, housing, and land use impacts within each scenario world, we also asked experts to estimate the likelihood of each scenario world to occur and why. At the end of the first workshop, we asked participants to assign a percentage likelihood to each scenario world representing where the “next normal” would most likely end up (Table 5).

Table 5: Expert outlook on likelihood of each scenario world to occur in the future

Scenario World	Expert 1	2	3	4	5	6	Average
World 1 "Return" to Normal	10%	10%	5%	10%	5%	10%	8.3%
World 2 Rise of the Suburbs	15%	15%	20%	15%	10%	20%	15.8%
World 3 "Maximum" Work Flexibility	15%	30%	37.5%	30%	15%	40%	27.9%
World 4 Office and CBD Transformation	60%	45%	37.5%	40%	70%	30%	47.9%

Experts collectively agreed in the scenario planning workshop sessions that the scenario worlds with more flexibility would be more likely to occur. On average, experts assigned Scenario World 4, which includes flexible work policies and centralized work locations, an almost 50% likelihood of happening. In contrast, Scenario World 3 was estimated to have a likelihood of 28% of occurring in the next three to five years. Meanwhile, the first scenario world, Return to Normal, with rigid work policies and offices located in the CBD, had the lowest likelihood of happening at 8%. Scenario World 2, with rigid work policies and decentralized offices in suburban locations, reflected a likelihood of 16% of occurring in the next three to five years.

Key Takeaways, Policy Options, and Future Research

Based on our discussions with the expert scenario planning committee, we summarize the key takeaways on the future of work and transportation impacts of work from home, policy options in the next three to five years, and future research recommendations.

Key Takeaways

- Maximum flexibility with respect to in-person and remote work is the most likely scenario for all employers who participated in the workshops. Experts agreed that any company requiring full-time in-person work would be at a competitive disadvantage in the race for talent.
- Experts were uncertain whether companies would maintain office presences in the CBD or decentralize workplaces to suburban areas in the next three to five years.
- Workshop participants agreed that the nature of offices would change to take advantage of more employees working remotely, and this may lead to changes in the CBD (e.g., conversion of office space to residential or other uses).
- More flexible work policies will impact non-work travel and may result in spatial and temporal changes in travel demand.
- There are opportunities to shift short, non-work trips to active modes (e.g., walking, biking).
- Increased flexibility in work policies pose an existential crisis for public transit and expose the need for public transit agencies to evolve and find new funding mechanisms and operating strategies.

Policy Options

Given the impacts that work from home policies have on spatial and temporal travel patterns, experts suggested the following policy options to maximize social and environmental benefits.

- **Set clear guidelines for flexible work policies:** One major concern of workshop experts is that allowing complete flexibility with work policies could result in travel demand disparities on different days of the week, as well as difficulty ensuring collaboration among team members in the office. Employers should consider requiring in-person work on specific days per week, a strategy which offers employees flexibility to work from home while mitigating some the impacts of work from home on travel demand (e.g., public transit use). For example, one workshop participant shared that her workplace requires employees to sign up to work in-person either on Mondays and Thursdays or Wednesdays and Fridays. Another workshop participant said that his workplace requires employees to work in the office for one Monday and one Friday every two weeks.
- **Implement travel demand management (TDM) strategies:** Flexible work policies will result in varying travel demand by day of the week (e.g., fewer commutes on Mondays and Fridays) and time of day (e.g., more non-work trips during the day). TDM strategies can mitigate the impacts of variable travel demand and can be used to induce modal shifts away from single-occupancy vehicles toward public transit.
- **Develop more flexible public transit:** Public transit services must innovate and become more flexible to better serve off-peak hours and suburban locations, as these times of day and locations are where experts presume to see an increase in trips with more flexible work policies. Existing examples of public transit agency partnerships with microtransit services are one potential strategy to increase public transit flexibility. Other strategies include modifying monthly public transit passes, which are designed for daily commuters, to multi-trip passes.
- **Densify suburban areas:** As the suburbs continue to grow and develop, land use policies that support increasing density and transit-oriented development can reduce private vehicle use in suburban areas.
- **Expand walking and biking infrastructure:** Increases in short, non-work trips taken during the day present an opportunity to shift these trips toward active modes. Expanding walking and biking infrastructure in cities and suburbs (e.g., wider sidewalks, new bike lanes) can encourage more use of active modes. Companies can also support active modes by installing facilities such as bike racks or showers in office locations.

Future Research

To conclude the two scenario planning workshop sessions, we asked the expert committee what questions or uncertainties researchers should explore further as the nature of work and the workplace changes over the next three to five years. Research recommendations include:

- Study the long-term impacts of work from home policies and hybrid work on productivity, employee retention, collaboration, and other key metrics.
- Understand demographic and other factors driving preferences for in-person or remote work.
- Study ways to improve the effectiveness of hybrid work, particularly for on-boarding and training new employees.

- Test refinements of hybrid work models, such as identifying the optimal days per week for employees to work in-person.
- Explore the impacts of innovative, disruptive technology (e.g., virtual reality, automated vehicles) on work preferences.
- Examine the extent to which employee expectations of their employers have changed due to the COVID-19 pandemic.
- Understand how much of corporate policy will continue to be employee driven vs. employer driven.

Given potential changes to travel patterns as a result of changes to remote work, research recommendations specific to transportation include:

- Examining changes in public transit use, including changes in ridership by time of day and day of week, and trip purposes with public transit;
- Assessing the impact of different pricing options (e.g., multi-trip passes, varying fare by time of day or day of week) on public transit ridership, congestion, and use of other transportation modes; and
- Studying how parking supply and demand has changed as a result of remote work and shifts in travel patterns.

Conclusion and Next Steps

As a result of lockdowns from the COVID-19 pandemic, large-scale shifts to remote work for white-collar employees have resulted in major changes to spatial and temporal commuting patterns. In light of continued uncertainties around the future of work, we used a scenario planning method to bring together experts to discuss and estimate the impacts of work from home on transportation, housing, and land use. In the two scenario planning workshop sessions, we worked with a committee of ten scenario planning experts from academia, the public sector, industry, and commercial real estate and four faculty members from the Telemobility UTC to explore four different scenario worlds with flexible vs. rigid work policies and centralized vs. decentralized work locations. Within each scenario world, we asked experts to consider the following focal question:

What will travel demand and spatial patterns look like for public transit and automobile travel in the “next normal,” given changes to in-person work?

Experts were prompted to consider this focal question in urban and suburban areas in the next three to five years.

Overall, the scenario worlds with more flexibility toward remote work were considered more likely to occur in the future, while experts said that any employer requiring in-person work would put themselves at a competitive disadvantage in the war for talent. In some cases, increasing flexibility for remote work could reduce public transit ridership and pose an existential threat to public transit agencies. This possibility is more severe with decentralized work locations, as suburban areas have lower parking costs and levels of public transit service. However, flexible work policies could also result in more non-work trips occurring during the day, which could be served either by public transit or active transportation modes such as walking and biking, especially if these trips are taking place in more urban areas. In all of

the scenario worlds, experts agreed that public transit services need to innovate and evolve to serve changing needs of riders (e.g., through microtransit or other, more flexible transportation options). Transportation demand management strategies (e.g., variable public transit fare pricing) and alternate pricing strategies (e.g., mileage charges) could also help support public transit and encourage mode shift away from private vehicle use.

These two workshops focused on the impacts of work from home in urban and suburban areas. The results from these workshops will be used to inform regional transportation modeling efforts in the Chicago metropolitan area as a next step.

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