The Tetris City: workplace mobility and the dynamic spatiality of knowledge work in Silicon Valley North, Canada

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May 2021

A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of Doctor of Philosophy in Urban Planning, Policy and Design.

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Dedication

To my family and friends with gratitude for their love, which truly transcends time and

space...

Abstract

Economic geography scholarship rests on the assumption that work has a well-defined and fixed location. Existing data and traditional methods for capturing the location of work have not yet been able to grasp the increasingly dynamic spatiality of knowledge work that other disciplines — like the Mobilities branch of sociology and Management and Organizational Studies — have been discussing for some time. These disciplines suggest that as a result of greater worker mobility, flexibility and digitization, work has been extending beyond the official, well-defined workplace.

If this is indeed the case, the concepts that underpin our understanding of where work takes place need to be rethought. The dominant paradigms that shape how economic geographers and urban planners think about the location of work are informed by *fixed* categories, which likewise treat places and workers as *fixed in time and space*. And while recent studies using census-type data are showing a modest but steady rise in mobile work, they fail to capture the locations (in addition to the formal workplace) that are used for work throughout the day, the week, the month and the year. At present, this complex spatiality of knowledge work can only be qualitatively explored.

A closer look at these nuances will improve our understanding of new ways of working, how spaces are being used for work, and how these changes affect real estate and urban planning. This is especially important given the Covid-19 crisis and the unprecedented shift to remote work. The experiences of knowledge workers (for some of whom the "new normal" has been normal for some time) pre-pandemic reveal valuable insights on what workplaces are likely to be like once the pandemic has been resolved.

Indeed, focusing on knowledge workers in Canada's high-tech and start-up hotbed in Kitchener, Cambridge and Waterloo, this dissertation confirms that work has *not* been detaching from its usual location, but that is has been *extending* beyond the formal, designated workplace (i.e., the office) to include a number of other locations. What is more, it reveals that the increasingly fuzzy boundaries between work, life and play have produced fuzzy definitions of work and the workplace. For example, the expectation to be available and digitally "multipresent" complicates the workers' ability to distinguish official workplaces from unofficial ones.

Meanwhile, interviews with corporate consultants and real estate professionals reveal that firms have been changing their offices to mirror new trends, and while some have been reducing

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the amount of space required per worker to generate more collaborative and attractive work environments, others have been deploying the same strategies (i.e., flexwork) for cost-saving purposes. No matter the motive, the willingness to pay a premium for flexible spaces (and flexible leases) has exacerbated office real estate costs, driving more companies to pursue flexwork options, and thereby intensifying the need for workplace mobility. This circular relationship between flexwork and rising office rents also makes it difficult to keep track of who is using spaces, how and for how long. Interviews with city planners reveal that while they are cognizant of these changes, they feel limited in their capacity to regulate the real estate market. Finally, flexwork has become, above all, a real estate play and a feature of the financialized and deregulated real estate market. What is more, because these new ways of working are considered innovative and creative, they've garnered institutional support, thereby obscuring their downsides.

I conclude that workplace mobility affects the city in a manner resembling the "Tetris Effect", or the need to constantly think about and adapt space — across personal and professional domains — in order to maximize economic utility. Neoliberal planning, with its focus on growth, neglects the downsides of workplace mobility as it seeks out ways to accommodate it. This calls into question the effectiveness of planning tools (as well as their ideological foundations) in ensuring that corporate decisions are in the interest of the public in the longer term.

Résumé

La recherche en géographie économique repose sur l'hypothèse que le travail a un emplacement bien défini et fixe. Les données existantes et les méthodes traditionnelles d'identification du lieu de travail n'ont pas encore été en mesure de saisir la spatialité de plus en plus dynamique du travail du savoir, telle que discutée dans d'autres disciplines depuis un certain temps, notamment dans les études des mobilités en sociologie et la gestion et les études organisationnelles. Ces disciplines suggèrent qu'en raison d'une plus grande mobilité, flexibilité et numérisation des travailleurs, le travail s'est étendu au-delà du lieu de travail officiel et bien défini.

Si tel est effectivement le cas, les concepts qui sous-tendent notre compréhension du lieu de travail doivent être repensés. Les paradigmes dominants qui façonnent la manière dont les géographes économiques et les urbanistes appréhendent le lieu de travail s'appuient sur des catégories fixes, qui considèrent tant les lieux de travail que les travailleurs comme fixes dans le temps et dans l'espace. Si des études récentes utilisant des données de recensement montrent une augmentation modeste mais constante du travail mobile, elles ne parviennent pas à capter les lieux (en plus du lieu de travail formel) qui sont utilisés pour le travail tout au long de la journée, de la semaine, du mois et de l'année. À l'heure actuelle, cette spatialité complexe du travail du savoir ne peut être explorée que qualitativement.

Un examen plus approfondi de ces nuances améliorera notre compréhension des nouvelles façons de travailler, de la façon dont les espaces sont utilisés pour le travail et de la façon dont ces changements affectent l'immobilier et l'urbanisme. Cela est particulièrement important compte tenu de la crise de la Covid-19 et du passage sans précédent au télétravail. Les expériences pré-pandémiques des travailleurs du savoir (pour certains dont la "nouvelle normalité" est normale depuis un certain temps) révèlent des informations précieuses sur ce à quoi ressembleront probablement les lieux de travail suite à la pandémie.

En effet, en se concentrant sur les travailleurs du savoir à Kitchener, Cambridge et Waterloo, haut lieu canadien du high-tech et des startups, cette thèse confirme que le travail ne s'est pas détaché de son emplacement habituel, mais qu'il s'est étendu au-delà du lieu de travail officiel et désigné (soit le bureau) pour inclure un certain nombre d'autres emplacements. De plus, elle révèle que les frontières de plus en plus floues entre le travail, la vie et les loisirs ont produit des définitions floues du travail et du lieu de travail. Par exemple, l'attente d'être

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disponible et «multi-présent» numériquement complique la distinction entre les lieux de travail officiels des lieux non officiels du point de vue du travailleur.

Nos entretiens avec des consultants en gestion et des professionnels de l'immobilier révèlent que les entreprises ont modifié leurs bureaux pour refléter les nouvelles tendances, et si certaines ont réduit la quantité d'espace nécessaire par travailleur pour générer des environnements de travail plus collaboratifs et attrayants, d'autres ont déployé les mêmes stratégies (c'est-à-dire le travail flexible) à des fins de réduction des coûts. Quel que soit le motif, la volonté de payer une prime pour les espaces flexibles (et les baux flexibles) a exacerbé les coûts de l'immobilier de bureaux, poussant davantage d'entreprises à opter pour des options de travail flexible, et intensifiant ainsi le besoin de mobilité du lieu de travail. Cette relation circulaire entre le travail flexible et la hausse des loyers des bureaux rend également difficile de savoir qui utilise les espaces, comment et pendant combien de temps. Des entretiens avec des urbanistes révèlent que s'ils sont conscients de ces changements, ils se sentent limités dans leur capacité à réguler le marché immobilier. Enfin, le flexwork est devenu avant tout un jeu immobilier et une caractéristique du marché immobilier financiarisé et dérégulé. De plus, comme ces nouvelles méthodes de travail sont considérées comme innovantes et créatives, elles ont recueilli un soutien institutionnel, ce qui occulte leurs inconvénients.

Je conclus que la mobilité du travail affecte la ville d'une manière qui ressemble à «l'effet Tetris», c'est-à-dire la nécessité de constamment penser et adapter l'espace - dans les domaines personnels et professionnels - afin de maximiser l'utilité économique. L'urbanisme néolibéral, qui met l'accent sur la croissance, cherche à s'adapter à la mobilité du lieu de travail mais néglige de traiter de ses inconvénients. Cela remet en question l'efficacité des outils de planification (ainsi que leurs fondements idéologiques) pour garantir que les décisions des entreprises contribuent à l'intérêt du public à long terme.

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Acknowledgments

The pursuit of a doctoral degree requires a well of support, which I certainly have not been without. I would like to thank my supervisor, Richard Shearmur, for his patience and guidance: for the hours spent reading pages and pages of text, for giving me space to bounce off ideas, and for steering me in the right direction whenever my nerdy enthusiasm would pull me off course. I would also like to thank my doctoral committee — Mario Polèse, Norma Rantisi and Tara Vinodrai — for challenging me, pushing me to go further and encouraging me to keep on going when energy ran low. Conversations with Richard, Mario, Norma and Tara were among the highlights of this journey and certainly some of the most stimulating exchanges that I have ever had — thank you.

My gratitude also to McGill University for funding this research through the Schulich Fellowship, the Graduate Excellence Scholarship and the McGill Engineering International Tuition Award. Many thanks to Gladys Chan and Paula Domingues for their cheer and for their help with the bureaucracy that tends to schlep along with an international student. I am also grateful for the opportunities to engage with the student body at the School of Urban Planning, and not just through classes and teaching. Running Free City, the SoUP Symposium and being part of the Organization of Urban Planning Students unquestionably added some zest to my experience as a doctoral student.

This dissertation would be nothing without the generosity and willingness of the interviewees to speak to me about their everyday working lives. Not only was I given access to a community and their workspaces, but also to thoughts, feelings, experiences and concerns about new ways of working, the future of work and the role of the city in supporting these changes. I would like to thank the urban planners at the City of Kitchener, City of Cambridge and City of Waterloo for walking me through (literally in some cases) plans, developments and policies, but also for asking questions. Learning is a two-way street, and the willingness of these individuals to engage in further conversation fills me with optimism. Most of all, I would like to thank the knowledge workers for carving out time to share their experiences. For some of these individuals an hour away from work is a sacrifice — and they'd given me two. Fieldwork was the most exciting and thought-provoking part of this journey; it is why I love being a researcher, and I am grateful for the reminder.

As ever I am indebted to my family and friends for their love and unwavering support. I have had the great fortune of forming bonds that no distance can weaken. I would like to thank Tahnee Prior, for sharing with me her own PhD journey, and for making sure I don't lose too many marbles along the way; Giulia Maci, whose dedication and commitment to cities inspire me to do my best; Isidora Markou for her unmatched empathy; and Sorina Itu, Suzanna de Ridder and Marija Zore-Elsner for knowing when to keep me grounded and when to lift me up. Thank you for putting up with me for years on end, and for seeing me through this process with compassion and humor.

I would also like to thank my cohort: Sarah Gelbard, Patrick Kilfoil and Jimmy Paquet-Cormier for sharing their thoughts and passions; and other PhD students at the School of Urban Planning, especially Nufar Avni, Ehab Diab, Danielle Kerrigan, Dea van Lierop, and Meadhbh Maguire for their conversation and good company. My gratitude also to Djurdja Boričić, Anne Cloutier, Clay Dasilva, Dana Decent, Milie-Jade Dion, Sufia Duez, Margaret Ellis-Young, Bojan Francuz, Sophia Giannakakis, Omar Hallawi, Carla Maria Kayanan, Chris Mosiadz, Ana Novaković, Eimear O'Leary-Barrett, Sara Pimpaneau, Elena Petković, Ioli Plastira, Jess Reia, Nick Revington, and Yasmin Shearmur for their support. Special thanks to the Shearmurs and the Cloutier-Kilfoils for being a home away from home here in Montréal.

And finally, I would like to thank my family — Mom, Dad, Ana, Danilo, Miodrag and Co — for being my lighthouse whenever I felt lost at sea.

Filipa Pajević McGill University December 2020

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Contribution of Authors

This dissertation contains four research chapters, of which three are peer-reviewed manuscripts published in journals and as chapters in edited volumes, and one is currently in preparation for submission. The dissertation, as a whole, is an original contribution to scholarship. A more detailed overview of the research chapters, in terms of their authorship, is provided below.

Chapter four was co-authored with Richard Shearmur, peer-reviewed and published in the Journal of Urban Technology 24:3, in July 2017. It also appears as a chapter in "New Urban Geographies of the Creative and Knowledge Economies", a Routledge publication edited by Simonetta Armondi and Stefano Di Vita (2018). Richard and I each contributed 50 percent of the effort towards this publication.

Chapter five is currently in preparation for submission to a peer-reviewed journal, and I am the sole author.

Chapter six was co-authored with Richard Shearmur and will appear as a chapter in "New Workplaces: Location Patterns, Urban Effects and Development Trajectories", a Springer peerreviewed publication, edited by Stefano Di Vita, Ilaria Mariotti and Mina Akhavan (Februrary 2021). I contributed 80 percent of the effort towards this publication. I conducted all of the research and analysis, and authored the first full draft of the manuscript. Richard contributed 20 percent of the effort towards this publication. He contributed intellectually and shaped the text through comments and direct edits to the manuscript.

Chapter seven has been accepted for publication in Cities, a peer-reviewed international journal for planning and policy and I am the sole author.

Chapter 1: Introduction

1.1 Brief overview of the dissertation: new ways of working, new spatialities of work and new developments...

Work, ways of working and the spaces used for work are changing. Digital technologies, and the ongoing digitization of work processes, are enabling more flexible ways of working, including mobile and multi-locational work, that effectively separate work activity from designated — and often fixed — locations. Office-based work has been undergoing changes that reflect both this adaptation to (and application of) "wireless mobilities", as well as broader, more structural factors affecting the spatiality of work. In situ office management strategies, such as hot-desking, hotelling, coworking and remote work (which includes teleworking and work from home) have been considered by employers and employees alike for their cost-cutting and flexibility benefits. What is more, as digital platforms (communication and file-sharing applications, cloud storage, and real-time sharing and editing features — to name a few) integrate into organizations, the space-time dynamics of interactions between workers (and their employers) become more fluid and geographically dispersed. This produces new realities pertaining to how economic activities organize in cities. And this is without factoring in the ongoing Covid-19 pandemic.

Indeed, I would be remiss if I did not acknowledge, right at the start, the unexpected and unsettling twist of producing a dissertation on the spatiality of new ways of working in the midst of arguably one of the biggest social experiments in modern history. The pandemic-driven push towards remote work has evoked a sense of dread about the future of our cities and the state of our urban economies, especially the downtowns and inner-city areas, characterized by bustling economic activity of which office work is a big component (and the most valued proportion of commercial real estate) (Hernandez-Morales et al., 2020; Thompson, 2020). These urban cores have now been emptied out, and there are fears of ghost towns, neighborhood decline and reduced public services (such as public transit) due to the ongoing struggle to maintain a modicum of activity (Burn-Murdoch and Romei, 2020; Hunt, 2020). What is more, there has been talk of a mass exodus to the suburbs and lower density regions with fewer Covid-19 infections, as well as of remote work becoming more permanent — as is the case for Big Tech

companies like Twitter, Google, Facebook and Canada's own Shopify (Cheng, 2020; O'Kane and Younglai, 2020). There are also emerging dystopian narratives (or Silicon Valley utopias, depending on whom you ask) that envision a future oddly reminiscent of Alvin Toffler's "electronic cottage" — of people living in remote areas, surrounded by wires, perpetually connected and uncomfortably alone.

For this reason, I would like to start this dissertation on an optimistic note and direct our attention away from the dystopias and anxiety about the future, to existing and emerging knowledge (of which this dissertation is part) that may offer some perspective and some clues as to how cities can better prepare for the aftermath of the Covid-19 crisis. The speed with which some (not all — and this is important!) sectors of the economy were able to transition to remote work speaks to the degree of preparedness and availability of infrastructure *already in place*. This is where the value of this dissertation partly lies: it explores the spatiality of knowledge workers, for whom remote work has already been a possibility and a lived experience. In other words, for these workers the "new normal" has been normal (or at least a possibility) for some time. What is more, firms were already adapting their office real estate to mirror trends in ways of working. Existing experiences with digitally-supported (and dependent) remote work reveal the bright and dark sides of these new ways of working. They also stress the importance of maintaining workplaces that *do not* include our bedrooms and basements.

Another value of this dissertation is that it includes the reflections of real estate professionals, corporate consultants and city planners on these new ways of working, offering a chance to learn from pre-pandemic challenges. This is of significance as we look to the future from a more solid place to stand. Cities have a stake in how work evolves from this point on — and they also have a say. This dissertation highlights some key issues that planners and policymakers need to take stock of, and offers insights that researchers and scholars of the changing world of work may use as steppingstones for further study.

1.2 Dissertation layout and description of chapters

Organized in eight chapters (including the introduction), this dissertation explores how and where knowledge workers have worked, and how workplaces — and the factors keeping workers "grounded" or on-the-go — have evolved along with these new ways of working pre-pandemic.

The original purpose of this research has been to: 1) explore a Canadian context for evidence of emerging trends in ways of working, that have been picked up in other places by other disciplines; and, 2) show that there are gaps in the logic that inform how economic geographers and urban planners think about work and its spatiality. More specifically, economic geography (EG) and urban planning scholarship have relied on the assumption that places of work are well-defined, fixed, and geographically distinct from other spaces and functions in the city. This assumption informs a number of planning tools and policies, form land use and zoning regulations to economic development initiatives. And yet, over the past twenty years, management and organizational studies (MOS) and Mobilities (Mb) scholars have been picking up on the increasing mobility and flexibility of work, enabled and supported by advancements in information and communication technologies (ICTs). If that is indeed the case, and new forms of teleworking are affecting the spatiality of work, then why haven't economic geographers and urban planners adapted their own ways of thinking and conceptualizing work location? Finally, if workers — especially in coveted sectors — are less attached to a well-defined location, how can cities adapt to better support these new ways of working, and should they?

Chapter two is a review of literature, outlining the key factors that have shaped how and where knowledge work has been performed, and how these changes contrast with dominant assumptions about work location in urban areas. It draws from three distinct yet related disciplines — economic geography (EG), management and organizational studies (MOS) and the mobilities branch of sociology (Mb) — to discuss post-Fordism, the disintegration of vertical systems of production and the shift to a service-based, knowledge-intensive economy. However, there is a tension between these disciplines: economic geography scholarship has so far shown little change in established patterns of employment and clustering of knowledge-intensive activity in downtowns and inner-city neighborhoods, while MOS and Mb scholars highlight significant changes in ways of working that enable the mobility and multi-locality of work. More specifically, rather than performing their work from a single or fixed location, knowledge workers — especially digital work and skills — have been working across a network of spaces that adapt to their specific needs, and which they adapt to suit their needs. This suggests that the spatiality of work, especially knowledge work, is more complex and more dynamic than what has been observed by economic geographers.

Chapter three is a detailed description of the research design, which includes key research questions, data and methods. It highlights that not only do EG, MOS and Mb have different degrees of "space sensitivity" as it pertains to work, but also approach the subject from different angles, scales and units of analysis. And while there is potential for connections and overlaps, there has been little convergence on the subject of mobile and multi-locational knowledge work. What is more, this chapter stresses that, so far, there has not been a study that qualitatively explores a Canadian context for these new trends in ways of working. This research combines Canadian census place of work data with qualitative semi-structured, in-depth interviews to better understand how and where knowledge work is performed in Canada's start-up hotbed ----Kitchener, Cambridge, Waterloo in Ontario. Forty-six interviews were conducted between 2017 and 2019, and combine the perspectives of knowledge workers, real estate professionals, corporate consultants and city planners. This chapter also addresses the ongoing challenge of defining knowledge work. Lastly, it addresses the key limitations of this research, which include context-specificity, potential bias in interviews, the problematic definition of knowledge work, and the focus on a specific type of worker and work activity that cannot be used to make broad claims about the nature of knowledge work on the whole. Notwithstanding, the findings of this research highlight the limitations of the dominant approaches and data deployed for the study of work and its spatiality.

Chapter four reflects on methods that can be used to study mobile and multi-locational work. It introduces the term "workplace mobility" — the ability of workers to perform their work at any time and in any place as a result of flexibility, mobility and digitization — and asks whether the technologies supporting these new ways of working can be used to study them. More specifically, the chapter explores the extent to which Big Data can shed light on these new spatialities of work, given that they provide real-time information on geolocation. It stresses the importance of qualitative, door-to-door research to gain insight on the ways in which work and spatiality have been changing, and the need to for more information before Big Data can be used to track workplace mobility.

Chapter five combines census place-of-work data and qualitative interviews with knowledge workers to shed light on the spatial patterns and behaviours of knowledge-intensive activity in Kitchener, Cambridge and Waterloo. Census place-of-work data show that knowledge workers remain attached to their usual, well-defined place of work, such as the office.

Meanwhile, the interviews reveal that the usual place of work is predominantly used *in combination* with other spaces, like the home, café, library, client location, hotel rooms, and so on. These interviews also reveal that knowledge workers change their location at different frequencies during the day, the week, the month and the year. This, together with other emerging themes, highlights the complexity of new ways of working, and the limitation of census data to fully grasp these space-time dynamics.

Chapter six stresses that prior to the Covid-19 crisis, how and where work was performed in cities was changing. The chapter draws from interviews with knowledge workers to reveal that the blurring of professional and personal domains — intensified by workplace mobility — has produced fuzzy definitions of workplaces. It highlights the tendency of some workers to treat the virtual workplace as the official workplace, as well as the difficulty in establishing the temporal boundaries of work. The expectation to be online and "multi-present" has generated a cognitive confusion that makes it difficult to distinguish unofficial workplaces from official ones.

Chapter seven addresses the adoption of flexwork (which enables workplace mobility) as a corporate office management strategy. It broadens the critical discourse on new ways of working — the adoption of coping strategies, such as flexible work, as a profit-maximizing tool — to include flexwork, and shows how these conflicting definitions are affecting the use of workplaces. It introduces the "Tetris office" as a term used to describe how new ways of working disassemble and reassemble office spaces on a need-to basis for the highest yielding (and cost-effective) fit. Interviews with corporate consultants reveal that flexwork tends to be deployed as a talent-attraction strategy, even though its cost-cutting benefits seem to be of equal, if not greater, import. Interviews with real estate professionals reveal that flexwork has raised the demand for flexible leases, and that some companies are willing to pay more for this flexibility, thereby driving up office rents. Lastly, interviews with city planners reveal that these flexible uses of space have been considered as an opportunity for more effective real estate management against the backdrop of a volatile economy. Planners feel limited in their capacity to exert influence over the real estate market, which calls into question the effectiveness of policies and tools at their disposal to ensure that corporate decisions are in line with public interests.

The final and concluding chapter discusses these findings in terms of their contribution to theory and practice. The relevance of location theory in light of these changes in ways of working is discussed, as is the relevance of data and methods in fully grasping the complexity of

workplace mobility. The chapter also raises important questions about the role of the city and its underlying governance mechanisms in supporting ongoing changes in the qualitative landscape of knowledge work. The increasing permeability of private spaces to public (corporate) activities suggests that more spheres of everyday lives are governed by utility maximizing principles. More specifically, institutional support of corporate workplace mobility underplays the downsides of these ways of working to the potential detriment of the workers and the spaces in which they live. Should these new ways of working become more permanent in the aftermath of the Covid-19 crisis, this dissertation shows what needs to be more closely and more critically examined.

1.3 Research goals, new objectives and key contributions

This dissertation contributes to economic geography scholarship and urban planning practice in several ways: it highlights changes in the function and use of space for work; it calls for an interrogation of planning policy and practice, focusing on how — and if — cities should support new ways of working; and it suggests that traditional ways of thinking and conceptualizing work location need to be rethought.

As already mentioned, the purpose of this dissertation has been to explore a Canadian context — in this case, Kitchener, Cambridge and Waterloo, in Ontario — for evidence of workplace mobility. To my knowledge there are no studies that qualitatively explore mobile and multi-locational knowledge work in Canada. Another key objective has been to highlight the gaps in economic geography and urban planning scholarship as they pertain to the spatiality of knowledge work. What is more, it is important to address the tension between economic geography, management and organizational studies and mobilities scholarship. Economic geographers need to incorporate workplace mobility in their conceptualizations of work and work location. Similarly, management and organizational studies, as well mobilities scholars, need to address the role that place has in supporting these new ways of working. A stronger relationship between these three disciplines is encouraged, as together they will offer new opportunities for conceptual and methodological advancement of the study of work and its spatiality.

What is more, it is important to understand and reflect on emerging trends — including the pandemic-driven shift to digital remote work — and anticipate their impact on the use of space for work and city planning more generally. Different perspectives — from knowledge workers to city planners — help construct a more holistic overview of these changes. Finally, insights from knowledge workers and their experiences with workplace mobility will shed some light on what work and workplaces are going to look like once the pandemic has been resolved.

Chapter 2: Post-Fordism and the Network Society in an age of Liquid Modernity: the role of flexibility, mobility and digitization in shaping the spatiality of the present-day economy

2.1 Brief explanation and description of literature

This chapter is a review of literature, describing key processes that shape the present-day knowledge economy and its spatiality. Organized in five parts (including this brief introduction), the review begins with the decline of manufacturing activity across advanced industrial countries in the late 1970s/early 1980s, technological advancements and subsequent changes in production systems, and the internationalization of finance and the service sectors in a globalizing economy. The following section reviews literature on post-Fordism: globalization, the transformative role of new technologies, the rise of a "networked society", and the importance of "knowledge intensity" in facilitating the transition to a service-based, knowledge economy. It illustrates how knowledge and innovation came to the fore as key drivers of economic growth and development.

The third section of the chapter dives deeper into the spatiality of the knowledge economy, starting with a review of location theory, the role of cost and distance as underlying all spatial organization and land use patterns that dictate urban form. The purpose of this section is to highlight key changes brought on by the post-Fordism. It also reviews literature on the "revival" of industrial districts and the development of "new industrial spaces" as alternative sites of production and innovation. This is followed by literature on proximity and clusters as sites of knowledge creation, focusing specifically on "new economies" (e.g. IT-led and high-tech occupations, new media) and the role of creative milieus as anchors of knowledge-intensive economic activity. Generally considered instrumental for economic development, these spatial manifestations of the knowledge economy have become a key feature of present-day city planning objectives. Lastly, this section also highlights literature linking the "distance-shrinking" capabilities of modern technologies to the "end of geography" and the diminishing role of colocation in the behavioral strategies of firms. This is counterbalanced with literature on the importance of tacit knowledge, the continued relevance of face-to-face interaction and the

creative potential of chance encounters, facilitated by proximity and co-location, especially in cities.

The fourth and final section of the chapter focuses on the impact of "wireless mobilities" on organizations and ways of working as seen through the lived experiences of knowledge workers. Literature on flexibility, intensified by digitization, and the growing mobility of work is discussed. The section concludes with the "extendedness" of office-based work across multiple locations.

Lastly, this literature review consists of research and theory drawn from three distinct yet related disciplines: economic geography (EG), management and organizational studies (MOS), and the mobilities branch of sociology (Mb). These disciplines have different viewpoints and focus areas, as well as approaches to the study of changes in work and its spatiality. More specifically, at the heart of MOS are new organizational structures and management strategies; Mb scholars investigate the impact of movement (of people, ideas, objects) on contemporary society; and EG is concerned with the location of economic activity. Together, these disciplines present a more comprehensive overview of changes in ways of working and their spatiality. Not only do they offer multiple angles from which to approach said changes, but also different levels, or rather scales, of analysis, ranging from individual experiences and groups within certain professions, to firms, organizations and industries. This is especially useful since it points out where it is most likely that changes can be observed, where they have the most impact and on whom.

2.2 Post-Fordism and the Network Society

Most accounts of the knowledge economy begin with the post-Fordist regime of production, or rather the decline of manufacturing activity in industrialized countries (mainly in North America and Western Europe) and the shift towards more flexible and less routinized systems of production. The highly standardized and heavily regulated system of mass production championed by Henry Ford, together with institutional support in the form of the Keynesian welfare state, crumbled under the threat of global competition, rising oil prices and labor unrest that characterized most of the 1970s (Amin 1994; Boyer 2005; Harvey 1990). Reasons for this include technological advancements in production, communication and transportation that have

broadened the geography of manufacturing activity, changing the location of production to places of lesser control and regulation, effectively restructuring the global economy and allowing firms to exploit scale economies (Drache and Gertler, 1991; Malecki, 1986; Piore and Sabel, 1984; Scott and Storper, 1986).

More specifically, a range of industries had decentralized segments of production and relocated these parts of the process to less regulated, low-wage areas. This precipitated a crisis of blue-collar work, strains on the welfare system and changes in consumption. This prompted the need for technological, organizational and institutional flexibility. As a result, the vertical, assembly-line way of organizing production gave way to smaller and more adaptable (horizontal) units of production that were better equipped to respond to market shocks (Jessop, 1992; Scott, 1988a). This gave some enterprises unprecedented bargaining power with governments and labor unions, thereby reducing any institutional obstacles to profit maximization (Massey, 1995). The specialized regional clusters in Italy (Emilia-Romagna) and Germany (Baden Württemberg) became symbols of the new "flexible" regime (Esser and Hirsch, 1994; Heidenreich, 1996). These models demonstrated the shock-resistant capabilities of smaller, flexible units of production, and their structural capacity to innovate and diversify production. Uncovering (and replicating) the spatial and organizational mechanisms of such clusters was paramount to the revival of cities and regions in decline, though this was not without its challenges (Amin, 1994; Markusen, 1999; Martin and Sunley, 2003).

The shift to post-Fordism was accompanied and supported by fundamental changes in the function of the state and changes in the role of governance as it concerns economic growth and development. Fordism sustained the expansion of the Keynesian welfare state — and the influence of organized labor on institutions — which subsequently imposed limits on profits and capital accumulation (Jessop, 1994a). Facing competition from developing nations and a crisis of over-production "at home", the neoliberal policies of conservative leaders like Margaret Thatcher and Ronald Reagan shifted the balance of class forces — especially the business elites — in favor of deregulation and mass privatization, and away from labor unions. What is more, this chimed with the political need of Atlantic Fordist economies (North America and Western Europe) to ideologically and structurally separate from the "socialist" paradigms antagonized throughout (and in the aftermath) of the Cold War (Harvey, 2007). As such, post-Fordism emerged as a "stable" regime of production and as a manifestation of neoliberal governance, in

favor of flexible and permanently innovative ways of organizing work, and with the promise of rising incomes for skilled workers and the service class. Post-Fordism can therefore be understood as both a response to the crisis of Fordism and as a practical implementation of a new neoliberal ideology.

Equally important to the restructuring of industrial capitalism has been the internationalization of finance and the prioritization of service sectors in national economies so as to remain abreast with the latest changes in productivity and price standards (Amin, 1994). The declining profitability of manufacturing sectors, combined with the rise in OPEC oil prices, had had a detrimental effect on the financial and trade positions of Atlantic Fordist economies. Moreover, fluctuating exchange rates incentivized companies to take advantage of transient financial opportunities, thereby stressing the importance of the financial sector and the timesensitivity of essential financial information. This intensified trade and facilitated the interconnectedness between cities, regions and nations on a global scale (Alderson and Beckfield, 2004; Dicken, 2003). However, it also intensified competition for foreign investment and centrality in the so-called global networks of cities (Beaverstock et al., 2000; Taylor and Derudder, 2004).

It is important to note that the attractiveness of neoliberalism partly lies in labor's selfcritique. More specifically, the growth of service occupations and sectors can also been interpreted as a product of the critique of Fordism and its exploitative and restrictive nature (Hampson et al., 1994; Scott and Storper, 1986). Indeed, labor markets under Fordism were characterized by mass production, rigid regulation and overwhelming bureaucracy. Occupations were typically life-long, siloed and with little overlapping functions. While praised for its efficiency, the Fordist regime was criticized for transforming work and employee relations into mechanized, monotonous routines devoid of authenticity and culture. Subsequent changes in ways of working were a response to both the social (fair wages and better working conditions) and the artistic (more meaning and fulfillment at the workplace) critique of work (Boltanski and Chiapello, 2018).

More specifically, labor unions across Europe and the US demanded a less rigid and dysfunctional administration of labor institutions, and a redistribution of capital in a more socially just manner (less gendered, less racially discriminatory and less class-based) (Jessop, 1994a, 1994b). This, in tandem with globalizing production and trade, contributed to the

restructuring of occupational and remuneration structures in favor of flexible, knowledgeintensive and project-based ways of working. Post-Fordism manifested itself through a so-called liberation (geographical and organizational) from the rigidity of its predecessor. New generations of workers sought occupations in less "mechanical" and more "liberal" professions. The demand for new information and the need for management (of the relationship between capital and labor) against the backdrop of vertical (and spatial) disintegration of Fordist systems of production facilitated the rapid growth of knowledge-intensive, office-based — "symbolic" and "immaterial" occupations, especially in management, business services, information sectors and research and development (Daniels, 1993; Hardt and Negri, 2001; Malecki, 1986; Reich, 1992; Urry, 1986).

Focusing on the "knowledge intensity" of these occupations opened up new way of negotiating with labor unions and securing their support through the promise of higher wages and the possibility of professional fulfillment at the workplace (Powell and Hendricks, 2014; Zuboff, 1988). Post-Fordism can therefore also be interpreted as an era of individualization and of an increasing fluidity of social interactions. However, this "liquid modernity" has also been characterized by temporary occupations (projects), transient spaces and employment insecurity (Bauman, 2004, 2013). Sociologists have been arguing that the future of work will likely revolve around pacifying fears and anxiety over the increasingly temporary nature of employment through the promotion of freedom and happiness so as to keep the regime intact (Bauman, 2004; Beck, 1992; Boltanski and Chiapello, 2018; Hochschild, 2012; Hochschild and Machung, 2012).

Indeed, subcontracting — previously a marginal feature of production — became more pronounced during post-Fordism, and seen as an opportunity for companies to cut costs, reorganize and expand production through temporary linkages with secondary firms and supporting services (Holmes, 1986; Kalleberg, 2000; Peck, 1996). More specifically, the shift to flexible production was also mirrored in the restructuring of work via the disintegration of full-time, permanent employment into temporary, part-time and project-based contractual employment (Felstead and Jewson, 1999; Kalleberg, 2000, 2003). Initially, part-time employment was reserved for women in the workforce. However, as flexibility started to take on a more prominent role, so did the spread of flexible work arrangements across different social groups and segments of production. Even though these new forms of employment were promoted as life-long learning opportunities and greater worker autonomy in lieu of inert, life-

long vocations, there were already reservations about the potential for exploitation irrespective of the dynamism and knowledge intensity (Beck, 1992; Ekinsmyth, 1999; Giddens, 1991).

It was believed that through subcontracting, specialized units could become part of multiple parent firms through temporary projects, thereby gaining access to more knowledge than any individual firm with no external links and partnerships. Also known as "networked enterprises", these flexible units of production have been praised for their knowledge intensity and adaptability to new technologies (Castells, 2000; Scott, 1988a). These units are dependent on "informationalism" (dynamic flows of information) and the computerization (nowadays digitization) of work processes (Castells, 1989, 1996, 2009). Advancements in technology, therefore, included the automation of routine office-based work so as to improve the speed and flow of organizations and production. Therefore, new technologies focused on improving efficiency and minimizing the distance between different stages and segments of the production process. What is more, by virtue of being programmable, these new technologies offered unprecedented versatility and flexibility of application (Elam, 1994; Gibbons, 1994; Malecki, 1991). This intensified the need for companies to remain at the forefront of cutting-edge technologies and innovation, exacerbating competition between firms as well as these "spaces of flows" (Castells, 2014; Maskell and Malmberg, 1999; Porter, 1998).

Therefore, talent infused with tacit knowledge became essential to companies seeking competitive advantage and access to new information on emerging markets and the latest technologies (Gertler, 2007; Howells, 2002). Creativity and innovation became essential for economic growth (Bell, 1976; Cooke, 2002; Florida, 2002b). This highlighted the importance of learning and educational institutions to companies, and for cities and regions looking to diversify their economies and appeal to the increasingly "footloose" knowledge workers (Asheim, 1996; Florida, 2002b; Ottaviano and Thisse, 2002).

Indeed, developments in ICTs have provoked questions about the relevance of geography (or irrelevance of place) in a world that is increasingly flat (Batty, 1997; Cairncross, 1997; Friedman, 2006). However, the network society has reaffirmed the importance of place, of locality and proximity, despite the distance-shrinking capabilities of modern technologies. Spatial proximity has remained relevant for face-to-face interaction that is still essential for trustbuilding and the exchange of tacit information (Gertler, 2003, 2007; Graham, 1998; Graham and Marvin, 2002; Storper and Venables, 2004).

To conclude this section, post-Fordism and the rise of the network society have raised important questions about the role of place in a globalized, informational economy. By increasing the mobility of capital and flexibility of organizations, post-Fordist systems of production and neoliberal governance attempted to resolve the crises sparked by its predecessor. Though the extent to which these crises have been resolved — and not simply glossed over — is arguable (Amin, 1994; Brenner and Theodore, 2005; Rainnie, 1993; Thrift, 1989, 1989; Webber, 1991). It is important to recognize that the Fordist/post-Fordist division is an oversimplification of the structural and ideological shifts that have taken place since the 1970s. Indeed, there are debates within post-Fordism scholarship that discuss the intricacies of these shifts, and offer different approaches to the understanding of these broader socio-economic dynamics (Amin, 1994; Lipietz, 1986; Piore and Sabel, 1984). Notwithstanding, it is a useful device for teasing out some of the key differences between the industrial and economic organization of the 1950s and that of the late 1970s and beyond. The next section discusses how these broader structural shifts affected the form, function and development of cities. More specifically, the section combs through economic geography and urban studies literature for clues on what new values and location factors have emerged since the shift to post-Fordism, and how they affect where work — specifically knowledge work — takes place.

2.3 Urban Form and Location in the Knowledge Economy: from classical location theory to new industrial spaces and "cool" neighborhoods

The spatial manifestations of post-Fordism include the decline of many industrial cities and regions in North America and Western Europe (e.g. deindustrialization in Detroit and Milan), the relocation of the manufacturing industry to peripheral areas, the boom of office towers and skyscrapers in central business districts (CBDs), and the development of high-tech science parks in attempts to concentrate and spatially define sites of knowledge-intensive activity (Peck, 2000; Walker, 2000). Cities rich in human capital and with higher levels of education — especially pertaining to knowledge-intensive service occupations — were considered better able to make the transition to a service-based, global economy (Glaeser, 1998, 1999; Glaeser and Mare, 2001). The core-periphery, hub-and-spoke relationship between places in regions extended across the globe through complex inter-city networks in which key command and control functions are concentrated in major metropolitan centers (or global cities) — and key high-tech, new media

complexes in new places (e.g. Silicon Valley, CA and Silicon Alley, NY) (Castells, 2014; Indergaard, 2004; Sassen, 2011; Saxenian, 1991).

Mainstream literature on post-Fordist geographies tends to focus on cities as key sites of knowledge creation, innovation and creativity (Florida, 2002a, 2002c, 2005; Glaeser, 2011); urban and regional competitiveness (Bathelt, 2008; Begg, 1999, 2002; Porter, 1990, 1995; Ström and Wahlqvist, 2010); and on the intricacies (and inevitability) of world-city networks (Beaverstock et al., 2000; Burger et al., 2014; Meijers, 2007; Taylor and Derudder, 2004). Together, these ideas suggest that postmodern geographies manifest through the interconnectedness, competition and collaboration between cities for knowledge-intensive activity (Dear, 2000; Dicken, 2003). This is counterbalanced by literature on new forms of governance and institutional frameworks; more specifically, the blurring of public and private sectors to prioritize business (or entrepreneurialism) in how we govern cities (Harvey, 1989; Peck et al., 2009; Theodore et al., 2011).

These scholars warn that cities and companies have distinct priorities, the latter being more concerned with profitability and share prices. As such, the terminology and strategies used in business are less likely to attain city objectives, even if urban economies tend to be largely defined by the machinations of private enterprises (Brenner and Theodore, 2005; Malecki, 2002, 2004). Nonetheless, the ability to attract and retain investment and talent has become a priority, and for cities this means understanding the kind of spatial attributes, or location factors, that are coveted by profit-yielding industries (Malecki, 2004; Markusen, 1996). The focus on locality as a "sticky" factor in the increasingly "slippery" world of post-Fordism stresses the importance of place for the new regime. More specifically, neoliberal regimes seek a "spatial fix" for a socio-economic landscape in flux (Brenner and Theodore, 2005; Harvey, 1981; Walker, 1989). However, in order to understand these changing geographies, it is important to backpedal to the fundamentals of location theory, especially as they pertain to the spatiality of knowledge-intensive, service-based economic activities. This will also highlight key changes instigated by the transition to a knowledge economy.

It is important to address the question of scale when discussing location theory. While some of the ideas and concepts discussed in the following section examine agglomeration economies at a regional scale, they are also applicable (and observable) at a city scale. Indeed, many of these concepts originate from a regional perspective and have been built upon to explain

where and why industries locate at the city scale, e.g. from von Thünen (1826) to Alonso (1964), from the Marshallian industrial district (Marshall, 1920) to Italianate industrial clusters (Piore and Sabel, 1984) to dense urban environments (Jacobs, 1961) and inner city neighborhood clusters (Hutton, 2004; Scott, 1983). The principles that underpin location theory — centrality, proximity, accessibility and interaction — are common denominators that can be used to explain industrial location at multiple scales (Scott, 1988b; Shearmur, 2012b).

2.3.1 Location Theory and Urban Form: Models and Schools of Thought

Location theory is based on the assumption that there is a logic to how industries behave in space and where they choose to locate. This location in space is determined by a number of factors, or key considerations, that economic agents take into account as they look for optimal places to settle in. These factors affect land use patterns and cost structures (land rents) and inform urban growth and development (Lloyd and Dicken, 1977). Transportation costs and accessibility to markets are considered the primary factors of locational decision-making in von Thünen's theory of agricultural land use (Chisholm, 1961). Its focus on agricultural land notwithstanding, the theory shows how a competitive market organizes land use around a core or a center. Isard (1956) and later Alonso (1965) adapted the theory to better suit urban land use applications, and introduced the bid rent function, according to which the willingness to pay determines land market values and affects the location of economic activity through competition for land closest to the center.

As such, urban growth takes on the form of concentric rings, developing outward from the core. Indeed, the concentric zone model developed by the Chicago School (Burgess et al., 1925) is closest to the Thünen model. In it, the CBD, or the core, is where most economic activity is concentrated. Individuals must commute to and from residential areas developed around the CBD. Rents fall as distance from the CBD increases, suggesting that households have to trade-off housing size and amenities for better job accessibility. Similarly, industries will locate in areas where the cost of production is lower — proximity to labor reduces those costs (O'Sullivan, 2009). High-order services (e.g., legal and financial services) are typically concentrated in the CBD, since this is the median location, or the optimal distance from labor and other services, i.e., firms and institutions on whose information these establishments rely.

These establishments will gravitate towards centrality also because they tend to have clients across the entire metropolitan area. Finally, early location theory stipulates that office establishments, being in the business of information exchange, will be willing to pay more for such central locations.

Another pillar of location theory is Central Place Theory, which shows where industry and labor locate based on proximity to consumer markets (Christaller and Baskin, 1966 (1933)). The theory predicts the number and hierarchy of cities, towns, villages and hamlets in a region, based on market size. According to this theory, firms favor locations that minimize the distance to their consumers, and workers locate near the markets, driving new development. Production of goods and services will tend to cluster together in "central places" with the largest markets (i.e. large cities), and the relationship between different orders of goods and services is fixed. Though criticized for its static and somewhat rigid approach to the analysis of urban and regional development (Massey, 1973), it is a useful (and observable) model that stresses the importance of proximity and access to consumer markets as a key location factor. Later updates to the theory explain how central places also garner the highest value and maximize agglomeration benefits (Lösch, 1954). In an attempt to explain why industries change location, Weber took into account all three of the location factors discussed so far: transportation costs, labor costs and agglomeration economies (Weber and Friedrich, 1929). Since location is adjusted for cost, the central place model becomes fuzzy, or rather more dynamic. Echoing Lösch, Ullman suggests that mobility and interaction between sectors affects location. As a result, cities are likely "polycentric", or have "multiple nuclei" that cater to a variety of needs. However, if transportation and labor costs are too high, both movement and interaction will be restricted (Harris and Ullman, 1945; Ullman, 1941).

The knowledge intensity and information-sharing characteristics of central places extends to definitions of agglomeration economies and, more specifically, of urbanization (external benefits to multiple industries) and localization economies (external benefits to a specific industry). While Jacobs (Jane) and theorists of the New York School, popularized the idea that diverse urban environments create positive spillover effects for residents and industries alike (1992 [1961]), Marshall was the first to highlight the benefits of agglomeration for economic growth. In agglomeration economies, companies flock together to exploit external economies of scale in production. Introduced by the Cambridge School of Economics, industrial districts are

examples of clusters in which industry secrets and new knowledge are "in the air" (Marshall, 1920). These companies bring specialized skills and technologies, establishing industrial districts as sites of innovation. What is more, in industrial districts skilled labor moves between companies, building a knowledge base that allows producers to specialize and contribute effectively to the final product. This requires coordination that the spatial proximity of industrial districts allows for. Knowledge is shared between companies in a so-called "neighborhood effect" (Hagerstrand, 1968).

More specifically, information spreads outward from the source, and those in the immediate vicinity will benefit from this new knowledge. Indeed, tacit knowledge is complex information that is best disseminated through direct contact with people who have that specific skillset and "know-how", which is why spatial proximity has been considered an advantage in industrial districts (Gertler, 2003; Howells, 2002; Polanyi, 1966). The distance-decay effects of new technologies have supported the "innovation diffusion", but the need for face-to-face interaction and trust-building has ensured that external spillovers remain spatially bound to the area from which new ideas originate (Hagerstrand, 1976). The shift to post-Fordism raised doubts about the strength central places and the importance of cities to economic growth as opposed to institutions and broader socio-economic conditions (Harvey, 1975; Webber, 1968).

Indeed, with the onset of post-Fordism, the fundamentals of location theory were intensely scrutinized for oversimplifying the processes that undergird the spatial behavior of industries, firms and economic agents in space (Harvey, 1981; Massey, 1973). It was argued that these models could not account for globalization, socio-political tension, developments in ICTs and the shift to a service-based economy that drastically altered the qualitative landscape of production. In other words, location theory is too static and rigid to grasp these wider structural factors that affect the location of economic activity (Anas et al., 1998). Indeed, there has been a shift in the spatial division of labor, facilitated by social and power (class, gender and race) relations inherent in all organizations. More specifically, there is a geographical separation of functions — of different levels of control and executive functions (Massey, 1995). Control functions tend to be concentrated and executive functions tend to be dispersed across a range of production sites. While this highlights changes in the role and function of place under a post-Fordist regime, it also explains the continued relevance of CBDs and the scatteration of certain

types of service jobs (low-wage office work) to back offices to suburban extensions (Nelson, 1984; Wilson, 1995).

The LA School, observing dispersal and sprawl, focused on the flexibility capabilities of modern communication and transport technologies, the reduced need for clustering, and therefore challenged the very essence of monocentric urban form (Dear, 2000; Dear and Flusty, 1998; Pascal, 1987; Soja, 1989). The decline of manufacturing centers and the decentralization of employment activity across US cities hinted at the diminishing power of agglomeration economies (Glaeser and Kahn, 2001; Gordon and Richardson, 1996; Hansen, 1990). Indeed, decentralization and scattered patterns of employment activity have been well-documented (Garcia-López and Muñiz, 2010; Garreau, 1991; Giuliano and Small, 1991, 1999; Shearmur et al., 2007). However, within this body of literature clusters of economic activity in or near downtowns (CBDs), and orthodox patterns of urban development and industrial location are also present (Borruso and Porceddu, 2009; Coffey, Drolet, et al., 1996; Coffey, Polèse, et al., 1996; Coffey and Shearmur, 2002; Shearmur and Alvergne, 2002; Shearmur and Coffey, 2002). This suggests that agglomeration economies (proximity and collocation) work at multiple scales and that "new" patterns have not quite replaced or invalidated the "old" (Agarwal et al., 2012; Amin and Thrift, 2002; Markusen, 1996; Shearmur, 2011; Shearmur and Doloreux, 2015a).

2.3.2 Changing to remain the same? The ongoing relevance of Location Theory (with some tweaks...)

Downtown and trendy inner city neighborhoods remain important to the postmodern "corporate city" for visibility and prestige (Zukin, 1989, 2009). This emphasizes the symbolic role of CBDs. Indeed, not only do corporations locate their headquarters in downtowns where they are able to outsource accounting, legal and advertising activities and exploit scale economies, but also where they can enjoy the additional advertising afforded by a fashionable office in a tall building (Helsley and Strange, 2008). Finance, insurance and real estate (FIRE) activities in Canada's largest cities remain concentrated in CBDs, with few major establishments venturing out of the downtown for the suburbs. While cost and proximity to producer services and clients are important to these establishments, other key reasons for maintaining a central location are indeed about visibility and prestige (Coffey, Drolet, et al., 1996; Coffey and Shearmur, 2002).

However, it is important to mention that some scholars note "micro-fluctuations" in these core locations; that is, while CBDs appear stable on the whole, there are some micro-level disturbances and pockets of growth and decline (Shearmur et al., 2007). This suggests that contradictory trends may be observed at different scales and units of analysis. For producer services the patterns of location still mirror that of concentric rings, indicating that cost and market demand still dictate their locational behavior (Ó hUallacháin and Leslie, 2007; Shearmur and Alvergne, 2002). In other words, contrary to what has been suggested by the LA School, any changes in patterns of employment locations are far less chaotic — a degree of structure and logic remains intact (Shearmur and Doloreux, 2015a).

The location patterns of creative sectors including new media also highlight the importance of symbolism and attachment to old industrial areas in inner-city neighborhoods, such as the old garment district in Montreal and New York (Rantisi, 2002; Rantisi and Leslie, 2006, 2010). Interestingly, as value shifted from places dominated by hardware and manufacturing to places able to facilitate innovation in software and creative production, old industrial areas in inner-city neighborhoods became places where culture, technology and buzz — also considered essential for innovation — meet (Graham and Marvin, 2000). Indeed, smaller IT companies have tended to concentrate in a number of gentrifying inner-city neighborhoods, where these new economy firms can use both the localized services of the "traditional sort", as well as ICTs to connect to local and global networks and markets (Duvivier et al., 2018; Duvivier and Polèse, 2017; Hutton, 2004).

What is more, these inner-city neighborhoods possess an architectural quality that has been particularly conducive to new industries due to their new ways of working; that is, the versatility of the spaces and their ability to combine work, life and play are aligned with the proposed values of new economy firms. The role of a "bohemian milieu" in attracting talent and diversifying labor pools (Florida, 2002; Glaeser, 2011; Pratt and Jeffcutt, 2009) flooded urban and economic development policy discourses. This, however, proved to be a rather reductionist approach to understanding the link (and causality relationship) between space, knowledge creation and the attraction of high-caliber knowledge talent. More specifically, an urban environment with a creative milieu is too vague an explanation for why some places thrive and others do not (Rantisi and Leslie, 2010; Scott, 2006, 2014; Shearmur, 2012a). Nonetheless, such symbolic imagery contributes to the positivist narrative of urban change, deployed by municipal governments so as to rebrand abandoned districts (Hutton, 2006, 2009; Pratt, 2000). As important as the creative dynamics is the fact that these unused sites are coveted by new firms because they offer larger, more flexible spaces at typically lower rents adjacent to the CBD.

What is more, it is generally assumed that post-Fordism revived the Marshallian industrial district. These neo-Marshallian districts have been characterized by local specialization, regional clustering and global connectedness, spatially concentrated in inner city neighborhoods or on the edge of cities in science parks (Amin and Thrift, 1992; Garreau, 1991; Scott, 1988a, 1996; Scott and Storper, 1986). These clusters have reaffirmed the benefits of proximity, especially for generating new technical knowledge, producing spillovers and improving production efficiency and information exchange (P Krugman, 1991; PR Krugman, 1991). Additional benefits include learning opportunities through innovation and chance encounters i.e. Marshallian externalities and the invaluable benefits of face-to-face interaction (Asheim, 1996; Asheim et al., 2007; Bathelt and Turi, 2011; Storper and Venables, 2004).

In the global, "associational economy", the key drivers of innovation are information exchange and reduced transaction costs (Cooke and Morgan, 1999). Trust between employers and employees and networks of producers is also essential, and is established through frequent face-to-face interaction and "embeddedness" in local social and institutional networks (Granovetter, 1985). But are these neo-Marshallian districts "old wine in new bottles" (Boschma, 2005; Harrison, 1992; Markusen, 1999)? More specifically, the aforementioned benefits are echoes of existing patterns of locational behavior, and the extent to which the onset of post-Fordism "revived" industrial districts as opposed to highlighting their already existing attributes is arguable.

2.3.3 Clusters, proximity... place-branding?

It has been suggested that novelty is not in the clustering of economic activity, but in placebranding so as to attract foreign investment and talent (Markusen, 1999; Nathan et al., 2019). Referring to these clusters as "high-tech fantasies", critics (Castells, 2014; Massey and Wield, 2003) have questioned whether these places are really sites of innovation and new ways of working and not simply symbols and instruments of governance in attempts to anchor foreign investment and talent. According to the Regulation School, the most profound change has

occurred in the role of public institutions as key supporters of innovation and facilitators of spatial organization so as to boost competitiveness (Pike, Dawley, et al., 2010; Pike, Rodríguez-Pose, et al., 2010; Tomaney et al., 2010). What is more, some scholars argue that geographical (spatial) and organized (relational) proximity are often wrongfully conflated, and that distinguishing between the two shows that proximity can be maintained at a distance for certain types of activities (Rallet and Torre, 1998; Torre and Rallet, 2005). Some types of knowledge-intensive activity, R&D for example, do not require as much physical proximity as managerial relations do, and modern technologies maintain organized proximity to a satisfactory degree (Gertler, 2003, 2008; Huber, 2012; Malmberg and Maskell, 2002). Proximity between advertising companies, for example, fuels competition and rivalry rather than collaboration (Grabher, 2001, 2002). In the case of Internet companies in Lyon, clustering occurs only if knowledge and services are complementary (Moriset, 2003).

Meanwhile, design and development activities require face-to-face interaction, especially for tacit knowledge inputs. The success of Silicon Valley, for example, is often attributed to faceto-face interaction, informal conversations, office gossip, and "dirt" on competitors, markets and new tech (Saxenian, 1991), suggesting that new technologies are complementary rather than a substitute for face-to-face communication (Audretsch and Feldman, 2004; Graham, 1998). What is more, the higher the density of these types of activities, the greater the skill-matching opportunities, which are especially important for project-based creative workers that are facing increasing levels of precarity despite their coveted "creative" status (Vinodrai, 2006, 2010). This body of literature also shows that the "glocal" nature of knowledge-intensive occupations has not necessarily led to an overall improvement of economic conditions experienced by these workers. Indeed, Silicon Valley high-tech workers" "high-risk-high-reward" lifestyle is notoriously full of anecdotes of workers living out of cars and offices due to unaffordable housing prices in the Bay area (Stehlin, 2016). The link between these high-tech occupations and gentrification raises an important question: knowledge-intensive economic growth for whom?

To conclude this section, deindustrialization and the disintegration of vertical production systems — as well as the emphasis on flexibility, technology, knowledge and learning — are emblematic of the post-Fordist regime. In the last several decades transportation costs have become less important in firms' locational calculus as a result of advancements in production, communication and transportation technology. Service sectors, especially knowledge-intensive

activities *in theory* no longer need to locate in close proximity to markets and labor. However, economic geography scholarship shows that general urban patterns of location remain more or less structured and aligned with the general principles of classical location theory (e.g., Shearmur and Doloreux, 2015a). Even the claim that the most fundamental shift has occurred in the specialization of smaller cities (more focused on production) and the greater versatility of larger cities (more focused on management and services) (Duranton and Puga, 2000) is an echo of Christaller's location theory. There have, however, been some important modifications and addendums, such as the re-ordering of priorities, in favor of more symbolic elements of location.

Also important has been the differentiation and interconnectedness of functions and types of knowledge-intensive employment that may require different levels of geographical and organized proximity. For example, the Internet as a sector produces "schizophrenic geographies" by virtue of the number and variety of services involved, and only by disentangling these services from the sector could more sensical patterns start to emerge (Moriset, 2003). What is more, changes in the role of institutions and the adoption of a more corporate tone justify and promote development and renewal projects in old industrial areas and "switched off" inner-city neighborhoods. This also explains why creativity has become so popular in urban policy circles and why the "coolness" of inner-city neighborhoods is often overpitched for investment and talent attraction purposes (Florida, 2002c; Pratt and Jeffcutt, 2009; Vinodrai, 2017b).

The combined effects of symbolism, flexibility and innovation produce changes in the landscape of corporate *power* relations more than they do in the general patterns of employment location. However, as pointed out by a number of scholars, a finer scale and unit of analysis may show distortions, or rather fluctuations (e.g., Shearmur et al., 2007), even in these ostensibly stable patterns of location. Indeed, geographers focusing on creative work (Brennan-Horley, 2010; Rantisi and Leslie, 2010; Vinodrai, 2010) and digital skills (Bissell, 2018; Gorman-Murray and Bissell, 2018; Richardson, 2017; Richardson and Bissell, 2017) have been pointing out their increasingly dynamic spatiality i.e. the dispersed networks of multiple workplaces in an urban setting. It is also interesting to note that this multi-locality of work appears to be a shared feature of creative and digital work.

Finally, advancements in ICTs, especially pertaining to the speed of flows of information, has broadened the scope of organized proximity. Taking into consideration that these advancements — especially the capabilities of smart devices, cloud computing and the Internet

of Things — have been integrating into the workings of the knowledge economy, it is important to consider how they have affected knowledge work and workers, and by extension, knowledge-intensive firms in urban settings.

2.4 New ways of working: digitization, flexibility and mobility

In recent years, the two primary mechanisms for promoting and delivering flexibility have been the incorporation of new technologies — namely, digitization and virtualization of work and organizational structures — and engagement through temporary, project-based contracts (Bathelt and Turi, 2011; Castells, 2000; Davidow and Malone, 1992; Kalleberg, 2000, 2003; Okhuysen et al., 2013; Ruostela et al., 2015; Taylor and Luckman, 2018). Firms and workers alike bid for projects and negotiate the workload. What is more, they need to be able to shift roles and tackle new responsibilities at short notice. Telework and virtual work, both products of the post-Fordist regime, have been established as key components of "flexible work arrangements", co-existing with other models of work such as office-based work and work from home. In these new ways of working, time trumps space, especially in the virtual workspace, and locations are used interchangeably (Messenger and Gschwind, 2016).

2.4.1 Mobile work and worker "multi-presence"

As ICTs evolve and more routine tasks (especially in office-based work) digitize, being kept in one place becomes more of a disadvantage (Elliott and Urry, 2010; Flecker, 2016; Maccoby, 1996). Where physical, or "corporeal" mobility is not possible, virtual mobility can be exercised through an ever-expanding array of digital software and applications (Urry, 2007). Workers engage in "mobility management" by exploring new ways by which they can be "multi-present", though these arrangements also entail densified hours and working overtime (Koroma and Vartiainen, 2018). This suggests that workers are increasingly encouraged to be available (and accessible) in different spaces as well as at different times, leading to "disjointed space-times of interaction and relation" (Richardson, 2020)¹. These workers' experience of place is virtual: the

¹ It is important to mention that the changing space-time dynamics of work have been the subject of sociological inquiry for some time (Bauman, 2005, 2013; Hochschild, 2001; Hochschild and Machung, 2012; Jacobs and Gerson,
Internet, laptop, email, phone and desktop are places where information is collected and exchanged, and where new relations are formed (Kesselring, 2006). Moreover, same-sector employees can have varying degrees of mobility, as well as combine different types of mobility (e.g. corporeal and virtual) so as to achieve their intended professional goals. These variations are subject to a number of conditions that include but are not limited to family life, living arrangements, community engagement and obligations, personal finance and wages, as well as the importance of corporeal travel for work.

It is important to note that there is a gender and class dimension to these new ways of working: as already mentioned earlier in this chapter, project-based and part-time work used to be restricted to (and restrictive to) typically marginalized social groups. To this day, some of these practices (virtual work, project-based work) are used as coping strategies by workers with little institutional support and precarious working conditions (Ekinsmyth, 2002, 2002, 2011; Taylor and Luckman, 2018). However, with the ubiquitous use of ICTs, a growing number of generally considered privileged professions have become more mobile (Elldér, 2019; Kesselring, 2015; Vilhelmson and Thulin, 2016). This prompts questions about the use of worker mobility and flexibility as determinants of social status (Pajević and Shearmur, 2017; Shearmur, 2017).

Portable (mobile), wireless devices have facilitated the spilling of office-based work across a number of other locations, including the home, hotel rooms and lobbies, airport lounges, train stations and so on — as well as mobile spaces like cars, planes and trains (Axtell et al., 2008; Cwerner et al., 2009; Hislop, 2013; Lassen, 2006; Schwanen and Kwan, 2008). Over the past two decades, management and organizational studies (MOS) scholars have been highlighting the rising mobility of workers — especially in knowledge-intensive occupations as well as the increasing *spatial* mobility of office-based work (Hislop and Axtell, 2007, 2009; Kesselring, 2015; Taylor and Spicer, 2007). Indeed, certain types of work are also performed onthe-go, or rather in-between places as well as at specific locations.

Digital skills and work, in particular, have dynamic workplace geographies (Richardson and Bissell, 2017). Connecting spaces, such as trains, planes and cars, temporarily transform into

^{2004).} These changing dynamics have also been picked up by economic geographers looking into the "time-space compression" capabilities of new technologies (Harvey, 1999), the demand for spatial and temporal flexibility in high tech work (Massey, 1996), project-based work (Ekinsmyth, 2013) and for firms more generally (Schoenberger, 2000). What is more, the neglect of complex space-time dynamics in mainstream geography has been raised by Hägerstrand in the 1970s, though empirical work on "time geography" is scarce (Miller, 2005, 2016).

workplaces, and mobile workers often adapt their work to suit the environment that they find themselves in. For instance, the availability of reliable cellular data and a Wi-Fi connection is often an enabling factor, and the lack of privacy (awareness of other users of the space) can be a constraint. The types of activities performed in connecting spaces also depend on the nature of the work, the culture promoted by the employer, and the time-constraints or time-sensitivity of the work itself. In other words, working anytime and anywhere — a common assumption associated with mobile work — is more hype than reality (Axtell et al., 2008). The type of space, the kind of activity and the degree of constraints (spatial, temporal, technological) determine how (and where) mobile work is performed (Brown and O'Hara, 2003). However, workplaces have been changing — and expanding (Martins, 2015a; Richardson, 2020).

2.4.2 Multi-locational work, hybrid workspaces and the coworking office

In addition to becoming more mobile, knowledge work is also increasingly multi-locational. Much of the earlier literature on telework and virtual organizations neglects the group of workers that perform their work from both the home and the office, as well as other "third spaces" such as collaborative, co-working spaces and cafés (Halford, 2005; Kingma, 2016). It also lacks a deeper analysis of the relationship between work activities and spaces used for work: certain spaces can be adapted to accommodate work activities, just as activities can be curated so as to maximize the utility of particular spaces (Brown, 2017; Brown and O'Hara, 2003)

A survey of business consultants² in the UK revealed that it has become an effort to be at the "base" office "at least once per week", and that this is due to commitments at the clients' locations. To manage their multi-presence, workers would make informal arrangements and "negotiate" schedules, so as to meet at the office once per week for face-to-face meetings and administrative tasks. This fuels the need to be "perpetually connected" so as to remain in sync with other team members (Hislop and Axtell, 2009).

² It is important to note that such professions — business consultants, real estate consultants, accountants — have always been mobile to a degree, spending less time at the official workplace due to the nature of the work that requires more time spent at client locations or at site visits. The Hislop and Axtell study reveals how multiple workspaces inform the tasks that are conducted by these workers, and the effort required on the part of workers to ensure that they are available, reachable and that the work tasks can be executed at these different locations. These insights are relevant because these occupations tend to occupy "symbolic" downtown locations, and their space-time dynamics have been by and large neglected in urban analyses of work location.

The changing physical, virtual and social settings are also frequently a source of stress for employees — especially when needing to manage work outside of regular hours due to operations or projects involving workers in different time zones (Koroma et al., 2014; Koroma and Vartiainen, 2018; Vartiainen and Hyrkkänen, 2010). These scholars have stressed a need to look more closely at individual as well as collective, organizational practices of mobile workers so as to better understand the conditions and spatiality of their particular profession.

Moreover, taking these "hybrid workspaces" into account, more recent literature has started to critically discuss the blurring of work-life boundaries, the permeability of domestic (private) spaces and the practice of digital management and surveillance (Cousins and Robey, 2015; Sewell and Taskin, 2015; Sørensen, 2011). While teams of mobile and virtual workers continue to take on managerial functions (Barker, 2005), the rise in virtual surveillance has been deemed a "reverse panopticon" whereby technologies enable individual monitoring (Clegg and Baumeler, 2010, 2014). What is more, the increasing capacity of digital surveillance at and beyond the workplace also raises important questions about the potential for digital discrimination and exclusion from virtual networks and projects (Lyon, 2003; Zuboff, 2015, 2019).

Meanwhile, coworking spaces have increasingly been regarded as hotbeds of collaboration and innovation, and as symbols of digital nomadism on work on-the-go (Gandini, 2015). However, ethnographies of coworking spaces show that these types of spaces are transient nature and adapted to serve functions more geared towards networking. Even then, research shows that for coworking space users the business network (virtual) is the official workplace, not the physical space that is being used (Kingma, 2016; Richardson, 2017). What is more, coworking spaces are attempts to anchor *and curate* social interactions rather than facilitate collaboration. The idea that coworking spaces generate a collaborative atmosphere that is conducive to innovation has a complex and contradictory history. On the one hand, coworking as a style of work and a spatial aesthetic has been popularized by the digital elites of Silicon Valley; on the other, coworking has been a resilient practice deployed by creative professionals and types of work characterized by temporality, mobility, scarcity and employment insecurity (Gandini and Cossu, 2019; Merkel, 2015, 2019). The lack of distinction between these two different uses of coworking puts both users and spaces at risk of delusion and exploitation. What

is more, it generates a real estate bubble based on the assumption that coworking is a practice of privilege, whereas it is, by definition, not (Moriset, 2013).

The spill of office-based work across a range of public and private spaces has also drastically altered office layouts through open spaces, coworking desks and office management practices such as hot-desking, hoteling and so on (Bernstein and Turban, 2018; Gerdenitsch et al., 2018; Hislop, 2008; Hislop and Axtell, 2009). Offices have started to mirror coworking spaces in layout and design, so as to serve a more facilitating function. Ironically, these open, collaborative spaces have actually deterred workers, creating an atmosphere in which workers actually avoid interaction and seek out more private settings (Irving et al., 2020). Indeed, the restless experience of the open-concept office is distracting and runs interference with the workers' tasks. Workers struggle with finding a quiet place to work, with having limited storage space, and with having to constantly negotiate time and private spaces for face-to-face meetings. The combination of internal (office layouts), external (required mobility), rising office costs and longer commutes have been driving workers to renegotiate their physical presence in favor of the virtual (Bosch-Sijtsema et al., 2010).

To conclude this section, digitization, mobility and flexibility of work (and the worker) have contributed to the spilling of work activities across multiple locations in urban settings. Rather than performing work at a single or fixed location, workers — especially digital work and skills — have been performing their work within a network of spaces that adapts to their specific needs. These networks include the office, the home and "hybrid spaces", "third spaces" and "connecting spaces". They are a mixed bag of private, public and quasi-public spaces — as well as virtual spaces. The scope of this mobile and multi-locational way of working is determined by the nature of the work being performed, individual workers' needs and contexts, as well the characteristics of the spaces being used. What is more, workers often have to adapt their tasks so as to maximize the time spent at each location. While the styles and number of places that are now being used for work have been expanding, there still appears to be a hierarchy, or a prioritization of fixed spaces (such as the office or the home) as "base" spaces (Hislop and Axtell, 2009; Martins, 2015). However, attempts to make offices more flexible and collaborative seem to have produced the opposite effect (Saval, 2014).

2.5 Key takeaways from the literature

The expanding geography of work spurred by technological advancements, the disintegration of vertical systems of production and the diversification of work activities is also mirrored in workers' daily experiences. The need for production units to be more flexible has trickled down to the individual worker, and as work activities multiply (and require varying degrees of interaction), so do the spaces used for work. For economic geographers and urban planning scholars, broader structural factors have not destabilized existing patterns of knowledgeintensive economic activity: central places, such as CBDs and inner-city neighborhoods still attract and cluster this type of activity, albeit for slightly different reasons. While some location factors (such as transportation costs) may matter less now than they used to, others like proximity to workers, services and consumers are still key considerations for knowledgeintensive firms. In other words, there is still a logic and a pattern to their spatial behavior. However, as shown by sociologists and management and organizational studies scholars, these patterns are more complex — more dynamic — than what is being observed at higher scales of analysis. According to MOS and Mobilities (Mb) scholars, work is becoming more mobile and multi-locational, extending the boundaries of the workplace beyond a designated or a fixed location.

This highlights a tension between disciplines, and a tendency on the part of EG scholarship to overlook the idea that work is less attached to a well-defined, fixed location. This is partly because existing data and methods show little change in established patterns of employment location in cities. It is also, in part, due to mainstream ideas developed around mobile workers — e.g., Richard Florida's "creative class" — that oversimplify and romanticize the role of the built environment in anchoring these types of workers. Indeed, if these workers are "mobile and finicky" should they be the focus of city planners for well-functioning urban economies (Peck, 2005)? For this reason, this dissertation highlights MOS and Mb scholarship that would encourage urban scholars to take these changes in work and workplaces more seriously.

So far, this literature review has produced several key assumptions: 1) knowledge workers are less bound to fixed work locations, and different types of places are frequently combined to produce a network of workplaces that is mediated by the nature of work and the type of activity being performed; 2) mobile and multi-locational work is affecting a range of

knowledge-intensive professions and is no longer a characteristic of creative work alone; 3) other ways of organizing work and workplaces are becoming more important; and 4) economic geography and planning scholarship has not yet taken full stock of new ways of working and how they may be affecting work location at the city scale.

Chapter 3: Research Design — Data and Methods

3.1 Problem statement and introduction to research design

In the previous chapter, three distinct yet related disciplines were reviewed for insight into the changing world of work and its spatiality against the backdrop of digitization, mobility and flexibility. Economic geography (EG), management and organizational studies (MOS) and the Mobilities branch of sociology (Mb) have different approaches, conceptual and methodological, to the study of work, employment and its location in space. Not only do these disciplines have a different degrees of "space sensitivity" as it concerns work, but also approach the subject from different angles, scales and units of analysis (Taylor and Luckman, 2018; Taylor and Spicer, 2007).

There has been a tendency, on the part of economic geographers in particular, to treat workplaces as immobile and fixed in place. The focus has by and large been on the distance between these well-defined and fixed points of employment, and how this affects (in tandem with other factors) the locational behavior of firms, labor and consumer markets. The assumption that work has a fixed location has informed a number of policy and planning tools and actions, such as land use plans and zoning regulations, and has also generated the idea that successful, innovative work environments can be planned and replicated. Also, the assumption lends itself to efforts that treat places as containers of economic activity, as well as anchors of investment and talent.

At the same time, MOS scholars have tended to neglect the fact that workplace relations (management, organization, surveillance, accountability) are fundamentally spatial processes, focusing instead on how changes in the world of work affect productivity, satisfaction and motivation of employees within an organization. Finally, sociology and its newer sub-disciplines like Mb focus on the experience of place in response to broader structural factors, often neglecting the role that the built environment plays in shaping these experiences. While there have been overlaps and crossovers — most notably by Marxist scholars that draw from multiple disciplines to explain how structural changes manifest spatially and why — there has, to my knowledge, been little of this convergence on the subject of mobile and multi-locational knowledge work.

Concerning methods, MOS scholars traditionally focus on the behavior of individuals and firms within certain occupations (Hislop, 2008; Taylor and Luckman, 2018). Therefore, the methods used typically include qualitative surveys, interviews (in-depth, semi-structured), ethnography, shadowing and reflexive journaling. Similarly, Mb scholarship relies on surveys and interviews, but has also been developing new methods to better understand the new forms and effects of mobility (Büscher et al., 2011; Jensen et al., 2019). These "mobile methods" include tracking moving objects and engaging in movement so as to see how, for example, still or stationary activities (i.e. face-to-face interaction) change as people move between places using different means (wireless technologies). Some mobilities scholars also draw from numerical data, but usually in combination with qualitative data (see for example Kesselring, 2006).

Given the focus of EG scholarship on location and distribution of economic activity, it most often relies on place-specific numerical data and quantitative surveys such as the census. Qualitative data and methods were not as coveted a method and research design within economic geography until fairly recently — and are arguably still secondary to quantitative tools, largely because of their limited (for now) geographical scope and (as is generally perceived) their idiosyncratic nature (DeLyser et al., 2009; McDowell, 2010). There are, of course, notable exceptions like Doreen Massey, Manuel Castells and Erica Schoenberger, among others, whose work positioned both qualitative and quantitative approaches on level ground. However, even though they are economic geographers, often times their contributions to the field are communicated through the prism of urban sociology³. It is difficult to say whether this tendency is due to methods, but it does mean that when it comes to phenomena like mobile and multilocational work, as economic geography and planning scholars we are facing a problem.

As shown in the previous chapter, the mobility and multi-locality of work is a complex and conditional occurrence. It depends on a number of overlapping factors that existing numerical data can only partially grasp, e.g., the nature of the profession, type of work and activity, employee relations, the spatial and temporal contexts, and workplace culture. As such, it demands a more flexible and in-depth approach to these largely behavioral elements of work.

³ Are Marxist economic geographers "painted" as urban sociologists because their work is also qualitative or because it is politicized? I suspect that it is a combination of both, though I myself have been labelled "one of those" by economic geographers at conferences, even though I strive to remain politically neutral and as objective as I can in my tone and presentation of findings. I include this footnote because I think that there is something to be said about the general attitude of the discipline towards qualitative scholars.

While data sets and survey designs are being adapted to reflect new ways of working e.g., the European Working Conditions Survey (EWCS), they still rely on fixed categories that do not fully accommodate the range and interchangeability of mobile and multi-locational work.

Over the recent years, a number of studies that extrapolate from numerical data — such as the EWCS, the Labour Force Survey (UK) and Canadian census data — have concluded that mobile and multi-locational work is a slow phenomenon, and that the data has failed to show any major changes to the spatiality of work. More specifically, contrary to the perceived qualitative changes, knowledge work is still spatially bound to "traditional" places of work, such as the office (Felstead, 2012a; Felstead and Henseke, 2017; Ojala and Pyöriä, 2018; Putri and Shearmur, 2020). The data that these studies draw from show that mobile work is not as widespread, and that public and semi-public places like cafés, libraries and airport lounges are not as frequented by workers as expected given the backdrop of digitization, mobility and flexibility. These are indeed empirically valid findings.

There are, however, grounds for challenging these findings: first, the data do not allow for overlaps in project-based work, which is often balanced with full-time employment, or other projects with different timeframes — and likely with different spatialities (Bologna, 2018; Eurofound and the International Labour Office, 2017). Recent studies on employment in the UK and The Netherlands, for example, show that advertising occupations are increasingly opting for self-employment due to structural factors, such as the declining average income, rising competition and the need for specialized skills. Other EU member countries, like Greece, Bulgaria and Romania, which have been disfigured by political uncertainty and heavy-handed austerity policies, also see a rise in self-employment and freelancing as a means of pursuing economic alternatives (Taylor and Luckman, 2018). This suggests that existing numerical data alone are simply not enough to grasp what, where and why changes in work are happening. Second, these studies are unable to grasp work mobility at different temporal scales e.g., the day, the week, the month and the year. Mobilities scholars and researchers interested in the impact of digital technologies on work have been better able to pick up on these nuances through qualitative approaches.

Meanwhile, studies using multiple vantage points are yielding interesting findings. For example, a recent study from The Netherlands — drawing from the national Labor Supply Panel and focusing on the use of technology and frequency of telecommuting — shows how a rise in

working from home has started to affect commuting patterns with far-reaching implications for their dense networks of transit routes and connections (Vos et al., 2018)⁴. Ethnographic studies of coworking spaces and sharing as a work style are also offering insights into new ways of working and their spatial underpinnings — offering relevant observations about the profile of workers and types of activities that are being performed in these spaces (Richardson, 2015, 2017, 2018). Real estate research is highlighting key changes in corporate real estate design and management for the purpose of accommodating an increasingly mobile workforce (Gerdenitsch et al., 2018; Petrulaitiene et al., 2017; Zamani and Gum, 2019). These studies reveal that "activity-based" strategies are essential for "responsive workplaces" that have become a key objective (and issue) for corporate real estate. Finally, recent studies in urban planning are showing that the rising numbers of mobile and multi-locational workers are quite the administrative conundrum for planning and governance — planners are finding it difficult to separate and plan for specific functions and uses of space (Di Marino et al., 2018; Di Marino and Lapintie, 2017, 2018).

I do not wish to negate the importance of quantitative research based on existing census data. Because I do see the empirical and epistemic value of combining and testing different methods, I am incorporating Canadian place of work data as a starting point — as a setting of the scene. Indeed, census place-of-work data show where companies choose to establish offices, and where workers are likely to congregate for work-related purposes and spend significant amounts of time. While MOS and Mb literature stresses that this may be one of multiple locations used for work, it is still the point of administrative attachment from which official work activity extends to include any other locations.

The remainder of the dissertation deploys a qualitative approach so as to better understand the experience of changes in ways of working across four essential groups of informants: corporate consultants, real estate professionals, city planners and knowledge workers. More specifically, it is a case study of a particular context — that of Kitchener-Cambridge-Waterloo, Ontario in Canada — and contains an analysis of people, decisions and

⁴ While other studies of telework in The Netherlands show that there has been no effect on commuting *distance* (Gubins et al., 2019), the de Vos et al study shows that teleworking has had an effect on commuting *time*. More specifically, the more work is performed at home, the higher the willingness of workers to accept longer commuting times, *but travel less* often. Indeed, this could be the reason why Gubins et al., with their focus on distance travelled, have not been able to see a significant change in the spatiality of work against the backdrop of telework.

planning through fieldwork and semi-structured, in-depth interviews. These interviews reveal what other locations are being used for work-related purposes, why and for how long, thereby building on census data to show *where* work is *actually* being performed. While there are undoubtedly limits to this approach, and they are recognized later in this chapter, the combination of these different perspectives offers a strong foundation for future research and support for researchers interested in exploring the same phenomena.

3.2 Research questions, and an overview and justification of methods

To reiterate: from a conceptual point of view, digitization, mobility and flexibility of work are changing the qualitative landscape of work. While some professions have always been mobile, multi-locational and project-based (i.e., construction, sales, consulting, creative work), recent changes, underpinned by wireless technologies and digital apps, are affecting a growing number of professions and work activities, especially what is commonly considered knowledge-intensive work. These knowledge workers are considered to be less bound to fixed locations, or "footloose" (Van Oort et al., 2003), and often use and combine different workplaces to form a spatially "extended" workplace (Brennan-Horley, 2010; Martins, 2015; Richardson, 2020). Other ways of working, spatially organizing and managing workplaces are becoming more important, and there are certain downsides to these emerging trends that need to be properly understood.

Empirically, different disciplines have yielded a range of results, all supported by existing literature. For example, census-based research shows that the rise in mobile and multi-locational work has been rather modest, but not insignificant: the shift towards multiple (or no fixed) places of work has been slow, but has reached levels that warrant further exploration (Felstead, 2012a; Felstead and Henseke, 2017; Putri and Shearmur, 2020). What these studies do not show, however, are types of locations that are used in addition to the "fixed" place of work, how often and for how long. Meanwhile, qualitative studies document the spaces as well as the experiences of workers whose work has been extending beyond the designated workplace (such as the office) as a result of digitization, mobility and flexibility (Gorman-Murray and Bissell, 2018; Kesselring, 2015; Richardson, 2020). It is therefore the key objective of this dissertation to combine these perspectives and explore the extent to which these trends are affecting knowledge workers and spaces used for work in a Canadian context.

While there have been many studies looking at the spatial behavior of knowledgeintensive firms in Canadian cities (Duvivier et al., 2018; Shearmur, 2012b; Shearmur and Doloreux, 2008, 2015b; Wernerheim and Sharpe, 2003), there are few examining the spatiality of project-based work (Rantisi and Leslie, 2010; Vinodrai, 2006, 2010), and even less looking specifically at mobile and multi-locational workers — with the exception of (Putri and Shearmur, 2020; Shearmur, 2017). What is more, there is no study in Canada, to my knowledge, that approaches these trends qualitatively and by combining the perspectives of workers, real estate professionals, corporate consultants and city planners.

For this reason, the main research questions that guide this dissertation are:

- Where is knowledge work being performed in Kitchener, Cambridge, and Waterloo in Ontario, Canada?
- 2) What are the key changes in ways of working and spaces used for work as experienced by knowledge workers, real estate professionals and city planners?
- 3) How do these changes affect the use and planning of space for knowledge work?

Following in the footsteps of Marxist economic geographers, this dissertation builds on quantitative insights along with qualitative observations such as participant observation, ethnography, interviews and discourse analysis (Castells, 1996; Harvey, 1987; Massey, 1995; Massey and Meegan, 2005; McDowell, 1993; Schoenberger, 1991, 1997; Smith, 1979). This approach is particularly sensitive to contexts and the conditions under which phenomena — such as changes in ways of working — occur. This is especially important for policy, especially urban planning policy, which could benefit from a better understanding of how these processes manifest in and affect spaces.

What is more, case studies are based on in-depth explorations of individual experiences and group dynamics, so as to better understand the underlying drivers of broader structural changes (Castree, 2005). As such, case studies favor multiple sources and methods, and require strong theoretical and contextual foundations. This dissertation also builds on more recent qualitative economic geography research on the multi-locality of creative work (Brennan-Horley, 2010; Rantisi and Leslie, 2010). The Brennan-Horley study, for example, deploys interviews and mental mapping techniques to show a "fivefold increase over census data in the number of important, everyday worksites reported by creative professionals" (pp. 39). This particular case study consists of fieldwork, a descriptive analysis of Canadian place of work data for Kitchener, Cambridge and Waterloo for context, and in-depth, semi-structured and in-person interviews — insights drawn from latter are the main focus of this dissertation. In economic geography the validity and empirical significance of interviewing was contested until relatively recently (McDowell, 2010), while it has been the preferred and essential method for other disciplines, such as MOS and Mb. The reason for this is that in EG the focus is on the spatial distribution of a phenomenon and on patterns that can be observed at higher geographical scales. Qualitative research tends to be context-specific, which also means that knowledge extracted using these methods cannot be used to make broader claims and generalizations about recorded phenomea. Notwithstanding, the in-person interaction afforded by interviewing techniques is important for trust-building. Indeed, it is through this type of interaction that as researchers we can better understand the circumstances that affect the spatial experience of workers. These insights can then be used to develop new data sources (or to make amendments to existing surveys), which can then more effectively speak to the distribution of mobile and multi-locational work.

A dual sampling strategy, criterion (purposive) and snowball, was used to identify and recruit interviewees for this case study. Forty-six interviewees were recruited in total: 25 knowledge workers, seven real estate professionals, seven corporate consultants and seven city planning officials. The real estate professionals, corporate consultants and city planners are treated as key informants, given that they are in the business of understanding key trends in ways of working, organizing workplaces and planning for the knowledge economy.

The interviewees were recruited on the basis of their occupation (profession) and role (seniority and function) at the place of their paid employment. Initial contact was established through local business networks — digital (LinkedIN), business networking events (Plugin) and through access to community spaces, such as the Communitech (local innovation hub and incubator) facilities. Upon contact via email, potential interviewees received both a brief research description and a detailed consent form, which they were asked to sign prior to the interview. At the end of each conversation, interviewees were asked to recommend others. Recruitment stopped after reaching saturation point — no new information or themes were emerging from additional interviews. The number of interviews, sampling and recruitment strategies are consistent with the norm for doctoral researchers and sole author/interviewers, with the average

sample size being between 30 and 50 interviewees (Creswell and Poth, 2016; Edwards and Holland, 2013; Marshall et al., 2013; Mason, 2010).

With the exception of two interviews and one follow-up conversation (not counted as a separate interview), all 46 interviews were conducted in-person over two separate fieldwork periods — one in February 2017 and the other in February, March and the first half of April 2019. Interviews lasted between 30 to 90 minutes, were audio-recorded, and later transcribed and analyzed for existing and emerging themes. The first round of coding was deductive — codes were developed based on existing literature. The purpose of this round was to determine whether the same themes emerge in a Canadian context. The second round of coding was inductive — new codes were developed to highlight new themes that have emerged from the interviews. I triangulated these findings with a content analysis of real estate reports, policy briefs, newspaper articles, promotional materials, and Internet-based public records that shed light on the latest developments and municipal governance mechanisms in Kitchener, Cambridge and Waterloo.

Four separate interview guides were developed to suit each group of interviewees, and were based on the themes identified in the literature (see Appendix A). These guides were semistructured so as to allow the interviewees to speak on experiences outside those defined by existing literature. Prompts were used whenever necessary so as to make sure that the themes identified in the literature were discussed.

Finally, census data on employment, education and place of work for Kitchener, Cambridge and Waterloo were obtained from Statistics Canada for the years 2006 and 2016 (the latest) at the census metropolitan area and census subdivision level. Key variables include place of work status, class of worker, work activity during the reference year, highest certificate, diploma or degree — by industry (NAICS classification v. 2012) and by occupation (NOC classification v. 2016).

3.3 Key definitions, explanation of case selection, and description of interviewees

3.3.1 Defining Knowledge Work

It is important to address the ongoing challenge of defining knowledge work. Sociologist Daniel Bell (1973) popularized the idea that knowledge is a central feature of all advanced "post-

industrial societies", namely North America and Western Europe. According to Bell, advancements in information and communication technologies (ICTs) and highly specialized knowledge (scientific and technical) spearheaded this shift in values and resources — from material goods to services. Peter Drucker, a key thinker in management theory, was among the first to discuss knowledge work as a way of differentiating work (and workers) from others in the economy (Drucker, 1954, 2011). And yet, at its core, knowledge work consists of by and large white-collar occupations that rely on information at all stages of the production process. Other ways of describing knowledge work surfaced over time: "intangible", "symbolic", "immaterial", "affective" and more recently "learning" and "creative" (Florida, 1995, 2002c; Hardt and Negri, 2001; Reich, 1992).

Despite the multiplicity of terms, the general consensus is that the contemporary economy places a premium on lifelong learning, creativity and innovation. Some scholars perceive the differentiation of knowledge work from the rest of the economy as a reclassification — and re-affirmation — of privileged occupations, especially those relying on expertise or professional knowledge (Alvesson, 1993; Collins, 1997). In other words, knowledge work as a class of workers is a product of the wishes and aspirations of such occupation-holders, and their need to maintain a superior role in the workforce. According to Mats Alvesson, a contemporary management scholar, "knowledge work" is ambiguous because it is a reflection of the desires of a specific social group (Alvesson, 2001). Ambiguity notwithstanding, categorizations do exist.

For example, Statistics Canada acknowledges the absence of a single, or definitive definition and has proposed a two-tier categorization that overlaps with most existing conceptualizations. The first tier (I) consists of "knowledge producers", i.e., scientific and technology-based enterprises. The second tier (II) is a broader category that consists of "knowledge users", i.e., "high-knowledge" management and business services. The National Occupational Classification (NOC) defines knowledge-intensive work as high-skilled work, based on high levels of education, the experience required to perform the work, and the degree of complexity and responsibility that is inherent in these types of work. This chimes with the work of Manuel Castells, who studied the "networked society" through the lends of advanced services (Castells, 2009). These services are present in all sectors of the economy — from manufacturing to agriculture — and rely on knowledge creation, information management and manipulation of symbols. They include finance, insurance, real estate, business consulting, legal services, real

estate, marketing and advertising, public relations, media and journalism, research and development, design, security and logistics. These types of occupations are classified in NOC (2016) categories Management (0), Business, finance and administration (1), Natural and applied sciences (2), Education, law and social, community and government services (4), and occupations in Art, Culture, and Recreation (5), which in this study are considered emblematic of knowledge-intensive work⁵.

3.3.2 Kitchener, Cambridge, Waterloo (KCW) in Ontario, Canada

Together, Kitchener, Cambridge and Waterloo (KCW) form the tenth largest census metropolitan area (CMA) in Canada, with a combined population of 523,894 according to the Canadian 2016 census. Kitchener is the largest of the three cities, followed by Cambridge and then Waterloo. Finally, the Waterloo region on the whole has traditionally been defined by its manufacturing activities (Region of Waterloo, 2018). Kitchener was predominantly a blue-collar city, with services and white-collar work locating in Waterloo, and factories and upper-level management residences in Cambridge. The tri-city area had been affected by the relative decline in manufacturing activities, throwing Kitchener especially into decline and inner-city decay. Over the past two decades the boom of high-tech and start-up activity — and the general growth of service sectors — combined with targeted economic development policies (i.e., land-use and zoning amendments, investment in public transit, and multi-level funding support to innovation centers) have altered the urban landscape, especially in Kitchener's downtown core. Ongoing policy efforts, at municipal and regional levels, are focused on attracting and retaining knowledge-intensive skills and activities.

It is generally assumed that knowledge-intensive, especially high-tech industries are a gateway to economic growth. In the attempt to secure a strong foundation for future economic development, cities have been targeting these industries and making an effort to nurture them within their own geographic boundaries — Kitchener, Cambridge and Waterloo are no exception. North American examples of knowledge-intensive, high-tech clusters include Silicon

⁵ NOC occupations 3 (Health) and 6 (Sales and service) have been excluded from this study. Health occupations, while knowledge intensive, are not the type of office-based employment that this study targets. Sales and services, though also arguably knowledge intensive, are generally considered as requiring less skills and levels of education. By contrast, NOC occupations 0,1,2,4,5 are considered skill A type occupations requiring a university degree.

Valley in California, the Research Triangle in North Carolina, and Route 128 in Massachusetts, among others. In Canada, one example is the "Next Gen" Manufacturing Supercluster, also known as the Innovation Corridor in Ontario, or Silicon Valley North — a 112km stretch between the Greater Toronto Area (GTA) and the tri-city area of KCW.

High-tech industries (and supporting services) have been clustering in the area for some time. In fact, the region has been considered a success in transitioning from its manufacturingbase to a more knowledge-intensive, IT-based economy (Filion et al., 2015). In the late 80s, early 90s it had been labelled the Canadian Technology Triangle (CTT), consisting of KCW and Guelph. This regional brand was developed in an attempt to bring together the four cities' distinct economic development initiatives, likely in imitation of other regional high-tech clusters (Vinodrai, 2016). The CTT consisted of predominantly small, local firms, usually spin-offs of university research programs. Indeed, the University of Waterloo, University of Guelph and Wilfrid Laurier University, as well as the Conestoga College of Technology and Advanced Learning are credited for the availability of skilled labor, including craftspeople and production workers in the area. What is more, the University of Waterloo's prestigious co-op program has been at the heart of regional R&D activities. Larger companies, although more product-oriented, sought to benefit from the co-op program, as the pressure to compete exacerbated the need for product innovation. Toronto, as a global business and financial center, has been an asset, though it was not formally established as part of the cluster until later.

Earlier studies of the CTT showed that access to skilled labor topped the list of desirable assets and attractors of firms and investment to the area. Proximity to universities (and the talent pool) and the residences of upper management (mostly around Cambridge and Guelph) were key anchoring factors (Bramwell et al., 2008; Bramwell and Wolfe, 2008). Access to a large market (Toronto) and major transit nodes and networks (such as Toronto's Pearson International Airport and the 401 highway) have also been important for the burgeoning cluster. Land availability and cost, average wages, and the overall social and cultural character — a strong entrepreneurial and community spirit, traced back to its Mennonite roots also played a role. Overall, the CTT, especially the cities of Kitchener and Waterloo (frequently conjoined), often ranked the same as larger cities like Montreal and Vancouver in terms of attractiveness to high-tech business (Bathelt and Hecht, 1990; Filion et al., 2015).

Chart 1. Kitchener, Cambridge and Waterloo Knowledge Workers according to Census Profile 2006 and 2016 (Source: Statistics Canada).



This chart shows the percentage of knowledge workers (employed in Management (0), Business, finance and administration (1), Natural and applied sciences (2), Education, law and social, community and government services (4), and occupations in Art, Culture and Recreation (5)) in each city in 2006 and 2016. Waterloo, traditionally a white-collar city, has the highest portion of knowledge workers, though Kitchener has had a subtle but higher increase of knowledge workers between 2006 and 2016. These figures chime with emerging studies measuring the number of knowledge workers (in this case "creative class") in cities across the USA relative to the total workforce (Florida, 2019).

In the early 2000s, Kitchener and Guelph experienced higher rates of growth than any other city in Ontario and in Canada on the whole. The two cities' rates of growth matched only that of Toronto, and their unemployment was the lowest in the country. Research in Motion (Blackberry) was the most successful start-up to emerge from the university co-op program, and its explosive growth has been linked to the socio-spatial transformation of Kitchener and Waterloo. Around the same time, the CTT reported growth in the creative occupations as well (Martin and Florida, 2009).

However, the 2008 financial crisis and the appreciation of the Canadian dollar shifted production to lower-cost areas, and the CTT suffered the consequences. The community response to this was to increase interaction with consumers and producers through links to other regional and international networks. These multi-level networks are often credited for the region's resilience, though there is something to be said about the past experiences and the

tightly-knit community that has shaped the region's ability to re-invent itself (Bathelt et al., 2011, 2013). It is important to note that the CTT was not just a place-branding instrument, but also a public-private-partnership — an economic development corporation with a mandate that included land use planning. Another collaborative public-private initiative has been the creation of Communitech, an innovation hub, in the late 90s with the goal of strengthening the relationship between universities, industries and local economic development organizations. Unlike the CTT, however, Communitech was specifically designed to support start-up activity in the Kitchener-Waterloo area, through events, and links to government funding and venture capital. The CTT and Communitech were instrumental in smoothing any administrative ripples commonly experienced in areas with many small municipalities (Lucas et al., 2009; Wolfe, 2010).

Interestingly, Toyota's manufacturing activity weathered the 2008 crisis while Research in Motion collapsed, thus challenging the notion that knowledge-intensive enterprises are more resilient than traditional manufacturing sectors. However, because of the volume and density of small high-tech enterprises in the area, the laid-off Research in Motion employees were quickly re-absorbed by the local labor market. The disintegration of Research in Motion had therefore produced a number of spin-offs, focusing on high-tech hardware and digital software development and production. Over the next decade, a number of successful high-tech enterprises emerged in the area. In 2016, Google established its national R&D headquarters — and its largest office in Canada — in downtown Kitchener. Still, a snapshot of census employment data for Kitchener, Cambridge and Waterloo shows that across all three cities, workers are largely employed in sectors that are not considered knowledge-intensive. However, focusing on occupations (NOC), the data shows that knowledge work is a significant portion of total employment: 45 percent in Kitchener, 41 percent in Cambridge, and 58 percent in Waterloo for the 2016 census year (see Chart 1).

Kitchener, Cambridge and Waterloo — like other mid-sized industrial cities in Canada and elsewhere — had experienced decaying urban cores with the shift to post-Fordism and the decline of manufacturing activity. Until the late 90s and early 00s, Kitchener's downtown suffered a rapid decline as most economic activity favored suburban locations along Highway 401 that stretches towards Toronto. However, with its stock of old and vacated textile factories and tanneries, universities and proximity to Toronto, Kitchener was well positioned to anchor

new economy establishments that are generally attracted by these factors (and the brick-andbeam aesthetic). Although the revival of downtown Kitchener — and growth of the tri-city area as a whole — is often attributed to the community's "strong entrepreneurial spirit" and "tradition of civic engagement", changes would not have been possible without a sizeable development fund (approx.. \$110 million CAD) set up by the municipal and regional government, specifically for brownfield redevelopment and revitalization of the downtown core (Bramwell et al., 2008; Nelles, 2014; Vinodrai, 2016). These efforts included the creation of Communitech and Velocity (a Univeristy of Waterloo start-up incubator), housed in one of the tannery buildings, as well as the conversion of a former rubber factory into the University of Waterloo's School of Pharmacy. The rubber factory was donated to the City of Kitchener, which the city then gave to the university along with a monetary contribution towards its renovation. Kitchener also partnered with Wilfrid Laurier University to purchase and redevelop an old high school into the presentday Lyle S. Hallman Faculty of Social Work. Another significant redevelopment project was the transformation of the downtown Center Mall into offices that have since been occupied by insurance and finance giant Manulife.

These efforts stress the role that the city (as an institution and an instrument of governance) has played in giving KCW its facelift. These efforts are ongoing. For example, interviews with city officials revealed that for the city of Waterloo the collapse of Research in Motion was particularly hard-felt and affected not just the priorities but also the size and functioning of the administrative body itself. To this day the city is dealing with the aftershock of Research in Motion. The company's fast growth and spatial expansion left a big void that the city is still struggling to fill. Some of the buildings have been handed over to the University of Waterloo, and others have been converted into smaller offices and coworking spaces by developers.



Map 1. Kitchener, Cambridge and Waterloo — an inventory.

 a) Position of Kitchener, Cambridge and Waterloo relative to the Greater Toronto Area. The tri-city area's proximity to Toronto and the Pearson International Airport is a key selling point. The Innovation Corridor is essentially the 112km stretch along Highway 401 connecting Kitchener, Cambridge and Waterloo to Toronto. b) Key knowledge-intensive establishments and sites in Kitchener.

c) Key knowledge intensive establishments and sites in Waterloo.



Image 1. Innovation Corridor promotional material.



a) The Waterloo Region Economic Development Corporation (EDC) markets the Innovation Corridor as a "special place for tech". It compares the cluster to North America's top tech hubs, and highlights the universities, multinational tech companies (Big Tech giants like Google and Amazon) and fast-growing local tech businesses like Shopify. In this promotional map, the EDC compares Waterloo and Toronto to San Francisco and New York City. Source: Waterloo EDC.

b) "112km of Innovation!" — promotional material sourced from the regional brand's official website. The website also lists the companies, universities, as well as languages spoken (to stress diversity) and the number of "awesome people" (i.e. number of tech workers) that are in the area. It positions the Innovation Corridor among the "best in the world" and showcases Google's presence in both Kitchener-Waterloo and Toronto. Source: *TheCorridor.ca*.



Finally, in 2015, the CTT was dissolved and a new corporation — the Waterloo Region Economic Development Corporation (WREDC) — was formed. It is not clear the extent to which the WREDC oversees planning activities. Together with the city of Toronto, Communitech and MaRS (Toronto's answer to Communitech), the WREDC manage the "Innovation Corridor".

The region recently implemented a new rapid transit system connecting Kitchener, Cambridge and Waterloo through light rail and an improved bus network. Also, Google announced an expansion of its existing offices in Kitchener's downtown Innovation District, to accommodate a new start-up hub and community center (CBC, 2020). Deloitte also recently settled in downtown Kitchener, relocating from its suburban office to a revitalized brownfield site that the company now treats as its prototype office of the future (Deloitte, 2019).

To conclude, the tri-city area of KCW has undergone a restructuring process that is emblematic of post-Fordism: the decline of manufacturing activities, suburbanization, diversification of the economy with a strong knowledge base, the establishment of social and business networks at multiple geographical scales, associational governance, the clustering of knowledge-intensive ICT companies, and the revitalization of inner cities and brownfield sites into "new industrial spaces". It is a high-tech and advanced manufacturing supercluster, with a strong digital economy. As such, it is the ideal case study for evidence of the latest trends in ways of working — including mobile and multi-locational work — and their spatiality. Indeed, dubbed "Silicon Valley North", KCW is likely to exhibit trends discussed in the previous chapter. Finally, while KCW tends to be grouped and researched at the regional scale, this dissertation examines each city more closely so as to better understand their distinct planning efforts to anchor and nurture knowledge workers.

3.3.3 Description of interviewees

The interviewees — knowledge workers (25), city planners (7), corporate consultants (7) and real estate professionals (7) — were identified and recruited using a dual sampling strategy (criterion and snowball), with initial contact established through digital networks (LinkedIN), Plugin (a local business community network) events, Communitech and other places of work. Although reaching out via LinkedIn, email and telephone proved successful in recruiting

interviewees, my physical presence at networking events and Communitech workplaces helped establish my credibility and interest in the community, which helped build trust with the interviewees. In retrospect, Plugin and Communitech acted as gatekeepers of the community. Both engage with (and specifically target) the high-tech and business services community.

All interviewees had to have occupations that fall within NOC classifications 0, 1, 2, 4 and 5 (see Table 1). The employers had to have offices in either Kitchener, Cambridge, or Waterloo, but the employees did not have to be residents of the area. Indeed, some of them live in nearby cities like Guelph and Hamilton. They had to be either employed or self-employed with at least a Bachelor's degree.

Interview Groups	Sampling Criteria
Knowledge	Employed or self-employed with at least a Bachelor's degree.
workers	Occupation (NOC) in management (0), business, finance and administration (1), natural and applied science (2), education, law, government services (4), art, culture and recreation (5).
	Industry (NAICS) in information and culture (51), finance and insurance (52), real estate and leasing (53), professional, scientific and technical services (54), management of companies and enterprises (55), and public administration (91).
	Designated, or official, workplace must be in either Kitchener, Cambridge or Waterloo, but place of residence does not have to be in KCW.
City Planners (key informants)	Employed at local municipalities (City of Kitchener, City of Cambridge, City of Waterloo) as an urban planner and/or economic development officer.
	At least five years of work experience at a higher level.
Real Estate Professionals (key informants)	Employed at a real estate company with offices in Kitchener, Cambridge or Waterloo, with experience in commercial real estate, especially the latest trends in the use of office space in Kitchener, Cambridge and Waterloo.
	At least five years of work experience at a senior level.
	Preference for professionals employed at firms which operate at a global level, so as to be able to speak to trends and changes in KCW relative to other cities, regions and countries.
Corporate Consultants (key informants)	Employed at a knowledge-intensive company or innovation center with offices in Kitchener, Cambridge or Waterloo, with at least five years of consulting experience.

Table 1. Criteria for interviewee recruitment/sampling strategy.

The real estate professionals and city planners were contacted directly through their place of work e.g., City of Kitchener, Cushman & Wakefield. As key informants, they had to have at least five years of experience working in planning and real estate in KCW, and seniority within their respective organizations. Corporate consultants were more difficult to reach directly, and so the interviews were conducted with individuals recommended by knowledge workers at Communitech. Some of these consultants are employed as advisors to start-ups and as liaisons with the broader business community.

Overall, the pool of knowledge workers was gender balanced (14 female and 11 male interviewees), with a range of age groups, though leaning towards millennials (18). Allowing for some age range was deliberate: conversations with both young(ish) and more seasoned workers were equally illuminating with respect to changes in workplaces and ways of working, and experiences of the same. With the exception of one knowledge worker, who is a self-employed entrepreneur, the knowledge workers were full-time employees at companies operating at local (8), regional (7) and global (10) scales e.g., Google, Hershey's, Deloitte and Ernst & Young. Some were employees of the University of Waterloo, and some worked at local start-ups with ties to Velocity, Communitech and Research in Motion.

The interviews were conducted in person — with the exception of two that were carried out over Skype, due to scheduling changes — at the interviewees' preferred location. For the knowledge workers, these locations were their official or designated workplaces (16) and the more casual places, such as cafés where they often perform their work (8). A few of the office-based interviews were conducted in cafes that were integrated into the office (3/16). The office-based interviews also included guided tours of the premises, pointing out key changes that had been made to the space to reflect new trends in ways of working. Of the six offices that were toured, four permitted photographing. Two interviews with city planners also included guided tours of some of the cities' ongoing key projects and developments.

Table 2. Overview of interviewees.

a) Knowledge Workers

ID	Gender	Age Group	Role	Occupation	Industry	ID	Gender	Age Group	Role	Occupation	Industry
KW_1	F	26-35	Co-founder, CEO, Engineer	Natural and Applied Science (2)	Manufacturing (31-33)	KW_14	М	26-35	Journalist, Ghost Writer	Art, Culture and Recreation (5)	Professional, Scientific and Technical Services (54)
KW_2	F	26-35	Founder, CEO	Natural and Applied Science (2)	Professional, Scientific and Technical Services (54)	KW_15	F	26-35	Customer Sales Executive	Sales Services (6)	Wholesale Trade (41)
KW_3	F	26-35	Project Manager	Education, Law, Government Services (4)	Professional, Scientific and Technical Services (54)	KW_16	F	26-35	Financial Analyst	Business, Finance and Administration (1)	Finance and Insurance (52)
KW_4	F	26-35	Project Manager, Researcher	Education, Law, Government Services (4)	Professional, Scientific and Technical Services (54)	KW_17	F	26-35	Real Estate Analyst, Senior Researcher	Business, Finance and Administration (1)	Real Estate and Leasing (53)
KW_5	М	36-45	Senior Manager, CPA	Business, Finance and Administration (1)	Finance and Insurance (52)	KW_18	М	46-55	CEO	Business, Finance and Administration (1), Management (0)	Professional, Scientific and Technical Services (54)
KW_6	F	46-55	CEO	Management (0)	Professional, Scientific and Technical Services (54)	KW_19	F	26-35	Project Manager	Business, Finance and Administration (1)	Real Estate and Leasing (53)
KW_7	М	46-55	CIO	Management (0)	Professional, Scientific and Technical Services (54)	KW_20	М	26-35	Manager, Mergers and Acquisitions, Technology	Business, Finance and Administration (1)	Finance and Insurance (52)
KW_8	М	26-35	Special Effects Compositor	Art, Culture and Recreation (5)	Information and Culture (51)	KW_21	М	26-35	Manager, Tax Services	Business, Finance and Administration (1)	Finance and Insurance (52)
KW_9	М	26-35	Software Designer	Natural and Applied Science (2)	Professional, Scientific and Technical Services (54)	KW_22	М	36-45	Project Manager	Education, Law, Government Services (4)	Professional, Scientific and Technical Services (54)

KW_10	F	26-35	Project Manager, Researcher	Education, Law, Government Services (4)	Professional, Scientific and Technical Services (54)	KW_23	F	26-35	Project Manager	Business, Finance and Administration (1),	Real Estate and Leasing (53)
KW_11	М	26-35	Journalist, Media Coordinator	Art, Culture and Recreation (5)	Professional, Scientific and Technical Services (54)	KW_24	F	26-35	Project Manager	Business, Finance and Administration (1),	Real Estate and Leasing (53)
KW_12	F	36-45	Executive Assistant, Facilities Manager	Business, Finance and Administration (1)	Wholesale Trade (41)	KW_25	Μ	56-65	Senior Partner	Business, Finance and Administration (1), Management (0)	Finance and Insurance (52)
KW_13	F	26-35	Executive Assistant	Business, Finance and Administration (1)	Professional, Scientific and Technical Services (54)		·	<u>.</u>			·

b) City Planners

ID	Profession	Role	Level of Government
CP_1	Urban Planner, Natural and	Economic	Municipal
	Applied Science (2)	Development Officer	
CP_2	Urban Planner, Natural and	Economic	Municipal
	Applied Science (2)	Development Head	
CP_3	Urban Planner, Natural and	Economic	Municipal
	Applied Science (2)	Development Officer	
CP_4	Urban Planner, Natural and	Economic	Municipal
	Applied Science (2)	Development Officer	
CP_5	Urban Planner, Natural and	Economic	Municipal
	Applied Science (2)	Development Officer	
CP_6	Urban Planner, Natural and	Economic	Municipal
	Applied Science (2)	Development Head	
CP_7	Urban Planner, Natural and	Economic	Regional
	Applied Science (2)	Development	
		Commissioner	

c) Real Estate Professionals

ID	Occupation	Role	Firm Operations (Scale)
RE_1	Business, Finance and	Real Estate Analyst, Senior	Global
	Administration (1),	Researcher	
RE_2	Business, Finance and	Real Estate Broker	Global
	Administration (1),		
RE_3	Business, Finance and	Real Estate Broker	Global
	Administration (1),		
RE_4	Business, Finance and	Real Estate Broker, Vice	Global
	Administration (1),	President	
RE_5	Business, Finance and	CFO	Regional
	Administration (1),		
RE_6	Business, Finance and	Vice President	Regional
	Administration (1),		
RE_7	Business, Finance and	Real Estate Consultant	Global
	Administration (1),		

d) Corporate Consultants

ID	Role	Industry
CC_1	Consultant, Managing Partner	Finance and Insurance (52)
CC_2	Consultant	Finance and Insurance (52)
CC_3	Consultant, Corporate	Professional, Scientific and
	Innovation	Technical Services (54)
CC_4	Consultant, Director	Professional, Scientific and
		Technical Services (54)
CC_5	Consultant, Manager	Professional, Scientific and
		Technical Services (54)
CC_6	CEO, Consultant	Professional, Scientific and
		Technical Services (54)
CC_7	Consultant, Managing Partner	Finance and Insurance (52)

3.4 Interviews

Semi-structured interviews offer a degree of flexibility in both the questions and the responses. For the purposes of this dissertation, it was important to let the interviewees respond however they saw fit so as to see how they understood the key themes and articulated their responses. Simultaneously, it is important to maintain a degree of consistency and structure to ensure that the key themes are being covered. For this reason, each interview group had its own corresponding interview guide. Finally, while semi-structured interviews do not permit the same level of comparability as structured interviews (questionnaire and surveys) do, there is enough structure and consistency to show meaningful similarities and differences in experiences.

The interview guides and prompts were designed to revolve around key themes, such as the nature of work, types of tasks, use and dependency on technology and the demand and experience of flexibility and mobility of work. Knowledge workers were asked to:

- Describe the kind of work that they do and to give a detailed account of their typical workday;
- Focus specifically on the location of their work, the kind of spaces where work-related tasks and activities were being performed;
- Discuss how often, on average, they worked away from the office on a daily, weekly, monthly and annual basis;

- Discuss their travels (commutes, business travel, personal travel), if and how often they worked whilst traveling or on travels, and in what kind of spaces (e.g. car, plane, hotel lobby, hotel room, airport lounge, etc.);
- Discuss to what extent they used and depended on technology and software to perform their work, and whether there were activities that did not require technology;
- Discuss their company culture and mobility opportunities/constraints;
- Share their experiences of mobile and flexible work (i.e. how they felt about changes in ways of working, and how their experiences vary over time).

The interview guides for corporate consultants, real estate professionals and city planners were slightly amended to reflect their particular viewpoints and areas of expertise. They were less focused on personal experiences and more on the broader trends as they relate to new ways of working and their spatiality. They were asked to:

- Identify key trends in ways of working and in the use and demand for office space, as well as changes in established patterns of industrial location;
- Discuss the degree to which mobility, flexibility and digitization contribute to changes in organizations and workplaces and broader patterns of industrial location;
- Discuss ongoing and future initiatives and objectives as they relate to commercial real estate and planning for economic performance;
- Discuss how new real estate developments such as the new Google and Deloitte offices, coworking spaces and incubators — are affecting ongoing and future initiatives and objectives;
- Discuss opportunities and challenges for workplaces, organizations and cities posed by ongoing changes in ways of working and broader considerations relating to the future of work.

To conclude, the interview guides were designed to cover key themes but from multiple perspectives. As a result, the interviews had points of convergence and overlap, but also points of difference that are useful in identifying the motivations and challenges experienced by each group. Finally, the interviews speak to broader trends, contextual factors, as well as the lived experiences of knowledge workers, producing a comprehensive overview of changes in ways of working and spaces used for work in the tri-city area of KCW. During the interview process I also took detailed notes, which I then combined with the transcripts for analysis.

3.5 Analysis: A note on transcribing and coding

The interview guides for each group were developed based on key themes that emerged from the literature review. These key themes also informed the first round of deductive coding (see Figure 1). All of the interviews were recorded, transcribed and coded using Dedoose, a secure digital application for qualitative and mixed methods research. On average, one hour of audio took four to five hours to transcribe, depending on the quality of the recording and the need to replay segments to ensure verbatim transcription. Interviews that took place in coworking areas and cafés were especially difficult to transcribe, though there were benefits to holding them there, especially when interviewees discussed why they sought out such places to perform work in. While verbatim transcription takes longer, it is integral to the interpretation of interviews: it picks up on tone, which is useful in identifying positive and negative attitudes, frustrations, confusion, even a sense of shame about certain aspects of work-life. What is more, it helps identify areas where I, as the researcher and interviewer, may have influenced the interviewees in some of their responses (further discussed in the *Limitations* section below). This is essential in ensuring that the excerpts included in this dissertation are as free of potential bias as possible.

Each transcript was reviewed multiple times, once for each code and then again for new codes. While this process may seem long and tedious, it allows the researcher to concentrate on each code and the theme it links to. Once all of the transcripts were coded, with each code visibly marked, it was possible for me to analyze how these codes relate to and interact with one another. Not only did this generate a deeper understanding of the interviews, but it has also been a key part of the discovery process. In addition to the codes, the transcripts were annotated with other observations and notes from fieldwork.

The second round of coding (inductive) entailed scanning the transcripts for new observations that were not captured by existing literature. These new observations were organized into axial codes — broader categories that can be categorized as new or emerging themes. This combination of both deductive and inductive coding is typical for grounded theory, though it usually starts with inductive coding. However, given that one of the research objectives is to explore the Canadian context for observations drawn from elsewhere, it was the logical choice to start the analysis with a scan for existing themes. All in all, qualitative interviewing —

the execution as well as the analysis — is an immersive process that allows the researcher to "dig deep" and really get a sense of what verbal data can tell us.



Figure 1. Overview of Themes, Interview Guides and Codes

3.6 Ethics, Validity, Reliability and Limitations

Fieldwork was executed in accordance with all relevant protocols and procedures mandated by McGill University. Interviewees were asked to review, in detail, the research description and consent form provided upon initial contact prior to agreeing to participate in the research. Most of the interviewees opted for total anonymity, i.e., no identifiers, no direct links to place of employment, a broadly defined occupation. For consistency, all of the interviews were treated as such. General information about an employer is disclosed and discussed only if that information is publicly available and accessible (i.e., a matter of public record), and if the information itself is not associated with any specific interviewee.

Given the interactive and qualitative nature of the research, it is important to address the question of bias that could potentially weaken the data. While I tried to be as neutral as I could — and took care not to include any leading questions or coercive approaches during the

interviewing process — there is always a slight risk of a Hawthorne effect, whereby interviewees adapt or exaggerate their responses so as to satisfy the researcher. Similarly, researchers can also unconsciously show agreement or enthusiasm when an interviewee provides hoped-for responses. While this may, on the one hand, prompt the interviewee to delve further, it also takes away from other insights that may be of import. In other words, unconscious enthusiasm on the part of the interviewer may also steer the conversation and "taint" the responses. This is why a thorough review of the recordings and transcripts was paramount. I have tried to avoid influencing the interviewees during the interviewing process by stressing that there was no other objective but to learn from these interviewees' experiences, and therefore openness in their responses was essential. Probes and follow-up questions were used, but only to clarify responses. Interpreting questions, such as "are you saying that x is the cause of y?" were avoided as much as possible. It is also important to remind the reader of the subjective nature of the coding process. While the inductive round of coding has been triangulated with secondary sources, it is still one of many ways of approaching the subject and of telling the story. This is why more research is urgently needed. The insights provided throughout this dissertation offer a reliable starting point.

Nonetheless, there is a logic to this research design that is replicable and can be used to explore other contexts for existing and emerging themes. While this research design is replicable, it is, at its core, about human behavior and lived experiences that are highly subjective and context specific. As such, these findings cannot be used to make general conclusions about *all* knowledge work in *all* contexts. Therefore, a key limitation of this dissertation is its exclusivity to Kitchener, Cambridge and Waterloo — the themes that emerge from this case study may not be observed in other settings. However, these emerging themes can be used to develop new quantitative surveys that can be distributed across a broader population. Indeed, qualitative interviews can corroborate theory and to support or question existing paradigms — in this case, of how and where knowledge work is performed in cities.

For this reason, it is important to read this dissertation as a steppingstone for future research, exploring Canadian and other cities for changes in the use of space for work as a result of flexibility, mobility and digitization.

3.7 Brief overview of research chapters and their contribution to the key argument

The following four chapters consist of articles that have been published (Chapter four), accepted for publication (Chapters six and seven) or in preparation for submission (Chapter five) to peer-reviewed academic journals and edited volumes. Though they are standalone pieces, they follow a logical progression, which mirrors the development of the key argument this dissertation makes:

Chapter four was written as I was starting to question why economic geography hasn't picked up on the mobility and multi-locality of work that other disciplines (MOS and Mb) have written about for two decades. Indeed, economic geography scholarship rests on the assumption that work has a well-defined and fixed location. Existing data and methods have not yet been able to pick up on the increasingly dynamic spatiality of knowledge work for two reasons: 1) key data sources (such as the Canadian census) do not capture this dynamism, and 2) the dominant paradigms that shape how economic geographers and urban planners think about the location of work are underpinned by fixed categories, which likewise treat places and workers as fixed in time and space. This chapter introduces the term "workplace mobility" to describe these digitally-supported new ways of working, and questions whether Big Data — given their volume and real-time tracking capabilities — could be used to shed light on the spatiality of work. It concludes that qualitative, door-to-door methods are best suited (for now) to grasp the complexity of workplace mobility.

Similarly, chapter five makes a point in favor of qualitative methods by showing the limitations of census data vis-à-vis insights drawn from verbal data. And while recent studies (e.g., Putri and Shearmur, 2020) using census data are showing a modest but steady increase in mobile work, they do not capture where and for how long work is being performed. At present, this complex spatiality of knowledge work can only be qualitatively explored. However, this chapter highlights the usefulness of census data in signaling where work is most likely to occur, albeit in tandem with other locations revealed through interviews with knowledge workers.

Chapter six stresses that prior to the Covid-19 crisis, how and where work was performed in cities was changing. Indeed, through a qualitative research design this dissertation corroborates and extends the findings of Mb and MOS scholars that work extends beyond the official workplace to include a number of other locations that are being used for work. What is
more, this research reveals that the ongoing blurring of professional and personal domains has produced fuzzy definitions of workplaces. The expectation to be available and "multi-present" complicates the workers' ability to distinguish official workplaces from unofficial ones.

Finally, chapter seven focuses on interviews with corporate consultants, real estate professionals, and city planners for insights on how these changing spatial practices of work affect the city by focusing specifically on office real estate. It reveals that firms have been adapting their workplaces to mirror these new ways of working, and while some have been reducing the amount of space required per worker to generate more collaborative and attractive work environments, others have been deploying the same strategies — such as flexwork — for cost-saving purposes. Flexwork, therefore, emerges as a real estate play, prompting worker mobility and multi-locality. Moreover, the willingness of companies to pay a premium on flexible spaces and leases exacerbates real estate prices that city officials feel limited in their capacity to regulate.

I conclude that workplace mobility affects the city in a manner resembling the "Tetris Effect", or the need to constantly think about and adapt space — across personal and professional domains — in order to maximize economic utility. Neoliberal planning, with its focus on growth, neglects the downsides of workplace mobility as it seeks out ways to accommodate it. This calls into question the effectiveness of planning tools (as well as their ideological foundation) in ensuring that corporate decisions are in the interest of the public in the longer term.

Please note that each chapter will contain some repetition of literature (though certain elements are elaborated on) and the methodology detailed in this chapter.

Chapter 4: Catch me if you can — Workplace Mobility and Big Data

A paper version of this chapter was co-authored with Richard Shearmur, peer-reviewed and published in the Journal of Urban Technology 24:3, in July 2017. We each contributed 50 percent of the effort towards this publication.

A growing number of workers, particularly in the knowledge and service sectors, can perform their work at multiple locations, and it is decreasingly realistic to assume, as researchers and planners have traditionally done, that employment in cities occurs in fixed locations. This suggests that census data or establishment registries do not fully capture where economic activity takes place. Given the role that ICTs play in enabling daytime workplace mobility, and given that they generate substantial amounts of real-time, geolocated data, this chapter ponders the limitations of "classic" data and methods (traditionally used by economic geographers and urban planners) and asks whether Big Data can shed light upon the trajectories of mobile workers at the urban scale.

4.1 Introduction

The proliferation of smart devices and other workplace technologies has not only made work more flexible, but also highly mobile. Indeed, people—often those in intellectual and serviceoriented jobs (Kesselring, 2006), or "creative work" (Florida, 2010)—are increasingly able to work from a variety of locations (Brown and O'Hara, 2003; Hislop and Axtell, 2007, 2009), arrange meetings and meeting places in real time, and it is less and less realistic to suppose, as researchers have traditionally done (Shearmur et al., 2007) that they have a fixed place of work, i.e., the office (see also Felstead et al., 2005). While not all workers can (or want to) take advantage of these possibilities, an increasing number do (Kesselring, 2015; Loacker and Śliwa, 2016). We define this phenomenon as *workplace mobility*, or the ability of workers to carry out work-related activities at any time and at any place as a result of the increasing flexibility of work and work policies, advancements in workplace technology, and temporality of contracts.

This workplace mobility can occur at a variety of spatial and time scales. During the course of the day, work can take place from an array of locations (vehicles, third spaces, parks, home, office ...), but the possibilities afforded by computerization of work-related activities also

enhance the capacity to perform work during business trips (in hotels, lobbies, airports) and while traveling for leisure—the temporalities of which may be weekly, monthly, annually or irregularly. From an abstract perspective, Hägerstrand's (1982) space-time prism—representing the spatial extent of activity given space-time constraints (often associated with the need to be at a specific workplace at specific times)—needs to be rethought in the light of work's decreasing spatial fixity.

However, before addressing this wider question, the more straightforward one of where work actually takes place needs to be addressed. Traditional approaches to the study of employment location—using census data or establishment registries that assume a fixed place of work—no longer fully capture where economic activity actually takes place and where economic value is created. This is not only of academic interest, but of practical importance to planning and design: as public spaces, transport infrastructure and places of entertainment (such as restaurants and cafés) become places of work and value creation, so the way these places are thought of and are incorporated into strategic economic thinking at the city level needs to evolve. Likewise, the role traditionally assigned to clusters, employment centers, and business parks (often assumed to foster interactions by virtue of the co-location of workers) will need to be reassessed in the light of these new behaviors (Huber, 2012; Martin and Sunley, 2003; Shearmur, 2011; Torre, 2008).

Given the role that information and communication technologies (ICT) play in enabling workplace mobility, and given that ICTs generate huge amounts of real time, geolocated data—phone users can be tracked, the intensity of data and line use can be geolocated and recorded throughout the day (Calabrese et al., 2007; Reades et al., 2009; Tranos and Nijkamp, 2015), Twitter posts can reveal activities taking place at a particular place and time, etc. (Shelton et al., 2015)—in this paper we explore whether these Big Data can—in principle at least—shed light upon the trajectories of knowledge and service workers at the urban scale. Given that traditional approaches to the study of employment location are not capable of capturing these trajectories, to what extent can Big Data be incorporated into research design and methodology? Can the technologies that enable workplace mobility be used to extract data on where work is being performed in cities?

The current discussion of Big Data has tended to be of two types: it has either been datadriven, providing examples of its use (Feinleib, 2014; Mayer-Schönberger and Cukier, 2013), or

it has been epistemological (and sometimes political), describing the nature, limitations, and possible dangers of Big Data in a general way (Kitchin, 2013, 2014). In this paper we briefly review this literature, looking at some applications of Big Data in recent social scientific research (mainly in urban studies), as well as some of the discourses on the opportunities and challenges of Big Data, in order to understand the extent to which we could rely on them to reveal the spatial underpinnings of knowledge and service work.

What are Big Data? On the one hand, Big Data are information: they are usually derived from users of a particular technology or from sensors, without people being aware of the data collection (Nunan and Di Domenico, 2013). Their usefulness derives from their volume (Delort, 2015), velocity, and variety (Kitchin, 2013). The metadata, not the content, are often the value of Big Data. They typically do not reveal the nature of an event, but when, how, and where an event occurs (Lyon, 2014). On the other hand, Big Data are a tool: the rapid rate at which they are refreshed, enable them to be used in feedback loops, altering behavior (or at least the networks that underpin the behavior) in almost real time (Eagle and Greene, 2014; Feinleib, 2014). Although data have always had this dual aspect—observation of a phenomenon and input for action—the speed and scale at which this can now be done are leading to qualitative changes in the feedback mechanism: from being a fairly slow, deliberative process, open to analysis and debate, it is becoming a real-time phenomenon guided by algorithms that are often opaque (Finn, 2017).

The opaque nature of Big Data algorithms, and of the underlying data themselves, is due to their operational, and often private, nature (Helbing, 2015). These data are not gathered by statistical agencies or through surveys, which focus on a pre-conceptualized population, on precise variable definitions, and for which adequate sampling is important. They are usually gathered opportunistically from users of particular networks or technologies: the data are massive, can be used to influence (and, hopefully, improve) the particular function for which they are gathered, but their usefulness in a social scientific context, to further understanding of social and economic processes that are multidimensional and that extend beyond users of particular technologies remains open to question (Kitchin and McArdle, 2016; Lyon, 2014; Mahrt and Scharkow, 2013; Van Meeteren and Poorthuis, 2018).

Although Big Data have already become mainstream in urban studies (Batty, 2013; Rathore et al., 2016), with researchers using social media platforms such as Twitter and Flickr to

understand gentrification and urban density (Hwang and Sampson, 2014), and web-based service platforms such as Über to understand the impact of these mobility services on traffic congestion (Hall and Krueger, 2018), it is difficult to determine whether the new wave of Big Data analysis is producing valuable insight and not merely vignettes of urban complexity. We argue that in spite of their potential, Big Data encounter difficulty when multidimensional information is required, particularly relating to emerging phenomena that require exploration: while tracking the whereabouts of people in real time is now relatively straightforward, understanding the *why* and the *wherefore* is far more difficult.

This article has two aims: first, to explain why our current knowledge about where work is actually performed in cities is increasingly imprecise; and second, to discuss whether research designs and methods used to study the location of economic activity can usefully integrate Big Data in order to capture the new (and mobile) geography of work.

4.2 Changes in Work and the Workplace: The Challenge of Locating Where Value-Creation Occurs

It is not possible to review all the changes that have occurred in the workplace and in the nature of work since the early 1990s. Two key changes will briefly be described. First, the types of contract and employment experience which current workforce entrants face differ from those that prevailed prior to the 1990s. Temporary contracts allow workers to engage in multiple activities throughout their careers, either as independent contractors (or freelancers), or as full-time employees whose work entails movement across sectors and between projects. At present, industrial and organizational behavior scholarship is focused on understanding whether such contractual arrangements make workers vulnerable or provide a sense of empowerment (Cook, 2015; Warner, 2015). Little attention is paid to the geography of employment based on temporary, multiple, and/or flexible contracts.

Second, for many types of work—particularly those types that are deemed "creative" (Florida, 2010) and that of "symbolic analysts" (Reich, 1992)—technology allows value creation to occur from a wide variety of locations (Kesselring, 2015; Schieman and Young, 2010): the assumption is that for these kinds of jobs, the nature of the workplace is changing. A more exact approximation of the kinds of jobs that are most subjected to such changes remains, to our

knowledge, elusive. Current definitions are either too broad, or focus on one specific industry or sector. A more complete overview and conceptualization of mobile work have yet to emerge in the literature. Nonetheless, both of these changes—the temporality of contractual arrangements and multi-location work—are connected, and both should lead to a reappraisal of the idea of "place-of-work."

Prior to the 1990s, most young people entering the workforce, in particular if they were graduates, could entertain reasonable expectations of full-time employment, and of a career structured by periodic moves between different stable jobs (Krahn and Lowe, 1998). A quarter of a century later, young people are entering an economy in which flexibility of work is commonplace in the app-based on-demand/gig economy.

As Boltanski and Chiapello (2005) presciently describe in the case of France, and as Sennett (1999) also observed, work is increasingly project based, people are integrated and dropped from projects on the basis of their specific skills, and each person is continuously monitoring their surroundings for the next project on which to work. Only a small number of more senior managers, themselves often involved in a variety of projects, benefit from stability, but this stability often reflects their relationships and position within professional networks rather than stable salaried employment. As Friedman (2014) argues with respect to the United States, echoing Capelli and Keller (2013):

"A growing number of North American workers are no longer employed in 'jobs' with a long-term connection with a company but are hired for 'gigs' under 'flexible' arrangements as 'independent contractors' or 'consultants', working only to complete a particular task or for defined time and with no more connection with their employer than there might be between a consumer and a particular brand of soap or potato chips." (Friedman, 2014:171)

This type of job has been growing particularly rapidly in the construction, business service, and other services sectors, but growth has been fast across the whole economy: about 85 percent of all new jobs created between 2005 and 2013 in the US economy had alternative contractual arrangements (i.e., alternative to contracts "with fixed hours, location and certain expectations of security")—up from only 3 percent between 1995 and 2001, and 55 percent between 2001 and 2005 (Friedman, 2014: 176). From a spatial perspective, Kesselring (Kesselring, 2015:572) cites a German study that found that "in 2008, 37 percent of the

interviewees ... were working to a various extent from changing locations," though he recognizes the paucity of studies recording where work actually takes place.

The second factor—linked to, but distinct from, the increasing flexibility of work—is the revolution in information and communication technologies that began in the 1970s and 1980s with the slow development and introduction of the Internet and of cellphones, which took off from the mid-1990s as these technologies became ubiquitous, reliable, and increasingly mobile. This has had a variety of consequences. The first is that many alternatives to the traditional workplace have become feasible, such as trains (Lyons et al., 2013) and cars (Hislop, 2013). At first, the principal alternative that was envisaged was working from home. As we saw above, our understanding of where economic activity occurs is premised on the notion of "place-of-work." From the 1990s, the Internet and ICTs made it increasingly feasible for employees and self-employed people to operate, at least part of the time, from home (see teleworking literature, e.g., Handy and Mokhtarian, 1995; Nilles, 1994). While these studies acknowledge some of the impacts of new communications technologies, they retain the idea that specific activities occur in specific places—in this case work occurs either at home or in the office. Kwan's (2002) discussion of the changing space-time matrices of everyday life is also premised on access to the Internet at fixed locations.

However, it is the advent of mobile phones and other handheld devices that has more fundamentally altered spatial work patterns (Katz and Aakhus, 2002; Licoppe, 2004). Most basically, these devices allow access to social media, to web-based documents, to conference calls, from almost any urban location. More subtly, they allow for the real-time coordination of meetings and of other activities. And these two changes are having major impact on work location, particularly for younger people who are more attuned to and at ease with these possibilities than older workers (Deal et al., 2010; Rainie and Wellman, 2012).

Indeed, with ubiquitous access to tools and information required for knowledge work (a broad term that encompasses creative and symbolic work), the assumption that knowledge workers need to be present at the office as they perform work becomes questionable. Some firms appear to have redefined the purpose of having a fixed place of work, treating the workplace as an arena for social and business encounters, it being understood that when a particular task requires concentration one retreats to a café, a park, or to one's home (Bennett et al., 2010; Waber et al., 2014). Furthermore, transport networks themselves have become places where

work occurs: what Augé (2008) characterized as non-spaces—platforms, sidewalks, rails, airport—have now become places from which people phone, respond to e-mails, arrange meetings, write; in short, places from which economic activity can be, and often is, performed. A study of business travelers and their car journeys revealed that they perform much of their work on the road (Lyons and Urry, 2005), changing how we understand productivity and evaluate the importance of travel time in the Information Age.

That said, people and economic activity are necessarily situated, and people necessarily take part in face-to-face interactions. Thus, even if the permanent co-location of workers is no longer as important (Bathelt and Turi, 2011), space continues to have a role as support for meetings, and also as support for transport networks that enable the mobility of agents attending these meetings (Agrawal et al., 2006). To use Castells' (2009) terminology, physical space undergirds not only the nodes, but also the flows, of a networked society. The way in which this undergirding occurs, and the functions that take place along networks or at meeting places require exploration, since physical networks and physical meeting places need to be designed, built, and maintained.

While Castells' ideas refer to global and national urban systems, they are also relevant in forming preliminary ideas about intra-urban work location—especially concerning worker mobility. Indeed, one of the limitations of current research on employment location is that it focuses on where firms locate (Currid-Halkett, 2008; Meijers, 2007; Parr, 2002; Shearmur, 2012b). However, firm location may only be the *official* place of work, and not the *actual* place of work. Consider, for instance, business consultants who often perform their work at their clients' location (Hislop and Axtell, 2009).

What is more, literature that emphasizes the benefits of geographic clusters assumes that most workers actually perform their work in—or very close to—their official place-of-work. However, there are growing reasons to question this assumption. The first reason to question the idea that economy-related interactions occur within localized clusters is the fact that such local effects are not always observed where expected (in high-tech business parks or in Central Business Districts, for instance): indeed, when they have been sought in a systematic way (Gordon and McCann, 2000; Huber, 2012; Quintas et al., 1992; Shearmur, 2012b; Suarez-Villa and Walrod, 1997) the results have often been inconclusive at best. These studies reveal that

there is no reason to believe that work-related interactions are localized—interaction within London's finance sector being one of the exceptions (Gordon and McCann, 2000).

Meanwhile, in literature on worker mobility, geography comes second to the psychological (individual and collective) effects of mobile work (Brown and O'Hara, 2003; Cooper et al., 2002; Felstead et al., 2005; Halford, 2005; Kesselring, 2015; Lassen, 2009). Studies that do look at the geography of mobile work are few and confirm that work is increasingly occurring away from the office, but still focus on working at home while ignoring largely because of lack of data—work performed in other types of urban spaces.

The two key changes described—the increasing flexibility of work, and advancements in ICT—call for a re-evaluation of the "place-of-work." The proliferation of temporary contracts, the multiplicity of projects undertaken by a single employee, and the multi-location of work are some of the key characteristics of increasing flexibility of work. Workers often alternate between projects, or line up engagements that require them to be accessible and perform work beyond office hours, producing a work–life balance that is less about balancing and more about the blurring of work–life time and space (Demerouti et al., 2014).

Given these considerations, we suggest that work should be conceptualized as taking place along geographic trajectories (Massey, 2005) punctuated by moments of fixity. In order to verify this hypothesis, the nature of work needs to be considered (is all work equally mobile?) and means to test it devised. We first consider work, and then consider Big Data derived from ICTs as a possible means to verify the hypothesis.

4.3 A Typology of Worker Mobility

Workplace mobility is clearly a growing phenomenon. Management scholars argue that "mobility for work" has become a key feature of professional life. Looking at the trajectories of academics and theatrical artists, Loacker and Śliwa (2016) conclude that mobility at a variety of temporal and spatial scales is necessary to maintain economic and professional status.

We have so far suggested that workplace mobility principally affects knowledge-related work: however, the reality is more complex and nuanced. To capture some of this nuance, we have drawn out six dimensions of workplace mobility, based upon the work done by mobilities scholars (Bærenholdt, 2013; Kesselring, 2006; Urry, 2007), management and organization

studies (Borg and Söderlund, 2014; Hislop and Axtell, 2009; Taylor and Spicer, 2007), and our own understanding of the phenomenon:

- *Meetings and face-to-face interactions:* even the most mobile of jobs require times and places at which face-to-face meetings occur (with clients, students, co-workers). Mobile technology can help coordinate these meetings, but often it is more expedient to have pre-arranged meeting times—for instance weekly team meetings or times at which a lecture is given. Furthermore, for some jobs meeting face-to-face with the client is necessary for a successful working relationship: these meetings are regular and often take place at the clients' locations (Hislop and Axtell, 2009).
- Mobility as freedom/choice or as a constraint/necessity: for example, new academics and
 researchers tend to exhibit higher levels of mobility as they seek to gain experience and
 employment—for them mobility is a necessity, while established academics move
 seldom and move by choice (Loacker and Śliwa, 2016).
- Status and mobility: spatial mobility can be associated with upward or downward shifts in status (Sheller and Urry, 2006), but given that the experience of mobility can be different for different types of workers (choice or necessity) there is no automatic connection between status and mobility. Indeed, workers engaged in home cleaning, dog walking, and personal care are mobile, and increasingly coordinate their timetables by way of mobile communications, yet do not benefit from the high status often associated with knowledge workers. Within this latter category, young workers engaged in "gig" work do not themselves benefit from particularly high status.
- *Fixed versus unconstrained mobility:* some mobile jobs are closely tied to networks. For example, high-status airline pilots, as well as lower status truck drivers, perform their economic activity while moving, but their activity is closely connected with heavy equipment (airplanes, trucks) and with particular routes along networks (air routes, highways). In opposition to this type of fixed mobility, unconstrained mobility corresponds to knowledge workers who can perform their job from any location that has a phone or a Wi-Fi connection.
- *Potential versus actual workplace mobility:* it is not because workplace mobility is possible that it is actually performed: recently Marissa Mayer, the director of Yahoo!

"order[ed] workers back to the office" (Miller and Rampell, 2013). This reveals two things: first that workday mobility is a reality, and, second, that while it is enabled by technology it is only implemented if the work environment and culture accepts it.

 Not all jobs have potential for mobility: finally, many jobs remain immobile out of necessity. Factory work, and other work closely associated with immobile capital equipment, can only occur in a fixed location. Likewise, many service jobs—from restaurant service to hotel management—require presence on a particular site, and interactions with clients at particular places.

Economic activity has not been thought about in this way before: mobility has been studied in terms of commuting, business travel, and—increasingly—of specific locations (e.g., third places or hybrid spaces) and networks (e.g., railway networks) where it can occur: but jobs themselves, and the creation of economic value, still tends to be associated with a "place-of-work." Faced with this new way of conceptualizing place-of-work (which remains hypothetical despite its plausibility), and in the light of our previous research on metropolitan structures and job location (that has relied on census data and establishment surveys, e.g., Shearmur, 2012; Shearmur et al., 2007), to what extent can Big Data further our exploration and understanding of these new trends? This is a particular instance of a wider question: notwithstanding the quantity and sophistication of data now available, can their analysis help us understand new (and hence poorly conceptualized and understood) social and economic processes, even in cases such as this where the new process is closely tied to ICT and is fundamentally one of geolocation? Having discussed in some detail the reasons for re-conceptualizing the location of work activity, and after highlighting the way in which it is enabled by ICTs, it is to this wider question that we now turn.

4.4 Big Data and Urban Studies

In the previous sections, we argued that economic activity and value creation can no longer be associated in a straightforward way with a "place-of-work." This has always been an approximation (there have always been traveling salesmen and taxi drivers, for example), but an approximation that has guided the way city managers and planners think about cities—with areas zoned for economic activity, buildings assigned specific uses, and specific neighborhoods and

clusters understood as being the locus of economic activity. It is increasingly important to envisage new ways of apprehending the urban space-economy, of identifying how economic activity draws upon urban spaces and unfolds across them. In this section we consider whether Big Data, specifically those derived from cellphones and social networking sites, can be used for this purpose.

Indeed, the communication and transport networks that support daily mobility are themselves generating vast amounts of passive data (Mayer-Schönberger and Cukier, 2013). There is considerable interest and optimism in the possibility that this information can be transformed into knowledge that could be applied to problem solving (Miller, 2010). Given the size of these data, and their rather disparate nature, data mining techniques are often envisaged that could lead to new knowledge (or at least to uncovering unsuspected relationships that require understanding and theorization). Furthermore, many of these data are associated with location coordinates or zones: this is seen as a tremendous opportunity for spatial sciences. Telecommunication patterns are now being used for real-time urban analysis (Steenbruggen et al., 2015), e-ticketing can provide new information on commuting patterns (Batty, 2009, 2013), and participatory GIS and social networks can offer insights into new uses of space and neighborhood dynamics (Shelton et al., 2015). Some even claim that we are now in the position to see, perhaps for the first time, the mechanics of the global economy as well as to better understand society (including the city and its functions) (Tranos and Nijkamp, 2013).

Notwithstanding the usefulness of Big Data for immediate response to issues such as traffic and crowd management, it is difficult to assess the extent to which Big Data enable understanding (as opposed to tracking and real-time optimization) of the underlying layers of the global economy and the generation of knowledge on changes in our society and cities. It is one thing to track cellphones, follow vehicles, or assess flows—it is quite another to understand what is occurring and what people are doing. In particular, it is difficult to assess whether an activity (being at point "A," driving from "A" to "B") is being performed for economic, leisure, personal or family motives. Yet to understand the interaction between work, location, and trajectories through the city, that is what would be required.

Much of Big Data's power lies in its combination of volume and diversity. However, without information on the population being observed, and without the capacity to cross-reference much of the information obtained (e.g., we may know where a cellphone is, but who is

using it and why?) insights are generated by way of inference and correlations. In many ways Big Data, well suited to identifying recent historic trends, are poorly adapted to uncovering change. It would require careful matching of new and existing data types for them to generate more concrete knowledge on the changing urban dynamic (Becker et al., 2011; Frias-Martinez et al., 2012; Steenbruggen et al., 2015).

These limitations reflect some wider issues that have been raised about the use of Big Data in the social sciences (Boyd and Crawford, 2012; Kitchin, 2014; Leszczynski and Crampton, 2016; Lyon, 2014; Symons and Alvarado, 2016). The "black-box" nature of Big Data and the considerable hardware and software resources necessary for their analysis are among the main causes for concern: not only does this place increasing demands on researchers to obtain the knowledge and skills necessary to operate the hardware and software (which can, arguably, be addressed by increasing budgets and collaboration), it may also lead to outsourcing of the more technical parts of research, leading to loss of control and understanding—by researchers—of data compilation, extraction, and analysis (Dourish, 2016; Miller, 2010; Tranos and Nijkamp, 2013).

Many researchers feel that this lack of technical understanding—due not only to the data's size and complexity, but also to their proprietary nature—will limit their capacity to analyze and interpret them. Notwithstanding these epistemological questions, other researchers suggest that these problems are essentially technical, which, once resolved, will allow Big Data to be used to improve cities by enabling real-time exploration, providing information and helping identify patterns that could be used to predict future problems (Batty, 2013; Eagle and Greene, 2014; Townsend, 2013).

This difference of approach reflects two different uses of Big Data. Doubts emanate from researchers seeking to understand social and economic processes, whereas those interested in observing and managing infrastructure, networks, and flows, express optimism. Where these two different uses of Big Data intersect—and we suggest that the study of workplace mobility is one of them—there is some confusion: the possibilities of Big Data that are touted by some are considered over-optimistic by others.

For example, there is widespread belief that Big Data can support better decision-making by helping to identify stakeholders, to find likely partners, and to form relationships, thereby enabling cities and city planners to better address the needs of multiple actors (Goldsmith and

Crawford, 2014; Townsend, 2013). Policymakers are increasingly drawn to the Smart City framework without much evidence of its actual benefits (Greenfield, 2013; Kitchin, 2013). As appealing as Big Data and their analytical tools and methods are, there is uncertainty as to what kinds of conclusions can actually be drawn from them. It has been argued that, mesmerized by Big Data, contextual, political, emotional, and other motivations are being overlooked by the optimists (Boyd and Crawford, 2012; Marshall, 2015; Shearmur, 2015). Cities making policy decisions based on data and correlations are at risk of misinterpreting causality, for people and their interactions cannot be reduced to the equivalent of billiard balls (Graham and Shelton, 2013).

These researchers question the extent to which Big Data can really further our understanding of urban processes—which is not the same thing as their observation. MIT SENSEable City Lab, the Center for Complex Network Research/BarabásiLab and the University of Tartu, for instance, have pioneered research on the urban metabolism with the use of Call Data Records (CDR). These are metadata: they consist of the origin and destination of calls, as well as their timestamp, the duration of the call, and the status of the caller (worker, nonworker, or student). CDR promises information on population clusters, travel patterns, and temporal clusters of activities, which, when combined with demographic data and land-use plans, can produce an image of the city and how it is being used by certain groups of individuals (Ahas et al., 2015; Becker et al., 2011; Calabrese et al., 2010; Ratti et al., 2006).

Yet these data remain passive, lack texture, and are opportunistic. The quality of CDR depends largely on the presence of cell towers within the desired area of study. Data are generated only when an exchange or transaction occurs, the underlying assumption being that these digital transactions are sufficient for obtaining an understanding of how the city works; without denying that interesting information is indeed obtained about phone calls, it is unclear exactly what else is being observed and what the underlying processes and motivations of the individuals and groups are (Steenbruggen et al., 2015). Furthermore, the data are not open source, and privacy regulations grant limited access to researchers; and, of course, it is difficult to determine the type of activity or exchange (personal or professional, and in what sector) taking place through CDR alone.

A recent paper by van Meeteren and Poorthuis (Van Meeteren and Poorthuis, 2018) uses Twitter data to test the Christallerian behavior of urban consumers. While these data are more

easily available than CDR, and while the study's results are promising, they conclude that: "We could only reach our conclusions after considerable effort and end up with a very partial geography, with limited relevance to the local population and policy makers. This alerts us to the fact that although Big Data is a defining phenomenon of our times, it requires critical scrutiny ... and we should be wary of embracing it as a panacea that can replace "traditional" data gathering and analysis" (2018: 22).

Considerable effort is being invested in developing new data mining techniques, and in exploring other sources of data (Yao et al., 2017), such as noise and mobility sensors, but it remains unclear what impact this will have on social scientific understandings of the city.

4.5 Can Big Data track where work actually takes place?

Given these characteristics of Big Data, to what extent can they be used to investigate the intraurban daytime mobility of workers? In their current state, are they adapted to investigating such a question?

So far Big Data have proven useful at establishing correlations between fairly simple things—for instance, while it requires huge amounts of data to predict which types of New York manhole cover will blow up (Mayer-Schönberger and Cukier, 2013) the dependent variable—a manhole cover blowing—is straightforward. Likewise, understanding traffic flows is highly complex, but can be based on large numbers of simultaneous, but straightforward, traffic counts (Reades et al., 2016; Zhong et al., 2016). Social phenomena can usually not be reduced to such straightforward events and counts. Even if Big Data are used to merely observe (e.g., see the methodology developed by Ahas et al., 2015), rather than explain, workplace mobility, this requires grasping the content of communications and understanding what people are actually doing at a given time and in a given place: someone can be sitting at a café working on a computer (reading an article on job location, for example), and his/her neighbor can be sitting near-by doing exactly the same thing, but for leisure purposes. We briefly outline three limitations of Big Data with respect to the study of where work takes place across the city:

1. What are different workers' levels of mobility and motility (mobility potential)? Big Data provide metadata, not specific information about the user such as employment status (full time

versus part time), the profession (entrepreneur versus technician), or the industry (higher tier services versus lower tier services, knowledge-intensive or labor-intensive). This makes it difficult to understand the level of mobility of different types of workers using Big Data alone. These data provide new—inductive and correlation-based—insights into how particular networks function, together with limited information on the users of these networks. But these data provide no information about the possibilities open to each worker: for instance, doing work at Starbucks out of choice is fundamentally different from working there because one has not been provided with an office.

2. What kind of work-related activities do mobile workers perform? Not all economic activity is mediated by technology: interacting with people directly, meeting them face-to-face, negotiating, collaborating, and discussing are key work activities that are not digitally recorded. Likewise, reading a (paper) report or book can be an economic activity that occurs off-line but is nonetheless mobile (Lyons and Urry, 2005). It is thus one thing to know where people are at each moment of the day (something that mobile phone operators could conceivably record for people with a mobile phone turned on and who are within range), but quite another to know *why* they are where they are and *what* they are doing there. By focusing on user information extracted from ICTs, we risk overlooking a level of mobility of work that does not rely on technology for workplace mobility.

3. Can Big Data illuminate individual mobile worker trajectories? Even if tracking data were used to address the more straightforward question of tracking the movement through the day of employed people, this cannot be done without identifying which phone users are employed, and which are working on a given day. Furthermore, one would need to make assumptions about how representative the workers being tracked (i.e., those with a phone turned on) are of all workers. In other words, it is not raw phone data (even if the actual content of conversations is known), but data crossed with information about the individuals in whose pocket the phone is sitting and their current activities that could begin to reveal information about where work activity takes place within the city. Strictly speaking, raw data can track where phones that are switched on are located throughout the day; maybe—assuming no confidentiality issues—what is said during conversations, and the location of the person being called can also be accessed. By assuming the phone is in the pocket of the owner, and by crossing phone data with information gleaned from social networks, somewhat more complex inferences can be made. This type of

analysis could provide new ideas about ways cities function, but cannot address the question that is central to this paper, and cannot verify that the ideas outlined in the first section are correct. It is also plagued with confidentiality issues that are virtually insurmountable since it would require the content of communications being analyzed.

While there is little doubt that Big Data can be a useful tool in furthering our understanding of worker mobility, they have yet to be properly harnessed and put to use as a tool for understanding social and economic questions relevant to city analysts and managers. The paradox—at least for those who put great stock in Big Data—is that these data can only be used to study processes that are already well understood (such as Christaller's theory of consumer behavior). They are less well suited to explore novel phenomena that are in the process of being conceptualized. For the time being, the way economic value is generated along trajectories by urban workers has not been studied and is not well understood. This requires qualitative work on the ways in which work location and work-life balance are changing; such research will provide some insight into the changing location of economic activity. It is only once the phenomenon is well understood that relevant indicators can be devised, and information drawn from Big Data used—as one tool among others—to track certain aspects of the phenomenon.

4.6 Conclusion

Technology is undoubtedly changing the face of the city. The creation of cyberspace, or cyberplace (Batty, 1997), has led to the detachment of some economic activity from physical space. This detachment is, however, partial. It is not that we no longer use space to perform work, but that the typology of space, or rather spaces, of work varies. Today, people can work at an office, from their homes, at a café, from a subway, or train station—their work taking place along a trajectory during the day. It has become more difficult to pinpoint where work, most especially knowledge work, takes place. As the idea of a fixed place of work begins to fade, urban planners need to concern themselves with the fate of workplaces that are no longer desirable, nor affordable, for firms as well as individuals. To do so, knowledge on employment location needs to be renewed.

Data and research methods traditionally used for the study of employment location are no longer suited to the task. In this paper we discuss whether Big Data derived from ICTs—that also enable workplace mobility—can be used to trace geographical trajectories of mobile workers.

We argue that the questions pertaining to workplace mobility, and of where valuecreation actually takes place in the city cannot be resolved by passively observing movement: this can provide some ideas, some hypotheses, but it is only by performing more qualitative, onsite observational and ethnographic studies that one can begin to understand how individuals separate work from other activities, and where these different types of activity take place in space and along trajectories.

One of the current dangers of Big Data is that they are being used to define questions being asked, rather than as tools to generate knowledge about socially relevant questions. The enthusiasm generated in some quarters by these new data, enthusiasm fueled not only by the possibilities they offer to better understand some urban phenomena but also by the economic interests they further, have tended to overwhelm basic methodological and epistemological precepts.

Furthermore, the distinction between correlations and causes is an important one: at the very least, causal analysis requires theory and an understanding of social mechanisms and interactions. Correlations can support and confirm theories, but can rarely produce them. Inductive methods, which are a long-standing and valid approach to theory building, do not obviate the need to build the theories themselves, nor the need to verify and test them by means that extend beyond just more correlations (Calude and Longo, 2017). While the end of theory has been touted by some prominent technophiles (Anderson, 2008) and furthers the interests and ambitions of corporations that profit from this type of belief (Simonite, 2014), there is skepticism in the researcher community about these claims: Big Data, their size and newness notwithstanding, have not altered basic epistemological precepts. They have however, ushered in renewed respectability for inductive reasoning. They present many opportunities, as well as challenges, for research, and more attention should be paid to ways in which Big Data can be paired to theory, and matched to other data and to qualitative work, to produce more concrete images of changing urban dynamics.

Workplace mobility—the process which we, as researchers interested in the urban economy, would like to better document and understand—is a reflection of wider social and

economic trends: the economic function of places in the city carries implications for planning practice. Given our belief—confirmed by a close reading of the literature, by theoretical reasoning, but not yet by empirical work—that the methods we have previously used to study the geography of urban economic activity are not able to capture the key phenomenon of workplace mobility, our initial idea was to turn towards Big Data such as Twitter feeds or cellphone metadata.

The more we considered this, the more it became evident that we currently have insufficient knowledge about workplace mobility to devise sensible indicators or to interpret the data. In this paper we have outlined the reasons why Big Data are not yet appropriate for this type of research. In doing so, we have touched upon wider questions that pertain to the nature of these data and to the nature of the knowledge that they generate. This contributes to debates about what these data can reveal, what they cannot, how they can be accessed, and whether they can be analyzed without recourse to "black-box" algorithms.

Of course, ever since Anderson's (2008) provocative assertion that Big Data are ushering in the end of theory, and as Big Data have become widespread and (partially) available, these questions have been discussed by many other researchers. The key contribution of this paper is to move beyond fundamental, but abstract, epistemological discussions of the possibilities and pitfalls of Big Data, in order to assess, for a specific question—the apparently straightforward one of where work actually takes place—what Big Data can and cannot contribute.

Chapter 5: New Places of Knowledge Work? Understanding the spatiality of knowledge workers in Kitchener, Cambridge and Waterloo in Ontario, Canada

The previous chapter is a conceptual starting point: it addresses the complexity of workplace mobility and questions the ability of existing data and methods to capture this dynamic spatiality of work. Moreover, it challenges the notion that Big Data, with their real-time tracking capabilities (and their sheer volume), can be used to study complex spatial phenomena. It concludes that 1) we do not know enough about workplace mobility to be able to determine the usefulness — and narrow the scope — of large data sets for enhancing our understanding of it, and 2) for the time being, door-to-door approaches, such as qualitative interviewing and ethnography, are best suited to establish an empirical foundation from which more robust studies can emerge.

This empirical chapter presents Canadian census place-of-work data and verbal (interview) data on where knowledge work takes place in Kitchener, Cambridge and Waterloo side by side. The purpose of the chapter is to better understand what can be learned from these data, see how they differ and where they complement one another, but also to examine the extent to which a descriptive analysis of census place-of-work data alone can deepen our understanding of workplace mobility.

5.1 Introduction

The global shift towards a knowledge-based economy is largely driven by the assumption that knowledge-intensive activities will make economies more competitive and resilient through innovation, collaboration and technologically advanced systems of production (Bathelt et al., 2004; Cooke, 2002; Florida, 2005). As a result, there is a premium on innovation in policy circles, especially among city planners for whom the attraction and retention of knowledge work has become a primary concern (Vinodrai, 2017b). Meanwhile, the nature of knowledge work has been changing (Florida, 2010; Kingma, 2018; Ruostela et al., 2015).

An assumption has been made that knowledge workers — by virtue of being mobile, flexible and digitally powered — are less tied to the office, or their designated workplace. Changes in ways of working, such as the rise of project-based work, casual work arrangements, digital skills and platform labor are rousing thoughts and theories reminiscent of technological futurists that predicted a lesser need for proximity and face-to-face interaction as most workrelated activities (including communication) move to the digital sphere (Cairncross, 1997; Toffler, 1980). These assumptions suggest that knowledge workers will have less need for physical spaces and that the office is essentially moribund (see for example Mulcahy, 2017).

The abilities afforded by modern wireless technologies and the ever-evolving digital applications are fueling the "spatial detachment" of workers from particular spaces (Messenger and Gschwind, 2016). Not only can more work-related activities be performed virtually, but also spaces can be altered to accommodate different work-related activities, thereby enabling work to sprawl across a variety of non-traditional work locations (Brown and O'Hara, 2003; Felstead et al., 2005; Hislop and Axtell, 2007; Kingma, 2016, 2018). In other words, work is not aspatial, but less bound to specific locations — it has extended beyond the boundaries of the office (Martins, 2015; Richardson, 2020). What does this mean for "traditional" workplaces? Is the office soon to become a relic of the past?

Before we can even begin to think about the impact of workplace mobility on the built environment, we must build sufficient knowledge to help us understand the extent to which this phenomenon alters and reduces the need for spaces traditionally associated — and specifically designed — for work. Only then can we begin to understand how new ways of working challenge our understanding of where work takes place.

Economic geographers and urban planners rely on the assumption that employment has a "fixed", well-defined location. This assumption is supported by data, typically census place-ofwork data, that show where work is performed based on the type of employment at the population level. Information drawn from these data — and guided by the assumption that workplaces are geographically well-defined — is then used to inform planning and economic development policy. Considering this, the notion that wokrplaces are "detaching" from welldefined locations could have significant policy implications. Indeed, recent planning research suggests that the rising mobility of work has been generating confusion as to how to best plan for

— and regulate — spaces for work in the city (Di Marino et al., 2018; Di Marino and Lapintie, 2017, 2018).

However, empirical research based on national employment data suggests that the extent to which mobile and multi-locational work permeates industries and sectors of the economy may be exaggerated (Felstead, 2012a; Felstead and Henseke, 2017; Ojala and Pyöriä, 2018). Irrespective of mobility, flexibility and digitization, most workers will remain spatially anchored to their usual places of work, such as the office or the home. A recent study exploring the Canadian census place-of-work data for evidence of rising workplace mobility supports the claim that this rise is modest relative to overall employment, but the authors also suggest that the number is worth looking into: "[workplace mobility] may also be growing in subtle ways not easily captured with current statistics" (Putri and Shearmur, 2020; 14).

This chapter builds on this empirical work to further examine what "classic" data sources (traditionally used by economic geographers and planners), such as the Canadian census, can reveal about workplace mobility. What is more, it confronts these data with information drawn from qualitative interviews with knowledge workers. It focuses specifically on the tri-city area of Kitchener, Cambridge and Waterloo in Canada, informally known as "Silicon Valley North". Compared to census data, the interviews offer a more nuanced understanding of where knowledge work is performed and why. They corroborate the finding that work extends beyond the boundaries of the traditional office. Census data, though limited in their capacity to capture the complexity of workplace mobility notwithstanding — still spend a significant amount of time at their designated workplace. The chapter is divided in five parts: the introduction, literature review, a brief overview of data and methods, findings and a conclusion. The next section is an overview of key literature pertaining to the spatiality of knowledge work.

5.2 Literature Review

The knowledge economy necessitates a widespread professionalization of labor. This means that places that have successfully transitioned towards a knowledge-based economy will experience a growth in occupations that require higher levels of skill, education, as well as specialized knowledge with potential for life-long learning (Blackler, 1995; Cooke, 2002; Reich, 1992).

These occupations include engineers and scientists, lawyers and consultants and work associated with high technical expertise and cultural work (i.e., writers, designers, architects and so on). Canadian cities have experienced the emergence of a knowledge-based economy in different ways (Filion et al., 2015; Shearmur and Coffey, 2002). While there has indeed been a growth in knowledge work across industrial sectors, traditional industries (like manufacturing) have remained constant, though there has been a relative decline in importance of these sectors to the local economy (Beckstead and Gellatly, 2004; Beckstead and Vinodrai, 2003; Gordon, 2013).

Municipal, regional and national policy initiatives have been encouraging businesses to seek and adopt innovative practices and new technologies to remain competitive, focusing specifically on network-building and information exchange (M Gertler and Wolfe, 2004; MS Gertler and Wolfe, 2004). Indeed, the knowledge economy is seen as crucial for innovation, especially in production and firm organization through advanced information technologies. The locational preferences of knowledge-intensive establishments have largely been defined and explained through the prism of agglomeration economies, i.e., the co-location of firms, related services, and customer and labor markets. Benefits of co-location and centrality include knowledge spillovers, opportunities for collaboration and transactional cost savings (Bathelt et al., 2004; Cooke, 2002; Malmberg and Maskell, 2002; Maskell and Malmberg, 1999).

At the city scale, the transition to a knowledge-based economy manifested through the boom of office buildings in downtown cores (or central business districts) and the proliferation of back offices in suburban areas or edge cities, reflecting broader changes such as the segmentation of office labor (Garreau, 1991; Walker, 2000; Wilson, 1995). Also, old industrial districts in inner-city neighborhoods were "revived" through the clustering of smaller, more flexible production units, usually with highly specialized skills and activities often found in cultural labor (Markusen, 1996; Scott, 1988a, 1997). These "new" industrial districts (brownfield redevelopments and gentrified inner-city neighborhoods) dominated policy discourses, placing innovation and cultural production at the center of planning objectives (Asheim et al., 2007; Florida, 2002c, 2005; Markusen, 2003; Martin and Sunley, 2003; Vinodrai, 2017b). The idea is that core areas and inner-city neighborhoods contain elements — "buzz" and "milieu" — that are conducive to innovation and are central for investment and talent attraction purposes, and have become a key feature of urban and economic development policies. What is more, they affirm the notion that firms and workers gravitate towards environments with distinct spatial features

and contain elemental locational pulls, such as proximity to downtowns and clusters of related economic activity.

However, knowledge on new ways of working — emerging from sociology and management scholarship — suggests that the extent to which knowledge-intensive economic activities are attached to particular spaces is debatable. Mobility has become an integral part of modern work-life, enhanced by wireless technologies and digital work platforms, as well as ease of travel across multiple geographical scales (Elliott and Urry, 2010; Hislop, 2008; Hislop and Axtell, 2009; Urry, 2007). A number of knowledge-intensive occupations (from business consulting to biopharmaceutics) appear to be increasingly mobile and multi-locational — i.e., performing their work on-the-go or at different locations, such as the office, the home, client locations and coworking spaces, as well as cars, trains and airplanes (Axtell et al., 2008; Bosch-Sijtsema et al., 2010; Hislop and Axtell, 2007; Koroma and Vartiainen, 2018; Lassen, 2006).

In addition to wireless technologies, another enabling factor is the broader digitization of work and skills, as well as labor market changes such as the rise of project-based and casual (gig) work (Ash et al., 2018; Bologna, 2018; Hislop, 2008; Kesselring, 2015; Richardson and Bissell, 2017; Taylor and Luckman, 2018). Flexible work arrangements — teleworking, the ability to work remotely, and the increasingly customizable schedules and workspaces — also play a role in changing where work is, and could be, performed (Felstead and Jewson, 1999; Peper et al., 2005; Vilhelmson and Thulin, 2016).

And yet, there is a lack of sufficient data to challenge prevailing paradigms in planning and economic geography scholarship on where work takes place. More specifically, most research on mobile and multi-locational work is limited to a specific firm or occupation, or a particular group of workers, thereby leaving existing ways of conceptualizing work location intact. What is more, the few studies examining the pervasiveness of mobile and multi-locational work at the population level suggest that the phenomenon may be overstated (Ojala and Pyöriä, 2018; Vilhelmson and Thulin, 2016). However, while these studies show that the usual place of work (the office or the home), remains the dominant work location, they also suggest that the rise in mobile and multi-locational work over time — albeit modest — warrants empirical attention (Felstead, 2012a; Felstead and Henseke, 2017; Putri and Shearmur, 2020). What is more, some scholars suggest that the reason why the numbers are modest may indeed be due to limitations inherent in the data, which remain conceptually attached to fixed and well-defined categories of

work location (Felstead and Henseke, 2017; Shearmur, 2020). This chapter highlights these limitations by confronting census data with information drawn from qualitative interviews.

5.3 Data and Methods

This chapter relies on the latest available Canadian census data (2016) and qualitative interviews (conducted in 2017 and 2019) to examine the extent to which knowledge workers — that live and work in Kitchener, Cambridge and/or Waterloo — are mobile and multi-locational. First, the latest census data on employment (2016) for each city (at the census subdivision level) was examined in order to understand the number and distribution of knowledge workers across industries. It was interesting to see which industries, in an area traditionally associated with manufacturing, employed the most knowledge workers and how this varied across each city⁶. Second, these snapshots were used to identify key knowledge-intensive occupations and knowledge-intensive industries in each city. Place of work data was then examined for these top occupations, revealing whether knowledge workers worked at home, abroad, at the usual workplace, or did not have a fixed workplace address. These data show what the general tendencies are in these occupations with respect to workplace location. Place of work data are based on paid employment held the longest in the year preceding the census. The "usual place of work" category is defined as a "specific address" and could be an office building or a factory. The remaining categories — home, abroad and no fixed place of work — are self-explanatory. In the census questionnaire, responses to the place of work question and the name of firm are used to establish workplace location⁷.

Next, semi-structured, in-depth interviews with 25 knowledge workers, whose work is based (officially located) in Kitchener, Cambridge and/or Waterloo were examined to better understand the experiences of these workers and evaluate whether there is enough evidence to

⁶ Knowledge workers are defined as highly educated workers in skilled professions and/or higher managerial occupations and roles. According to Statistics Canada, occupations classified under Management Occupations (0), Business, finance and administration (1), Natural and applied science (2), Occupations in education, law and social, community and government services (4), and Occupations in art, culture, recreation and sport (5) are linked to post-secondary education and require higher levels of skill. See detailed description of NOC 2016 v. 1 and Chapter 3 for a more detailed justification.

⁷ According to the *Journey to Work Reference Guide for Census Population 2016* available online: https://www12.statcan.gc.ca/census-recensement/2016/ref/guides/011/98-500-x2016011-eng.cfm

support the assumption that mobile and multi-locational work is emblematic of knowledge work en général⁸. What is more, these interviews also reveal the extent to which place of work census data aptly portray the spatiality of knowledge workers in Kitchener, Cambridge and Waterloo. The interviewees were recruited based on a dual sampling strategy: the initial criterion sample was based on occupations classified as NOC 1, 2, 4 and 5 — upper managerial and professional service occupations, with skill level A, which entails at least a bachelor-level education. These interviewees were then asked to recommend potential participants (snowball sample), which eventually led to knowledge workers employed across a number of industries, including manufacturing. The interviews lasted between 30 and 90 minutes, were audio recorded and transcribed. The verbatim transcripts were then coded (See Figure 2 for code structure) and analyzed for themes using Dedoose, a digital application for mixed-methods research.

The interviewees were asked to describe the kind of work that they do and provide a detailed account of their typical workday. They were also asked to list and describe the places they perform their work in and why. They discussed how often, on average, they performed their work at the office and out of the office on a daily, weekly, monthly and yearly basis. They were asked about their travels, work-related and personal, as well as how often they worked beyond "regular" work hours and on weekends. They were asked to discuss their reliance on technology and for what type of work-related activities technology was used for. Finally, they were asked to discuss their respective employers' company cultures, and their personal experience with mobile and flexible work. In this chapter, the focus is on technology, the nature of work and travel experiences.

Together, Kitchener, Cambridge and Waterloo (KCW) form the tenth largest census metropolitan area (CMA) in Canada, with a combined population of 523,894 according to the Canadian 2016 census. Kitchener is the largest of the three cities, followed by Cambridge and then Waterloo. Finally, the Waterloo region on the whole has traditionally been defined by its manufacturing activities (Region of Waterloo, 2018). Kitchener was predominantly a blue-collar city, with services and white-collar work locating in Waterloo, and factories and upper-level

⁸ Naturally, the findings emerging from qualitative interviews are not generalizable. Rather, they are useful in describing experiences pertaining to particular contexts. In this case, they show how these wider trends affect individual workers — if at all — and what other insights warrant further empirical exploration.

management residences in Cambridge. The tri-city area had been affected by the relative decline in manufacturing activities, throwing Kitchener especially into decline and inner-city decay.



Figure 2. Key themes and code structure (deductive).

Over the past two decades the boom of high-tech and start-up activity — and the general growth of service sectors — combined with targeted economic development policies (i.e. land-use and zoning amendments, investment in public transit, and multi-level funding support to innovation centres) have altered the urban landscape, especially in Kitchener's downtown core (Filion et al., 2015; Nelles, 2014; Vinodrai, 2016). Ongoing policy efforts, at municipal and regional levels, are focused on attracting and retaining knowledge-intensive skills and activities. What is more, the region is part of an ongoing federal innovation-boosting initiative as a Next Generation Manufacturing Supercluster (Government of Canada, n.d.). Since 2016, the population of KCW has grown by 38,000 (Macrotrends, 2020). Between 2011 and 2016, the Waterloo region experienced a 65.6 percent increase in high-tech employment (Waterloo Region Community Profile, 2018). If digitally powered workplace mobility is indeed on the rise, these traits are likely to be reflected in place of work data and in conversations with KCW's knowledge workers. The next section explores both for clues.

5.4 Findings: Knowledge Workers and where to find them

This section presents employment data from Statistics Canada (2016) to highlight key industries and occupations in Kitchener, Cambridge and Waterloo at the census subdivision level. It also

explores census place of work data for these industries and occupations so as to extrapolate the extent to which these industries and occupations show traits of mobile and multi-locational work; in other words, to what extent work is spatially "detaching" from the traditional office (usual place of work). What is more, excerpts from in-depth semi-structured interviews with six knowledge workers (whose occupations match the top NOC and NAICS codes) are then presented for additional insight.

5.4.1 Industry, Occupation and Place of Work status — a view from the top

Focusing specifically on occupations classified under NOC (2016) categories 0, 1, 2, 4 and 5 — which in this study are considered representative of knowledge work — the top five industries for each city are identified based on the total number of knowledge workers (see Table 3).

In Kitchener, Educational services (61) is the sector with the highest number of knowledge workers, followed by Professional, scientific and technical services (54), Finance and insurance (52), Manufacturing (31-33) and Health care and social assistance (62). The highest portion of knowledge workers relative to total employment within the same sector is in Professional, scientific and technical services, followed by Educational services. Manufacturing has a high number of knowledge workers, though the portion of knowledge workers relative to total employment within the sector is the lowest of the five (at 26%). This seems consistent with the level of start-up activity in high tech in Kitchener, and the strong ties with universities and the financial service companies in the area.

A smaller labor pool (and overall population), Cambridge's knowledge workers are mostly found in Manufacturing (31-33), Professional, scientific and technical services (54), Educational services (61), Health care and social assistance (62) and Retail trade (44-45). While it is not surprising to see manufacturing as a top sector — Toyota Motor Manufacturing Canada is based in Cambridge, as are Honeywell and Tenneco — it is interesting to see it as a top knowledge work employer. This, together with the numbers in Kitchener, is evidence that manufacturing has not been "replaced" by knowledge-intensive industries, but rather that manufacturing is also becoming a knowledge-intensive industry. Indeed, manufacturing employs the highest number of workers in Business, finance and administration, Management and Occupations in education. In Waterloo, Educational services (61) and Professional, scientific and technical services (54) have the highest number of knowledge workers. This is not surprising given the two universities, as well as its established, traditionally "white collar" economic base. As expected, Waterloo also has a high number of jobs in Education, Business, finance and administration and Natural and applied sciences occupations (2).

Table 3. Top five industries (NAICS v. 2012) by highest number of workers with knowledge-intensive occupations (No of KW).

	Kitchener			Cambridge			Waterloo		
	No of KW	NAICS	%	No of KW	NAICS	%	No of KW	NAICS	%
1.	8530	61	85	3830	31-33	26	7345	61	89
2.	8105	54	86	3415	54	82	5400	54	90
3.	5890	52	72	3190	61	87	3870	52	80
4.	5575	31-33	26	3105	62	46	2425	31-33	41
5.	5385	62	41	2290	44-45	27	2165	62	44

This table also shows the percentage of knowledge workers within each industry. The NAICS classifications are: Manufacturing (31-33), Retail trade (44-45), Finance and insurance (52), Professional, scientific and technical services (54), Educational services (61), and Health care and social assistance (62).

The top occupations in Kitchener by highest number of knowledge workers are in management and high-order business services (1, 4 and 0) (see Table 4). Kitchener has the highest number of Business, finance and administration workers of all three cities. This is closely followed by Education (4) and Management (0). A focus on occupations corroborates an environment conducive to start-up ecosystems in Kitchener — a combination of management, finance and business support, and education. This also means that Kitchener has topped Waterloo as the key high-order service provider in the tri-city area. What is more, it is interesting to see that occupations and industries associated with "creative work" are also top knowledge work employers (NOC 5 - Occupations in art, culture, recreation and sport; NAICS 71 - Arts, entertainment and recreation, and 61 - Educational services). It is also important to note that the highest portion of Management occupations are found in Retail trade (44-45).

Looking at the place of work status for top occupations and related industries (see Chart 2), the usual place of work is where knowledge work takes place. In all three cities, the highest proportion of workers at their usual place of work are in Manufacturing. This is followed by Retail trade, Educational services and Finance and insurance. While this is expected for

Manufacturing and Retail activities, I anticipated a lower number of "fixed" workers in Finance and insurance.

	Kitchener			Cambridge			Waterloo		
	No of KW	NOC	NAICS	No of KW	NOC	NAICS	No of KW	NOC	NAICS
1.	17850	1	52	9965	1	31-33	8315	4	61
2.	12530	4	61	7005	0	44-45	8290	1	52
3.	11870	0	44-45	5830	4	61	6930	2	54
4.	10615	2	54	4275	2	31-33	6425	0	44-45
5.	2980	5	71	1460	5	71	1730	5	71

Table 4. Top five occupations and corresponding industries.

The occupations are Management (0), Business, finance and administration (1), Natural and applied sciences and related occupations (2), Occupations in education, law and social, community and government services (4) and Occupations in art, culture, recreation and sport (5).

Table 5. Top occupations and corresponding industries in each city by number of knowledge workers.

	NAICS	NOCS
Kitchener	Finance and insurance (52), Educational	Business, finance and administration (1),
	services (61), Retail trade (44-45)	Occupations in education (4), Management (0)
Cambridge	Manufacturing (31-33), Retail trade (44-45),	Business, finance and administration (1),
	Educational services (61)	Management (0), Occupations in education (4)
Waterloo	Educational services (61), Finance and	Occupations in education (4), Business,
	insurance (52), Professional, scientific and	finance and administration (1), Natural and
	technical services (54)	applied science (2)

However, these workers do indeed have higher numbers of homeworkers relative to others, along with Professional, scientific and technical services, which have the highest proportion of workers working from home. Retail trade has the third highest percentage of homeworkers in all three cities, but this is likely due to the Management (0) occupations significantly present in this sector. Working abroad is "barely there" in all three cities. Educational services and Professional, scientific and technical services have the highest proportion of workers with a non-fixed place of work. This suggests that sectors and occupations in Education have the greatest degree of workplace flexibility.

1 Chart 2. Place of work status for NAICS with the most knowledge-intensive occupations (%).





8 Chart 3. Place of work status for top knowledge-intensive occupations (%).

A closer look at the place of work data for occupations did not produce dissimilar findings; more specifically, knowledge workers perform their work from their usual place of work. Occupations with no fixed place of work are Art, culture, recreation and sport (5) — with the exception of Kitchener, where these occupations are de facto attached to the usual place of work — followed by Education, law and social, community and government services (4) and Management (0). In all three cities, the highest proportion of homeworkers is in Business, finance and administration (1).

These data, however, exclude the possibility of workplace mobility. Indeed, according to the Census guidelines, the survey targets where workers perform their work for "most of the week". What is more, survey respondents opting for the "usual place of work" category do so if they "report to the same workplace location at the beginning of each shift". Similarly, teleworkers that spend "less than one-half of the workweek working at their home office" are required to provide the address of their employer⁹. Given the literature on mobile and multilocational work, these categories may not be effective enough at grasping workplace mobility. The next section explores verbal data (drawn from qualitative interviews) for a better understanding of where knowledge workers perform their work in Kitchener, Cambridge and Waterloo.

5.4.2 Interviews with Knowledge Workers

Semi-structured, in-depth interviews with 25 knowledge workers reveal that work is indeed mostly performed at the usual place work — typically the official office. Knowledge Worker 2 worked from her home office, which for her is the official workplace. Notwithstanding this, these interviews also reveal that these usual, designated workplaces are one of a number of key nodes in the spatial trajectories of knowledge workers. While these other locations may not be considered "predominant" work locations, working from these locations is frequent enough throughout the day and the week to warrant empirical attention.

To illustrate the complexity of where work *actually* takes place — and to illustrate the types of work activity that census-type data are not yet capable of capturing — six knowledge

⁹ For the official census guidelines, please consult <u>https://www12.statcan.gc.ca/census-recensement/2016/ref/dict/pop110-eng.cfm</u>

workers were singled specifically for this chapter (excerpts from interviews with other knowledge workers follow in the next chapter). Their work matches the occupations outlined in Tables 4 and 5. The findings are organized by three key themes: digitization (coded as *technology dependency*), flexibility (coded as *nature of work*) and mobility (coded as *travel for work*).

Workplace location based on technology dependency

All of the interviewees are rather heavily dependent on technology. Knowledge Worker 4 is a researcher and project manager employed full time at a think tank affiliated with the University of Waterloo. She is always connected to the Internet, mostly for coordination purposes with her employer, who is a highly mobile and multi-locational worker. Given that one of her key roles is organizing events across Canada, she needs to be able to manage a wide network of clients, partners, but also caterers, traveling agencies and other actors involved in these events. Also given the geographical distribution of said networks, she often manages these relationships across different time zones:

"So, I check my phone all the time. Oh, you kind of — with work, with the kind of work I do, I guess just because a lot of the people I work with are actually in different time zones... So one of our project leads is in Vancouver, so their 5pm in the day is 8pm for us. So work doesn't actually stop at 5pm, so I'll be, you know, answering emails or doing things at all hours of the day which is also nice, because I can sleep in on many days if I want to. I can set my hours and come in a little later the next day, as long as things really get done." (Knowledge Worker 4)

In other words, her reliance on technology — as well as her employer's hands-off style of supervision —provide flexibility and she is able to customize her hours. What is more, her reliance on technology suggests that she works at times beyond set hours, and beyond the designated workplace. Indeed, she lists the airport, hotel rooms and "random places like lunch spots, or cafés — honestly, like anywhere" (Knowledge Worker 4) as places where she performs her work. More importantly, technology enables virtual proximity to her employer and her collaborators, therefore reducing the need for collaboration and supervision at the designated workplace. Nonetheless, she stated that she "predominantly" works from the office, even though she also "very frequently" works from home.

Knowledge Worker 1, is co-founder and lead engineer at an advanced manufacturing start-up. Though she is highly dependent on technology, she limits her mobility *voluntarily* to *primarily* the office and the home and, on occasions, a café. It is important to note that in her case "the office" is a temporary community space, which is part of Communitech. Because her start-up requires multiple networks for marketing purposes, she spends a lot of time emailing, calling potential customers, managing orders to fifty countries across different time zones. What is more, she spends a lot of time writing research papers with her co-founders and establishing a presence online: "if you're not among the first five organic searches on the first page of Google, you're nobody" (Knowledge Worker 1). Her start-up also relies a lot on digital platforms for sales, such as Shopify (a digital platform that mediates sales between producers and customers¹⁰):

"...we rely on them and their stores, which are all online. Shopify, of course. We rely on our own online store. I've got a series of apps that help me keep in touch not only with my team, but also our customers, so again that would be things like Shopify, Orderhive for shipments, which is the part you get into when you've sold the product — it's the fulfillment procedure that actually takes the most time now if you wanna get more hardware." (Knowledge Worker 1)

These applications are installed on her phone and laptop. She carries her phone with her at all times, and "in the best-case situation" will have her laptop as well, so as to help customers with orders that need processing "right away" (Knowledge Worker 1). She also uses communication software like Slack to stay connected to her team. Interestingly, even though she is technology-dependent, and agrees that meetings and calls could take place anywhere, she prefers to go to the office. She works at home, at airports, and will spend at least half a day per week working from a café for a change in atmosphere:

"I do like coffee shops a lot if I'm doing very focused work. Uhm, definitely and it's a change of scenery. You start to feel claustrophobic at the office after a while, so I do take any opportunity that I can if I don't need to be directly at the office or collaborating — if I don't need to be elsewhere." (Knowledge Worker 1)

As a co-founder she feels compelled to be at the office along with her other teammates, and there is a sense of responsibility to use the space and facilities — especially the hardware required for

¹⁰ Shopify is also a major office occupier in Waterloo, having recently transformed a former distillery into a class A office space. It is important to mention that Shopify declined repeated requests for interviews and their facilities are difficult to enter without a formal invitation.

the assembly of their product¹¹. These factors keep her more attached to the office than Knowledge Worker 4, even though they equally rely on technology to communicate with their respective networks. She also works from home, writing emails and making calls (to clients in different time zones) before and after "official hours". Interestingly, to Knowledge Worker 1, the café is a place for focused work, and she finds the office too distracting.

Knowledge Worker 5 is an accountant and senior manager at a brand-name financial service company. The company has recently gone "agile", meaning that there are no designated desks and all employees work on laptops to facilitate internal mobility. The company is paperless, so all activities have been digitized including meetings with colleagues employed at the same location:

"I have a lot of meetings. A lot of our meetings though are over Skype. It's actually rare... it's more often than not over Skype. Not everybody is in the office. People work at different office locations as well. [If there are] clients closer to the Burlington office, so might work there for the day, or the Toronto office for the day. I might visit the Ottawa office for the day... we can work wherever we want. A lot of meetings, but a lot of Skype calls." (Knowledge Worker 5)

According to Knowledge Worker 5, workers employed at his firm are not required to work from their Waterloo location. In fact, if clients are in nearby towns, his colleagues may choose to work from their location or the company's offices closest to the client. This is key example of multi-locational work between multiple "official" workplaces. More specifically, a "usual place of work" may signal more than one location.

It is also interesting to consider that employees at an established company are more mobile and dispersed than employees at a start-up, though noting the nature of their respective professions, it is not that surprising. Indeed, start-ups require more time together, "hunkering down" to develop their product, while accounting and consulting are typically client-facing occupations. So, while both workers are dependent on their digital devices, they have different experiences and needs to be at the designated workplace due to the nature of their work. This is

¹¹ I followed up with Knowledge Worker 1 two years after this conversation. Her start-up has since "scaled up" and moved to a new office space, for which rent is quite high. This is a big reason why she insists on working from the office, even though she technically does not have to. What is more, she criticized the municipal government for not improving access to the office real estate market following "graduation" from Communitech. She stressed that prices (in 2019) have become too high for most start-ups to afford. Including "designated spaces" like Catalyst 137, a former warehouse-turned-coworking space marketed to start-ups in KCW. See chapter 8 for details.
important because it challenges the assumption that *all* knowledge work is limitlessly mobile and multi-locational.

Workplace location based on the nature of work

In the case of Knowledge Worker 5, the nature of his work dictates the amount of time that is spent at a designated location. He manages his own accounts and works on his own schedule. He works at client sites, and also "pops around from one to another" visiting teams that he supervises.

"There's weeks when I don't come here. I'll have three or four clients that can be in Cambridge, Kitchener, Waterloo, so I can go to one in the morning and one in the afternoon and never touch base here... It's quite cyclical. I'm not here [the office] a lot during this time, so Jan, Feb, March, April. But in the summer, I'm here almost every day, unless I'm out for coffees and marketplace activities... So I'm rarely here. Basically, I'm with the client and doing my review and tasks at client sites, but I'll come by here in the summer, unless people are on vacations." (Knowledge Worker 5)

During this four-month period, he works 12-14 hours a day, and has to work on weekends. However, he dislikes working from home because he finds it isolating and lacking the appropriate set-up (e.g., double monitors). He also dislikes the office because he finds it outdated and far away from clients and amenities. At the time of this interview (2017), the office was empty, apart from the administrative staff, because most employees were on site. The company was preparing for a move to a new, repurposed and much smaller facility in downtown Kitchener as part of a re-branding strategy. The new office would include walking stations, flex (open, semi-open and closed) spaces, ad-hoc meeting places, booths, lounges and cafés, as well as a gallery to showcase fin-tech products. Knowledge Worker 5 seemed enthusiastic about these changes:

"It's going to be one of its kind. It's an old manufacturing warehouse type, there's a smokestack that's going to be branded with [company name] and it's all going to be exposed brick and just not your typical accounting firm building like this one sitting off the 401. It will be downtown and quite cool." (Knowledge Worker 5)

A manager (tax services) at a rival company, Knowledge Worker 21, spoke of similar changes. However, this company's changes involved a relocation from Kitchener to the research and technology park in Waterloo. This company was also abandoning a purpose-built facility for a smaller, "cooler" space in Canada's first zero-carbon building — also as part of a re-branding strategy. This new space (like that of its rival) has a combination of flex-spaces, ad-hoc meeting rooms, booths, lounges and cafés. Knowledge Worker 21 "switched lanes" from audit to team management and tax advising services, and is also teaching at the nearby University of Waterloo twice per week. With respect to his spatiality, he stated that he works from the office 80-90 percent of the time and will sometimes work from home and sometimes from the client locations. As for his team, he said:

"I think in our tax and advisory groups it's a mixed bag. It really does depend on the individual. I mean, personally in our tax group I'd say people are working from home 10-15 percent of the time... Believe me, we have an infinite number of ways to get in touch with each other, so that's never an issue, but one thing that I have noticed recently since we moved into this new space is the number of meetings that we have and clients in our office space now has increased a number of times. We bring clients to our space versus our old office because we didn't have near the number of meeting rooms. It wasn't as open, wasn't as flexible. It wasn't as beautiful and you weren't as proud of it... So you may have individuals that, you know, maybe would have worked from home and then gone to the meeting with the client in their space and then spread from home, from the neighborhood. Now you see people — maybe they're coming into work from here for the day to have to have meetings in our office as opposed to going elsewhere." (Knowledge Worker 21)

Two key considerations emerge here: 1) spatiality varies across teams, and 2) there are cultural changes happening at the company level to encourage employees to use the facilities, especially for meetings. Indeed, another conversation with this company's innovation and real estate consultant (see Chapter 7), revealed that the main purpose of the new office is to reflect and adapt to broader changes in ways of working, which include demographic changes (the rising number of millennial employees), changes instigated by digitization in the nature of accounting as a profession (transition to fintech), and the need for shorter leases and flexible spaces with an emphasis on social interaction. Indeed, Knowledge Worker 21 confirmed that "service lines are no longer split" and that people move about and interact differently:

"[We have a] clean desk policy, always moving about whether you're working at different areas of the office or maybe you're working more from home. There's definitely been an increase in the amount of remote work that we are doing here, so I'd say those are the biggest shift. We do really want to focus on the culture... And I think this new office is just another way that we express that and to help to retain those that you know see the vision that we're looking to attain." (Knowledge Worker 21)

These cultural changes may be experienced by Knowledge Workers 5 and 21, but in the case of Knowledge Worker 6, she prefers to manage her software development company more traditionally. She considers herself a mobile and flexible worker, and as CEO is expected to attend events and have regular meetings with her board as part of her role. In other words, the

nature of her work demands mobility. She is in meetings 60 percent of the time, and the rest of her time is spent on her laptop. She "always" works on weekends and on these days works from home. On a typical workday she will also work from home in the evenings. In addition to the office, the home and client locations, she will work at conferences, which she attends about a dozen times per year: "Conferences — I'm working there all the time. Basically, I work constantly, wherever I am. There is no stop." (Knowledge Worker 6). As for her employees, while there are remote workers (and working from home is an option), she prefers to have them on site:

"I would say my preference is to have them on site, but, that said, we have a number of people who do work from home from time to time. And then we also have remote employees who work most of the time from their homes, so if you're living in the Waterloo region, the preference is for you to come in the office and work. We actually also require remote employees to come to the office at least a week a month." (Knowledge Worker 6)

The remote workers at her company work in sales, but there are also a few in professional services. What is more, these workers have managerial roles and are therefore responsible for managing their team tasks and delivering on time. This is the fourth company she has managed, and she finds that, in her experience, limiting workplace mobility positively affects productivity, culture and communication between employees. She is generally skeptical about flexible and mobile work, and sees it as a good thing "up to a point". In her view, a strong culture should revolve around transparency and giving employees freedom and flexibility to pursue ideas. It is interesting to see how a software company, which is in theory more flexible and mobile, is actually encouraged by management not to be.

Workplace location based on travel

As already mentioned, Knowledge Worker 6 travels often for work — locally, regionally and internationally. She has, on average, five meetings per day, some of which take place out of the office. that year she had traveled 18 times, mostly to Western Canada: "this year I'll probably do 25 trips and they tend to be concentrated January through June and then September through November" (Knowledge Worker 6). These trips consist of conferences and marketplace activities. She takes personal trips twice per year and "always" works. Whilst on these personal

trips, she will work "on the beach, my hotel room, in the hotel lobby, in a restaurant [laughs]" (Knowledge Worker 6).

Knowledge Workers 4 and 1 also travel often for work, and will work at the hotel room or lobby, or at a restaurant when away. Both the frequency and scale of travel vary from high to low depending on the stage or phase of the project or company:

"In the past year I've been to Ottawa probably five times. I've been to Vancouver twice, Calgary once, Montreal once, Halifax once, Toronto maybe six times... Um, I feel like there is something else but that's the ballpark. I don't know if that's a lot or not... This past month has been quieter just because we wrapped up the round-table portion of our project and the round-table was the reason I was traveling." (Knowledge Worker 4)

In other words, mobility is project dependent. Interestingly, Knowledge Worker 4 feels that compared to others her travels are not as frequent. In the case of Knowledge Worker 1, her travel patterns are tied to the phase of her company:

"Let me give you an example: there is one a large period of time when we were doing manufacturing, so I had to be in China for that you know? Ever since then things have started to calm down a little bit and become a little less dynamic, which is a good place to be actually as you sort of start self-sustaining and things start to normalize. Then things do become more fluid especially once you start hiring more employees and they can take on more managerial roles." (Knowledge Worker 1)

In addition to China (where she would spend three to four months at a time), she has also travelled to San Francisco, Berlin and Switzerland for at least a week at a time. This means that while she performs most of her work at the usual workplace — her office at Communitech — she is also absent for months at a time, depending on the stage of her company and the role she has at a given time. This is another characteristic that all of these workers share: they all have multiple roles that they juggle on top of their "official" occupations: "I mean, it's very, very dynamic. You wear lots of different hats" (Knowledge Worker 4).

Knowledge Worker 2 is founder and CEO of her own software company that was, at the time of this interview (2017), in its developmental stage. She has had experience working at other software companies in Kitchener and Waterloo and is part of the start-up ecosystem. What is more, she is based in Cambridge and predominantly works out of her home. However, because she finds that working from home makes it difficult for her to set a time to stop, she will frequently travel locally to meet with collaborators and potential clients:

"I went from working in an office to working on my own at the house, so I probably take any opportunity to meet in person. So, I might push a little more than the average person nowadays, right? [laughs] The average person would just say 'let's jump on a call', but I'm like 'let's meet in person'." (Knowledge Worker 2)

She "visits" Communitech on a weekly basis and has applied for a temporary workplace at another incubator. She hopes that will give her more options, or rather alternatives to working from home. Interestingly, she finds that working from home makes her feel unproductive and as a result she will work more: "so that's the one thing that I'm trying to struggle with, is to still be able to have that off time" (Knowledge Worker 2). She also frequently works at cafés for a change in atmosphere (like Knowledge Worker 4) and will also work on walks with her dog. Interestingly, she does not consider these trips around Kitchener and Waterloo as "travel for work" and claims not to travel for work in general. However, her partner travels for work frequently, and she often accompanies him and works from that location. In other words, there appears to be some confusion as to what constitutes "travel for work". And so, even though she does work on travels, these trips are not work-related and are therefore dismissed.

5.5 Discussion and Conclusion

The main purpose of this chapter has been to explore census place-of-work data and verbal data (from qualitative interviews) for evidence of workplace mobility. More importantly, the aim has been to confront classic data sources (typically used by economic geographers and urban planners) like the Canadian census place-of-work, with a qualitative approach in order to identify what these existing data lack.

Indeed, while census data do confirm that work predominantly takes place at the "usual place of work" and corroborate the findings of other scholars based on census-type data, there are limitations that qualitative interviews do highlight. Although the interviews complement this data well and show that work does indeed take place at the usual workplace, they also show that work *extends* beyond the official workplace to include a range of other, unofficial spaces other than one's home. Indeed, census data do not capture multi-locational work between official workplaces (Knowledge Worker 5), the frequency with which locations are changed during the day (Knowledge Workers 2, 4, 6), and the type of activity that tends to occur at the "usual place of work". To elaborate on the latter, these interviews reveal that offices are changing to

accommodate the more social aspects of work (Knowledge Workers 5, 21), while other places like cafés and libraries — are used to perform tasks requiring more concentration (Knowledge Workers 1, 4).

What is more, census data do not capture the effect that technology dependency has on work extending beyond designated workplaces *as well as* designated hours. Another interesting finding is that these blurring lines seem to be generating some confusion that affects the ability to separate work activity from non-work activity. Similarly, work performed "outside" official boundaries may not be cognitively categorized as work (Knowledge Worker 2). This is important, because these blurred definitions are less likely to be reflected in questionnaires that clearly define the boundaries between work and leisure (an issue also raised by Felstead and Henseke, 2017; Shearmur, 2020). While research using census-type data reveals that changes are slow, the subtle shifts towards mobile and multi-locational warrant empirical attention (see for example Putri and Shearmur, 2020). Still, there elements of workplace mobility that can only be observed qualitatively for the time being.

At the same time, the census place-of-work data do tell an interesting story about the economic palette of the tri-city area. For example, a significant portion of knowledge workers can be found in the Manufacturing sector, although relative to overall employment within the industry the portion of these workers is lower than in other industries. What is more, the data show that Kitchener has surpassed Waterloo in the number of knowledge-intensive occupations.

With respect to place of work status, these data show that Professional, scientific and technical services (4) have the highest proportion of homeworkers compared to other sectors in all three cities. They also show that occupations in Finance and insurance (52) are quite attached to the "usual place of work" — the same with occupations associated with Finance and insurance like Business, finance and administration (1). However, when confronted with qualitative interview data (specifically Knowledge Workers 5 and 21, employed in these sectors) the concept of the "usual place of work" slightly changes, or rather *extends* across multiple official locations that may not necessarily all be in Kitchener, Cambridge or Waterloo.

What is more, the interviews reveal that there are fundamental changes in how spaces are being used for work. For example, since service lines are no longer as fragmented as they have been in traditional offices, layouts have become more open and flexible, encouraging mobility even at the office scale. Another interesting finding is that brand-name companies have changed

their layouts *and* locations in search for more flexible and "cooler" spaces so as to boost recruitment.



Figure 3. Themes emerging from the verbal (interview) data.

Also interesting is the increasing importance of aesthetics and re-branding in order to encourage workers to *use* the offices (Knowledge Workers 5 and 21, for example). This is further explored in Chapter 7. It is also important to highlight the multiple geographical scales that affect how and where work is being performed. For instance, Knowledge Worker 6 very often travels to conferences, and will work in hotel rooms, lobbies and so on. Given the frequency of travel (about a dozen times per year), it is safe to say that she performs her work beyond the boundaries of the traditional office, even though she personally feels mobility ought to be restricted for productivity reasons. In her case — as for a number of other interviewees work also happens during non-business travels. Interestingly, for Knowledge Worker 2 it is difficult to acknowledge that the work activities performed whilst on vacation count as work. This is further explored in Chapter 6. Another interesting theme is that of the densification of work. Even in the case of the engineer (Knowledge Worker 1), the work has become increasingly dynamic, and she herself wears "multiple hats" that require different levels of mobility and flexibility. This suggests that mobile work may not only be project and activity-dependent, but also role-dependent of which there are many. Indeed, 24 of these knowledge workers (the exception being the visual effects compositor) all have multiple roles that they juggle as part of their paid employment. This suggests that place still matters, but the degree to which it keeps employees *fixed* in space is arguable.

To conclude, the qualitative interviews show that knowledge work indeed sprawls beyond a single location, to include multiple "official" workplaces as well as the home, client sites, cafés, hotel rooms and so on. What is more, due to their dependency on technology, work time is extending beyond regular hours, and therefore also beyond regular spaces for work throughout the day. A number of these workers "always" or "regularly" works on weekends, as well as in the evenings at home. In sum, though qualitative interviews complement census placeof-work data, they significantly nuance our understanding of work location. For census data to capture this, quantitative surveys need to be better adapted to the complexity of workplace mobility.

Chapter 6: Where are the knowledge workers? The case of Silicon Valley North in Ontario, Canada

This chapter was co-authored with Richard Shearmur and will appear in a Springer peer-reviewed edited volume titled "New Workplaces: Location Patterns, Urban Effects and Development Trajectories" (ed. Stefano di Vita, Ilaria Mariotti and Mina Akhavan), expected to be published in February 2021. I contributed 80 percent of the effort towards this chapter, while Richard contributed 20..

The previous chapter highlights the benefits, but also the limitations of research based on censustype data in deepening our understanding of workplace mobility. It concludes that, for the time being, qualitative approaches are better suited to build more knowledge on the topic. This knowledge can then be used to make adjustments to census questionnaires in order to better grasp the complexity of workplace mobility and measure its distribution across multiple geographical scales.

The purpose of this chapter is to contribute to the discourse on changing workplaces in the knowledge economy, by focusing specifically on workplace mobility. Drawing from the experiences of 25 knowledge workers in Kitchener, Cambridge and Waterloo, Ontario in Canada, this chapter highlights changes in the use of space for work, as well as changes in how spaces and work are being defined by workers. These insights suggest that the dominant paradigms, which inform our understanding of where work takes place in cities, need to be rethought. Finally, by exploring changes in work location that were underway prior to the Covid-19 pandemic, these findings also provide some insight about how workplaces are likely to look once the pandemic is resolved.

6.1 Introduction

Even before the Covid-19 pandemic, how and where we work was changing. Setting aside the massive – and probably temporary (Calbucci, 2020; Shearmur, 2020) – shift to on-line work in March 2020, ubiquitous wireless technologies, with their ever-expanding possibilities, have broadened the geographical scope of everyday working lives. A growing number of workers, especially knowledge workers, can seemingly perform their work at any time and at any place, provided they are properly equipped with the appropriate device, digital application, and decent

Wi-Fi connection. This enables work to be performed at different locations (beyond a designated, or fixed, workplace), between locations (on-the-go), and at times even at multiple locations simultaneously (virtual work and teleconferencing). In short, it is often assumed (by commentators who are themselves mobile) that knowledge work is spatially unbound: Cairncross's (1997) prophecy seems to have belatedly come true.

Of course, the death of distance only *seems* to have come true: even though large proportions of the workforce adapted to working from home because of the Covid crisis, the absence of physical movement, of meeting people, and of co-presence has highlighted the important roles they play. Workplace mobility – the combination of different work locations that enable (depending on time and place) inter-personal contact, isolation, remote connection and, when necessary, social distancing – is likely to increase as working worlds adapt to the new normal. This chapter focuses on the state of mobile work and of work locations prior to the Covid-19 crisis amongst a group of young(ish) knowledge workers in a region recognized for its concentration of technological know-how: we describe these work practices and assess what they can tell us about the likely future of work location.

The impact of digitization (and digital technologies) on work has been the subject of ongoing inquiry across different disciplines: broader media accounts have cited the many benefits of mobile work, which include more flexibility and freedom, creativity and collaboration, and potential for entrepreneurship and innovation. Such ideas have gradually trickled into policy discourses, aiming to uncover the most effective ways to support and anchor "digital nomads". But are all knowledge workers spatially unbound? Is mobile, multi-locational work prevalent, or is it just more feasible than before? Are there only benefits associated with mobile knowledge work, or are there pitfalls, too? Finally, if knowledge workers are less bound to fixed locations, how is this changing the use of space for work?

New ways of working warrant critical attention not only because they affect how knowledge work is organized (managed, supervised and exploited), but also because they affect *where* it is performed. This is of concern to urban planners and economic geographers, whose understanding of the urban economy has hinged on the assumption that work has a fixed location: the ability to locate and establish physical boundaries around a sector or an industry enable planners and policymakers to plan for performance. If knowledge work is indeed multi-locational, then how can cities adapt to these changes — and should they? Recent studies show

that the inability to locate where knowledge work is performed is becoming quite the administrative conundrum for planners (Di Marino and Lapintie, 2017, 2018; Di Marino et al., 2018). At the same time, available data suggests a gradual rather than a sweeping change: most knowledge workers continue to work from a fixed place of work, either an office or home (Putri & Shearmur, 2020).

The purpose of this chapter is to contribute to the discourse on changing workplaces in the knowledge economy, by focusing specifically on workplace mobility. Drawing from the experiences of 25 knowledge workers based in Kitchener-Waterloo, Ontario in Canada (also known as Silicon Valley North), we show that mobile and multi-locational work does indeed occur. We show that these new ways of working affect not only the use of different spaces for work, but also how spaces *and* work are being defined. This will affect how workplaces are studied, understood and planned for.

This chapter consists of this introduction, a brief overview of key literature, an overview of data and methods, a section on findings and finally a discussion and conclusion. We show how qualitative approaches to the study of workplace mobility complement existing research, as well as tease out new themes and considerations that will improve how places of work are understood and empirically approached.

6.2 Literature Review

In recent years scholarship on the mobility and multi-locality of work has grown (Elliott and Urry, 2010; Flecker, 2016; Nelson et al., 2017; Taylor and Luckman, 2018; Thompson, 2019). This interest is rooted in broader phenomena such as the ubiquity of wireless technologies, the increasing flexibility (and casualization) of work exacerbated by the digitization of work and work processes, and the global shift towards a knowledge-based economy. Scholars across disciplines have tackled the mobility of work from different angles: managerial and organizational, sociological and spatial, among others. This section briefly outlines the key themes concerning *spaces* of work that emerge from this growing body of research.

Management and organizational studies (MOS) have revealed that a growing number of office-based occupations are less rooted in fixed locations and tend to be mobile and multi-locational (Felstead et al., 2005; Perry and Brodie, 2006; Hislop and Axtell, 2007, 2009;

Vilhelmson and Thulin, 2016; Koroma and Vartiainen, 2018). Ubiquitous mobile phones and other handheld devices, coupled with the digitization of work, enable workers to perform their work on-the-go, anywhere at any time. This broadens the geographical scope, or rather the spatial trajectory, of many professions beyond the office to include also the home, client locations and other spaces visited whilst travelling.

The growing popularity of "third spaces" — which include coworking spaces and makerspaces, as well as cafés, libraries and other spaces of a more open, public nature than traditionally associated with office-based work — has also been highlighted (Kingma, 2016, 2018). It is generally considered that workers' wireless mobility enables "nomadic work" (Ciolfi and De Carvalho, 2014; Thompson, 2019). Such workplace mobility is most often associated with knowledge-intensive professions, due to the intangible, symbolic nature of their work (Vilhelmson and Thulin, 2016; Jarrahi and Thomson, 2017; Nelson et al., 2017; Aslesen et al., 2018), although the *most* mobile workers are those in traditional sectors, such as transport and construction, that have never been locationally fixed (Putri & Shearmur, 2020). The difference between knowledge workers and traditionally mobile workers is that workplace mobility is a relatively novel phenomenon for the former, and that it is digitally enabled.

Mobilities scholars examine the mobility of work in a context of an intensifying need for "multi-presence", i.e. the practice of multiple mobilities (from physical to virtual) at the same time (Kesselring, 2006; Urry, 2007; Elliott and Urry, 2010; Kesselring, 2015; Koroma and Vartiainen, 2018). These scholars argue that the need to be mobile has been both enabled and exacerbated by modern technologies — as has the expectation for workers to be available and "networked". Studies show commutes and travel time are frequently used for work (Lyons and Urry, 2005; Lyons et al., 2007; Axtell et al., 2008), which therefore includes trains, airplanes and cars as potential (albeit temporary) workspaces (Lassen, 2006, 2009; Hislop, 2013). This blurs the temporal and physical boundaries that exist between personal and working lives (Axtell et al., 2008; Sørensen, 2011; Cousins and Robey, 2015).

Meanwhile, economic geography scholarship — traditionally concerned with the location of economic activities — has not adapted its dominant paradigms on work location to reflect this dynamic spatiality of knowledge work. While the probability of complex space-time geographies has been discussed — albeit conceptually — since the 1960s by geographers like Torsten Hägerstrand and Doreen Massey (see also Thrift, 2004), empirical studies based on aggregate

sectoral data show that little has changed in terms of where knowledge employment is located in cities (Shearmur and Alvergne, 2002; Shearmur and Doloreux, 2015a). At the city level, central business districts, buzzing neighborhoods, and transit hubs still concentrate knowledge-intensive employment (Shearmur and Coffey, 2002; Duvivier and Polèse, 2017; Duvivier et al., 2018).

However, studies of project-based, creative work highlight the multi-geographical nature of these professions, stressing that workers frequently move between projects and locations (Vinodrai, 2010; Vinodrai and Keddy, 2015). Recent studies on the geographies of digital skills also highlight a more complex spatiality (Richardson and Bissell, 2017). They also examine how the practice of coworking and shared digital work leads to work sprawl beyond a fixed location (Richardson, 2017).

Still, skepticism persists, and likely due to lack of sufficient empirical evidence to warrant a paradigm shift on the location of work at the city scale. Scholarship relying on censustype data shows that changes, although present, are rather slow to take root (Felstead, 2012b). A recent study based on a more detailed survey of mobile and multi-locational work in Europe shows that irrespective of advancements in wireless technologies, knowledge workers continue to work predominantly at their employer's location, though it is likely that these professions will be working more from home in the future (Ojala and Pyöriä, 2018). Indeed, although these studies show that there hasn't yet been a "revolution" in established patterns of employment, subtle shifts do exist and warrant empirical attention (Putri and Shearmur, 2020). It is possible that the lack of nuance in studies of work location are a reflection of the limitations of existing data, methods and the concepts that underpin them (Felstead and Henseke, 2017; Pajević and Shearmur, 2017; Shearmur, 2020).

It is not necessary to postulate an 'either/or' scenario: data revealing the continued prevalence of fixed work locations are not incompatible with studies revealing that knowledge work is increasingly mobile. Indeed, even if knowledge workers now work during their commute, work from home, and perform micro-work whilst waiting for lunch, this does not mean that they do not spend large proportions of their worktime within a given office building, campus or neighborhood. Work locations may have radically expanded, but they may – more modestly - have become fuzzy without losing their traditional geographic focus.

Canadian census data¹² show that between 1996 and 2016 the proportion of high-order service workers declaring no fixed place of work remained constant at about 8%, with an increased proportion working from home (up 5% to 20%) and fewer working at a fixed place outside the home (down 5% from 77%). These data therefore illustrate some changes but hardly a revolution – particularly the rise in work from home, which has been accentuated, but not triggered, by the Covid crisis. Of course, they do not capture the "fuzzy" mobility of high-order service workers during their work day: it is likely that those working "at home" and those working in "fixed places" move about during the day whilst staying centered on a fixed work location – and this could be what scholars who study workplace mobility are in large part observing.

The question of the population-level prevalence of workplace mobility remains unresolved: current data are unable to measure it in all its dimensions, so the notion that knowledge work is increasingly mobile is driven by anecdotes, media stories and case studies. Such studies are important, though, because the very concept of workplace mobility remains vague, and cannot be measured until it is well understood. New evidence illustrating changing everyday work experiences continues to surface (Flecker, 2016; Taylor and Luckman, 2018). Given that most of this scholarship — especially in MOS and mobilities — is based on European experiences, this study explores the Canadian context for some of these themes.

6.3 Data and Methods

Two key assumptions undergird this study: 1) in a knowledge-based and rapidly digitizing economy, work experiences are shifting, and this shift includes changes in the use of spaces for work; 2) knowledge workers are increasingly spatially detached. To examine if and how these changes are occurring in Canada, this chapter focuses on knowledge workers in Kitchener, Cambridge and Waterloo (KCW) in Ontario — also known as Silicon Valley North. KCW is part of ongoing federal and provincial policy efforts to concentrate knowledge-intensive activities along a 112km stretch between KCW and Toronto. Dubbed "Innovation Corridor", this strip is meant to strengthen the link between KCW's bourgeoning high-tech start-up community and

¹² Special tabulations : approximately 1.5% work outside the country, and for the sake of this sentence these have been aggregated with the 'fixed place outside the home' category.

Toronto's business and financial services to rival California's Silicon Valley. What is more, the Innovation Corridor is one of five national "superclusters of innovation", set to specialize in "next gen manufacturing" (Government of Canada, 2020). It is important to note that Waterloo is the home of Blackberry (formerly Research in Motion), and Google Canada's new research and development headquarters are located in downtown Kitchener. Also, established companies in financial services (e.g., Deloitte) have abandoned their purpose-built facilities in suburban extensions for smaller, repurposed and "cool" spaces in downtown locations that they treat as protype "offices of the future".

A dual sampling strategy (criterion and snowball) was used to identify and recruit the 25 knowledge workers for in-depth, semi-structured interviews (see Chapter 3 for an overview). The interviews were conducted in person over a two-year fieldwork period, from February 2017 to April 2019, and lasted between roughly 30 and 90 minutes.

Questions targeted *where* knowledge workers performed their work, what they *did* at these locations and *why*. What is more, the workers were asked to comment on what *enables* them or *hinders* them to work in these spaces. The aim of the interviews has been to generate a better understanding of the extent to which knowledge workers can be spatially detached, and how this affects the use of space for work-related purposes. All interviews were transcribed and coded twice: once for existing themes in the literature (deductive), and a second time for new themes that emerge from the interviews themselves (inductive). The findings are discussed in the following section.



Figure 4. Key themes and code structure (deductive) — location.

6.4 Findings: Where do knowledge workers work?

The 25 knowledge workers discussed the nature of their work, their reliance on technology, their typical workdays, and, most importantly, the spaces where they performed their work. These spaces have been sorted into three categories: *official*, *unofficial* and *connecting* spaces.

Official Workspaces

All interviewees associate official workspaces with spaces where they are expected to be visible in their professional capacity. These spaces include the office, client locations and worksites. Knowledge workers in financial and real estate services list client locations among their most frequented official workspaces. This is not unexpected given the mobility that is an essential component of the work itself, i.e., auditing clients (accounting and tax services) and site visits (real estate). With the exception of one interviewee that runs her start-up from home, the remaining 24 interviewees are all employees of established companies, have an "official" office and spend a considerable amount of time on these premises on a weekly basis. Most of these workers are expected to show up at the office for team meetings and accessibility to colleagues.

As expected, the need to be at the office is also linked to the role, level of responsibility and the type of occupation. However, most work arrangements seem to be flexible: for example, team meetings are usually negotiated with colleagues on the basis of urgency and importance, which workers are then asked to attend either in person or to "plug in" via Slack, Skype, Zoom or other video-conferencing software. To maximize their time at the office, workers tend to have preferred days for office meetings, though these usually also hinge on the location and preferences of remote team members (across different time zones). Due to this organizational fluidity, most workers struggle to describe a typical workday.

"It seems to really depend on your manager. It depends a lot on how flexible your manager is... so I'm very lucky that my manager cares more about getting the work done than where I actually physically work, so I am able to move my hours around and work essentially wherever. That said, I do try to be in the office. Every Wednesday I'm in the office just because we have some team meetings that day. There's certain days where I'd look ahead in the week and if I know I have conversations coming up that would be better in person then I'd try and be in the office, but overall I can be quite mobile." (Knowledge Worker 10) Some workers are always required to be at the office. Reasons include company culture, the nature of work being performed, and the need for discretion or privacy when working with sensitive information. The latter is especially important for knowledge workers whose work can be broadly classified as "creative" (film) and "innovative" (software development). Contrary to popular belief, not *all* creative professions are spatially detached, visiting "cool" café-like open office space when they feel like doing so.

"Working in the film industry... um... like there's so many non-disclosure agreements and it's really strict with the file access and the servers and everything. So, unfortunately, although a lot of us want to work from home — and it should be possible because the work we do doesn't necessarily or shouldn't necessarily keep us in the office — but because of like working with Hollywood and big movies we must all be in one place." (Knowledge Worker 8)

Interestingly, while technology is considered an enabler of mobile work, in some cases it is also a hindrance. In addition to meeting "basic needs", such as having access to a strong Wi-Fi connection and working electrical outlets, there are also requirements when it comes to "tech specs". More specifically, some knowledge workers, especially in software development and videogame design, depend on powerful machines that cannot be moved between locations. As a result, they are bound to their workstations at the office.

"The video game industry is very different. It's a lot harder to do remote work because to run a video game you need to have a very powerful computer, which tends to be a desktop and so realistically the only place where you can have access to that is the office so everyone works from the office all of the time." (Knowledge Worker 9)

In website-building companies, like Google, the requirement to be at the office appears to be quite strict. Due to the sensitive nature of the work (and risks of leaks and corporate espionage), remote work is enabled but restricted to official *locations*. Workers can move around and within the boundaries of the office, as well as in-between offices. Moreover, brand-name companies with multiple locations across Ontario (and across Canada), encourage employees to visit and work from these locations in order to broaden the geographical range of their work activities (i.e., engage with a broader range of clients and colleagues). For some workers this is a decent way to balance personal needs (e.g., choosing to live in Toronto but to work in Kitchener). Indeed, working from "the office" essentially means working from multiple offices belonging to

the same firm. Meanwhile, for some knowledge workers, "the office" is a temporary desk at a client location:

"I have set hours that technically I need to be online, so 8:30-5:30 every day I have to be at the office, but that doesn't mean I have to be sitting at my physical desk at [client location]. I spend quite a bit of time working out of coffee shops when I'm in Toronto, [and] a little bit when I'm in Kitchener-Waterloo... My day is kind of all over the place given [that] we just rent a desk essentially." (Knowledge Worker 16)

In the case of this financial analyst, being online is equal to being at the office. Although her company is officially based in Montreal, they rent spaces either through clients (at client locations) or via coworking space providers like WeWork. It is the act of being connected and available for work-related purposes that is referred to as being at "the office". This suggests that "the office" could be a very loose term used to describe an "official" workplace.

Unofficial Workspaces

In keeping with the census data cited earlier in this chapter, the counterpart of the office is the home. Interviewees also identify holiday homes, hotels (rooms and lobbies) and other unofficial spaces such as cafés, libraries, even parks as temporary workspaces. With few exceptions, most workers are permitted to work from home at least one day a week. As with the work at the office, working from home is usually negotiated with the team or the employer. Family obligations, project demands, and the need for quiet space for concentration are among the factors listed as encouraging of working from home.

"I do a lot of work from home in the evenings, so I would say most evenings I'm doing a couple of hours or so, and then again I try to be in the office as much as I can in terms of my work... So I would say probably my evenings I mostly do a lot of work from home. Probably every other week I'm working like a day from home, but for the most part I try to be at the office." (Knowledge Worker 13)

Interestingly, even though this worker claims to be working from home once every two weeks, she *actually* works from home every evening and every morning before leaving for the office. When asked to describe their workday, most interviewees tend to exclude work activities performed early in the morning, such as checking emails and calendars (micro-work), making phone calls and arranging meetings (among others). Only when prompted did the interviewees

realize that they are indeed performing work over breakfast at home: "I try not to spend the first hour [at the office] checking emails – actually I wake up checking emails" (Knowledge Worker 13). Preparatory activities such as reading and minor administrative work are not always considered "work". However, activities like research and continuing education are considered work.

"Generally, [on] Sundays I plan the week ahead a little bit, and just get into my head of what's coming up. And what remains of worth, I'll spend several hours just doing that. Lately, because I've been doing my masters part-time, and part of it's related to a work project, there has been a lot of overlaps so I've been finding most weekends I do work for my masters, but then some of those hours I can count towards work, so it kind of blends together." (Knowledge Worker 10)

Few interviewees make a conscious decision to separate work time and leisure time — and, by extension, workspaces and leisure spaces. Those working with teams operating out of different locations (and time zones) find this distinction difficult to make.

"I get my daughter; I run and grab her and then go home and turn back on my laptop and my phone. And if our executive team is in San Francisco, obviously there's a time difference, so those days are a little bit longer, so answering emails up until midnight." (Knowledge Worker 13)

For most interviewees, the struggle to define what counts as work contributes to these blurring boundaries. As expected, technology is an enabler: most interviewees rely on one phone and one laptop for professional and personal use. The ease with which workers can now access communication channels enables them to perform certain tasks in unlikely places. "If there is a meeting taking place while I'm on vacation that's really important I will call into that meeting. Obviously, I still check my email while I'm away, so if it's an urgent email I will respond to it" (Knowledge Worker 9). One interviewee revealed that she checks and writes emails on the beach whilst on vacation (Knowledge Worker 6).

Spaces like cafés are generally used to perform minor, routine tasks or for brief meetings with colleagues and clients (with the exception of one interviewee, Knowledge Worker 1, for whom working at a café is an opportunity for work requiring more concentration). The decision to work from home or from a café is less based on the activity and more on a need for a change in atmosphere or "a different vibe" — including access to better coffee.

"Unless I'm building or working on a lot of collaborative things, it's the exact same setup as on a coffee station... a lot of the stuff is really similar to what I

would do if I was gonna go work at a coffee shop or work at home, like I have a home monitor and a home desk setup as well so it's pretty [easy] for me. I work at a coffee station or work at home on like a quieter day...There are a few coffee shops around me that kind of have a good vibe and I find that sometimes if I hit like a wall and I'm getting a little bit sluggish, or feeling a little bit slower, I do pop into a new coffee shop and the change of environment is really nice." (Knowledge Worker 15)

Alternatively, some workers choose not to work from home because of the amenities provided at the office: "When I'm in Toronto and I'm trying to decide between working from home and working from the Toronto office, I will often choose go to the Toronto office because the food is really good (laughs)" (Knowledge Worker 9). In this particular case, the employer offers gourmet meals, café spaces, gyms and libraries *at the office*.

Libraries are also used for work for hours at a time and are generally considered quieter than cafés. It is important to note that this is changing: libraries, like offices, are incorporating open spaces and cafés so as to attract more visitors. As a result, no matter where they are — the office, the home, the café or the library — workers cope with the lack of quiet space by listening to music or wearing noise-cancellation headphones. "It's a mental distinction sometimes between being in the office and not. I feel that when I choose to work [at the office] or work at a coffee shop, it's more me planning my own time, which is kind of nice" (Knowledge Worker 10). Essentially, for most interviewees the decision to work from a public space like the café or the library is made in order to regain control of their time.

"Sometimes I find the library is better. Even though they're encouraging more people to talk in the library, there's still that old sentiment that you can't talk in the library. So, I find it's generally quieter than other places, but I do work well with my headphones, so I find that helps me concentrate so even if it's a louder coffee shop I usually can manage fine." (Knowledge Worker 10)

Three important considerations emerge here: 1) unless the work activity is collaborative or requires intense concentration, the work setup is the same and can be performed in any space; 2) open layouts result in a need to compensate for the lack of available quiet, private spaces by adapting the activity to the space or by using more technology in order to get work done; and 3) official workspaces are incorporating amenities that offer the same perks (quality of food, vibe) so as to keep employees on site.

Coworking space providers like WeWork were discussed in the interviews but did not seem to be too popular among these workers. Renting coworking desks at client locations,

however, did appear to be common: "We rent space from one of our portfolio companies in Toronto, but we are not planning on opening a standalone [company] space" (Knowledge Worker 16). This suggests that coworking — not only as a design layout but also as means of generating revenue — is adopted by companies within their official workspaces¹³. This allows companies based elsewhere to establish a temporary presence in a place, avoiding the costs of standalone offices by renting spaces at clients' locations. This begs the question: *whose* knowledge workers work at *whose* offices?

Finally, the need to be available via multiple communication channels (Slack, Zoom, Google Hangouts and email, among others) is what drives work sprawl across unofficial workspaces:

"I find [travel] stressful in the sense you just can't — emails just keep piling up while you're at the conference so, both nights I — for the Ottawa conference — I just came back to the hotel and just powered through a little bit, so it's a bit of a challenge" (Knowledge Worker 4).

Hotels often turn into temporary workspaces because workers feel obliged to avoid a communication backlog and because they fear overflowing inboxes. This is also why work is performed in connecting spaces, such as moving vehicles and transit spaces.

Connecting spaces

Most interviewees disclose that they check emails or make phone calls whilst in transit or during travel. This includes cars, buses, trains and airplanes. While some hesitated to admit to working whilst driving, they did reveal that phone calls are frequently made especially over longer commutes.

"I make phone calls — my car has Bluetooth — but depending on the call I probably wouldn't. It's hard to call your customer and have like a serious call if you're only half listening. If it's a conference call for sure, yeah." (Knowledge Worker 15)

¹³ This also explains why there are so few coworking space providers like WeWork in KCW. The majority of coworking spaces are clustered around downtown Kitchener in former industrial spaces. Two of the largest and most occupied spaces are Communitech, a government-funded innovation hub, and Velocity, a university-run makerspace and tech lab. Velocity is an application-based program that provides space and equipment to students looking to develop start-ups; and Communitech grants temporary workspaces to start-ups for free, and only established, brand-name companies pay rent for a "fixed" desk. Velocity and Communitech share the same building.

Again, this reflects the need to be available and to avoid communication backlogs. Some interviewees feel that since the car is a quiet space, it is better suited for work-related conversations requiring more privacy. Bus commutes are usually shorter, less private and therefore used to check emails: "I will sometimes check my emails to kind of prepare and see if there's any fires that have to be dealt with right away" (Knowledge Worker 10). Interviewees that frequently commute between Kitchener and Toronto opt for the Greyhound or the GO Train (a regional train service) in order to have time work: "Traffic and parking downtown is such a hassle. And then I lose at least two hours where I can't do anything, because I'm sitting in the car driving versus like being able to respond to emails" (Knowledge Worker 16).

One interviewee commutes daily between Toronto and Kitchener, and works in the company-operated shuttle bus that transfers employees between the company's locations in both cities. The shuttle bus is equipped with Wi-Fi, and there is an expectation to use time whilst in transit to work:

"The bus ride takes about an hour and 45 minutes, and there's I guess about 20-30 employees from this office who live in Toronto, so the bus makes a couple of stops to pick up people at different locations. And we also have Wi-Fi on the bus, so it's pretty much treated like office space. Everyone is on their laptop and everyone is working." (Knowledge Worker 9)

In this case, by virtue of being run by the company, the shuttle bus becomes an official workspace in which workers are required to work even though they are technically in-between locations. A private space (one's own car), a public space (bus or train) and a company-run shuttle bus all become temporary workspaces — sometimes by choice, sometimes by necessity.

Work in the film industry is mostly project-based, and contracts usually last between three-to-six months, during which mobility is limited. However, these contracts themselves are mobile and workers often relocate to where the next gig is. Knowledge workers whose work is collaborative and client-facing travel more frequently. In the case of the financial analyst, the travel is near constant:

"On a weekly basis I commute and so I'll spend a day or two in Toronto... On a monthly basis I probably have at least one trip to another city where [company] has a strong presence... I would go and spend a couple of days in Montreal or New York or San Francisco or attend a conference somewhere every six week-ish. Once a quarter we as a whole team would get together and so we'll do an off-site for three-ish days and, umm, either one of the cities where we have a principal office, or we'll go somewhere more relaxing... I would go to one or

two big conferences a year so that is more substantive travel. And I would be gone for a week. A couple of weeks ago I had a crazy schedule where I went to Montreal, Toronto and Montreal and then home — it wasn't a fluke necessarily. The reason I did that was because I was judging a case competition in Kingston, so I added a couple of days in Montreal and worked out of those offices." (Knowledge Worker 16)

When travelling longer distances, interviewees typically perform work at airports (waiting areas, lounges) and on airplanes. Connecting spaces like trains and bus stations do not emerge as temporary workspaces for these knowledge workers.

6.6 Discussion and Conclusion: Blurred Lines and Blurred Definitions

This chapter explores *where* knowledge workers perform their work and *how* they use space for work-related purposes. In addition to exploring the extent to which workplace mobility can be observed in Canada, this chapter offers fresh insights on new ways of working pre-pandemic that should be considered in future research. What is more, by exploring changes in work location that were underway prior to the Covid-19 crisis, these findings provide some insight about how workplaces are likely to look once the pandemic is resolved.

Our study reveals that blurred work-life boundaries lead to blurring definitions of workspaces and of work. This is because knowledge work is no longer *only* attached to spaces traditionally associated with these types of occupations (i.e., the office). Indeed, work is performed across a range of official, unofficial and connecting spaces, some of which are used interchangeably based on need and the type of work activity. It is important to stress that the traditional office is not being *replaced*: rather, it is being *supplemented* by other places as work encroaches upon all moments (and places).

What can the situation described in this chapter reveal about the possible future of work locations? The majority of our interviewees are young (below the age of 35) and KCW is Canada's hotbed of technological change. Even in such a context, where new work practices are embraced, virtually no interviewee worked wholly from home before Covid-19 struck. Indeed, all interviewees speak of the need for face-to-face meetings, and much of the work mobility they describe is linked with the need to meet clients and colleagues. Furthermore, team meetings, confidentiality, access to objects and physical machines (such as powerful computers) all require

a more traditional workplace. Whilst many workers enjoy working from home one or two days a week, even these workers tended – before Covid-19 – to seek out libraries, cafés or other shared spaces like Communitech, for at least part of their home workdays. Such minor changes in location seem to offer a sense of ownership of time spent working (Knowledge Worker 10), as well as an opportunity to socialize after longer periods of isolation: "I went from working in an office to working on my own at the house, so I probably take any opportunity to meet in person" (Knowledge Worker 2).



Figure 5. Emerging themes — location.

To the extent that it is possible to foresee how work practices for traditional officeworkers will evolve, then the picture that emerges from these interviews is a reasonable place to start. The "office" – a space where teams meet, where key documents and equipment can be found, and where informal work-related discussions can occur in a confidential and controlled environment – will remain central to most working lives. Yet the office will increasingly be supplemented by remote work, remote meetings and other technologically mediated practices that can occur in a variety of physical spaces. Many more workers (i.e., not just tech-savvy millennials) have now become aware of remote technology's workplace potential: but, simultaneously, its drawbacks have been revealed, whether from the perspective of employees (ergonomics, lack of space at home, loneliness, difficulties in coordination, lack of work-life balance, surveillance concerns) or employers (management challenges, coordination challenges, acculturation of new employees, concerns with cyber-security, team morale). Paradoxically, the surge of work from home and the undeniable success – in an emergency – of remote work may reinforce certain aspects of the traditional office that had been taken for granted.

Broadly speaking, where people work today is similar to where they worked thirty years ago (Putri & Shearmur, 2020). However, at the margins, there has been considerable change: what used to be conceptualized as a fixed workplace ('the office') has become a fuzzy field of possibilities, usually centered on an office or a home, but encompassing many other work locations (Martins, 2015; Richardson, 2020). The Covid-19 crisis has accelerated this change but has also shed light on why (some form of) the traditional office – a place where people meet, where teams are constructed, employees acculturated, and coordination facilitated – is here to stay (Shearmur, 2020; Calbucci, 2020).

Chapter 7: The Tetris Office: flexwork, real estate and city planning in Silicon Valley North, Canada

A paper version of this chapter, of which I am the sole author, has been accepted for publication in "Cities", a peer-reviewed international planning and policy journal.

The previous chapter reveals that knowledge work is performed across a range of official, unofficial and connecting spaces, some of which are used interchangeably based on need and the type of work activity. It stresses that the traditional office is not being replaced as a result of workplace mobility, but that it is being supplemented by other locations as work permeates multiple spheres of everyday life. This has also had an effect on how companies have been using and restructuring their office space to mirror these new trends — namely, through the adoption of "flexwork".

This chapter delves deeper into the motivation behind the adoption of flexwork, how this has been affecting office real estate, and how planners have reacted to changes. Drawing from fieldwork and in-depth, semi-structured interviews with corporate consultants, real estate professionals and city planners, I show how flexwork translates into a demand for flexible leases, which landlords seize as an opportunity to extract higher rents. This exacerbates the need for flexibility (and workplace mobility), only this time for cost-saving purposes. City planners, while cognizant of this circular relationship between flexwork, flexible workplaces and rising rents, feel limited in their capacity to influence the real estate market. These insights are important considering the widespread adoption of flexwork at the onset of the Covid-19 crisis.

7.1 Introduction

Knowledge-intensive service companies are under mounting pressure to digitize (Mercer, 2019; OECD, 2019). Recent developments in modern technologies, as well as the use of digitized data to manage workflow, are said to offer opportunities for companies to explore the digital sphere for new product and service development, and upgrade their organizational structures. In order to digitize, companies must attract and cultivate digital skills. However, digital workers (especially millennials) have dynamic geographies (Moos et al., 2017; Richardson and Bissell, 2017). In

order to reflect this "new normal" (Taylor and Luckman, 2018), workplace strategies and cultures have also become more dynamic. Indeed, flexwork¹⁴ — flexible schedules and spaces used for work, as well as the ability to work remotely — has been gaining popularity across a range of industries, from biopharmaceutics to business services and consulting (Hislop, 2008, 2013; Kesselring, 2015; Sewell and Taskin, 2015).

However, contributing to these dynamic geographies is also a broader shift from fulltime, permanent work to casual work (part-time, freelance and project-based work), enabled and intensified by digitization (Cockayne, 2016; Nurvala, 2015). While these less formal styles of working tend to be associated with creative work (Vinodrai, 2010; Vinodrai and Keddy, 2015), they nowadays seem to be characteristic of a growing number of knowledge-intensive and office-based occupations (Kingma, 2018). This is paradoxical given that creative work — though synonymous with autonomy and entrepreneurialism — is also often associated with employment insecurity and dwindling institutional support (Boltanski and Chiapello, 2018; Fleming, 2017).

This paradox is reflected in the boom of coworking spaces across the globe. Championed by the digital elites of Silicon Valley, coworking spaces have been appropriated as a lucrative business model and office real estate strategy (Gandini, 2015). Google's playful coworking offices, for example, are generally considered model workplaces for "digital nomads" (Gandini, 2016). Indeed, coworking is a major component of flexwork, and companies have been looking to coworking providers like WeWork and Spaces for ideas on how to re-organize their spaces so as to attract digital talent. However, coworking as a flexible working arrangement is, at its core, a coping strategy deployed by creative workers as a means of sharing resources (space, materials, networks) and as an antidote to isolation. Therefore, the spread of coworking spaces across cities is often seen as a measure of "austerity urbanism" (Merkel, 2019; Peck, 2012).

Meanwhile, the attraction of talent, especially entrepreneurial, digital talent, continues to be of significance to cities — in Canada and beyond. More specifically, the importance of digitization and digital skills for economic growth has permeated economic development policy

¹⁴ It is important to stress that there is a distinction between flexwork and flexible working. 'Flexwork' is a corporate umbrella term that adopts flexible forms of working — remote work, multi-locational work and job sharing, as well as alternative work schedules and seating arrangements — as a corporate office management strategy, linked specifically to full-time, office-based employment. Other disciplines refer to this as 'mobile' and 'multi-locational' work, though these terms often encompass changes that have to do with uses of space beyond the official, designated workplace. Flexible working arrangements encompass the same styles of working — remote, multi-locational and so on — but are not necessarily tied to full-time paid employment. Rather, they are adopted by part-time, freelance and self-employed workers, not formally or permanently attached to a single employer.

discourses, thereby also becoming a concern for urban planners seeking to re-organize the terrain to better suit the digital economy. Digital skills are seen as essential for innovation, which has been a dominant urban and economic policy focus for decades (Asheim et al., 2007; Richardson and Bissell, 2017; Shearmur, 2012a; Van Deursen and van Dijk, 2014; Vinodrai, 2017b). These innovation-oriented urban development policies also stress the importance of creativity including creative ways of organizing work and spaces for work — in enhancing the attractiveness of places. If, however, these creative ways of organizing work and workplaces are fundamentally about managing costs and reducing risks, to what extent are innovation-oriented urban and economic development policies about austerity as much as they are about growth?

Drawing from fieldwork and in-depth, semi-structured interviews with corporate consultants, real estate professionals and city planners in Canada's "Silicon Valley North" — Kitchener-Cambridge-Waterloo (KCW) in Ontario — I highlight a circular relationship between flexwork, the demand for flexible workplaces and rising office rents. More specifically, flexwork as a talent attraction strategy has raised the demand for flexible and short-term leases, which, in turn, has exacerbated office rents. Ironically, these higher costs intensify the need for flexwork, only this time as a cost-saving strategy. This suggests that flexwork has become, above all, a real estate play and a feature of today's deregulated and financialized real estate market. It resembles a Tetris game: offices are broken into smaller pieces and then re-assembled on a need-to basis for the highest yielding fit. The purpose of this paper is to broaden the critical discourse on the spatiality of new ways of working beyond coworking spaces to also include flexwork. What is more, the paper shows how the adoption and adaptation of flexible working into a corporate office management strategy could be problematic.

This is especially important given the widespread adoption of flexwork as a way of grappling with the ongoing Covid-19 crisis. Even though the insights presented here are garnered from a Canadian context pre-pandemic, they show the impact of flexwork at a time when it was optional. Flexwork may become a more permanent way of managing office-based work, especially for the coveted digital skills, and as such planners need to consider the broader implications of these in-situ workplace strategies, especially with respect to real estate affordability. The paper is structured in five parts: the introduction, a review of key literature, a brief explanation of data and methods, the findings (flexwork for talent attraction, flexwork for

cost reduction, and flexwork as a planning conundrum), and a conclusion with some recommendations and suggestions for future research.

7.2 Literature Review

The following is an overview of key literature discussing recent changes in ways of working and in places used for work, including the rise of coworking spaces and flexwork as a corporate talent attraction strategy. It highlights scholarship in management and organizational studies, sociology, economic geography and urban studies.

Changes in ways of working

The impact of digitization and new technologies (namely, ubiquitous wireless devices) on work and ways of working is the subject of ongoing theoretical and empirical inquiry. This line of inquiry also interrogates broader, structural changes within labor markets, such as the casualization of work (the shift from full-time to part-time, freelance arrangements) and the restructuring of production into projects (Boltanski and Chiapello, 2018). From a managerial perspective, these broader changes — coupled with the capabilities afforded by new technologies and digital platforms — contribute to the mobility of work and the worker (Hislop, 2008; Hislop and Axtell, 2007, 2009). For example, workers that frequently travel for work are now better equipped to perform their tasks on-the-go (Gustafson, 2012; Hislop, 2012). Indeed, work can be (and often is) performed in cars, trains, airplanes as well as a variety of places beyond the designated workplace (Axtell et al., 2008; Felstead et al., 2005; Hislop, 2013; Kingma, 2016; Lassen, 2006, 2009).

To be available (or rather perpetually connected) and virtually "multipresent" is a growing expectation across digitizing companies, irrespective of the nature of their industry (Koroma and Vartiainen, 2018). Collaboration and coordination (physical and virtual) is essential to a growing number of workers against the backdrop of project-based work and the digital, sharing — gig — economy (Valenduc, 2019). This is why places that support connectivity, networking and flexibility are increasingly favoured by workers and business alike (Castells, 2009; Rainie and Wellman, 2012). Moreover, digitization broadens the geographies of

projects and teams, often resulting in a need to manage work across different time zones. This intensifies the need for mobility, but also for digital skills and flexible hours, thereby contributing to the dissolving boundaries between work and leisure (Aslesen et al., 2018; Dulebohn and Hoch, 2017; Kingma, 2018).

For this reason, digitization and digital skills also require flexible spaces for work that are capable of accommodating a variety of work-related activities at any time of the day. Notwithstanding, flexwork as an office management strategy is not new (Felstead and Jewson, 1999; Peper et al., 2005). What is more, the feminist critique of flexible working on the whole exposes some of its downsides: isolation, higher barriers to entry, the expectation to work overtime, lower wages and job insecurity (Cady, 2013; Ekinsmyth, 2011, 2014; Formánková and Křížková, 2015). Indeed, such conditions are a reality for most if not all project-based work, which emphasizes its general precarity. In recent years, however, such types of labor market flexibility have become more widespread (Bologna, 2018; Vinodrai, 2017a), and no longer just a feature of creative, freelance occupations. Interestingly, because they are often seen as "efficiency-boosting", flexible workplace strategies (integrated as "flexwork") are increasingly part of "stable" labor markets and full-time, permanent occupations. For example, in recent years, mobility has become a feature of full-time knowledge work in Sweden (Ruostela et al., 2015; Vilhelmson and Thulin, 2016).

Changes in places for work

With the aforementioned changes in ways of working, place becomes a "practical concern" for workers (Brown and O'Hara, 2003). Mobile workers must be able to adapt their work to the space that they are in (for example, no phone calls in open, public spaces), or the space must be adaptable to the task at hand. In other words, the workspace is either determined by the work activity, or by its ability to cater to multiple work-related needs (Kesselring, 2006, 2015; Towers et al., 2006).

Nowadays, work can be performed at the office, the home, coworking spaces, cafés, airport lounges and train stations, hotel rooms and lobbies, and so on (Kingma, 2016). This "spatial hybridity" challenges existing organizational and managerial structures, and the articulation of work and work activities across professional and domestic spaces (Halford, 2005).

Essentially, wireless mobility and digitization have broadened the geography of work (Bissell and Gorman-Murray, 2019; Gorman-Murray and Bissell, 2018; Richardson and Bissell, 2017). In other words, work "sprawls" beyond the physical boundaries of the office or designated/fixed workplace (Martins, 2015; Pajević and Shearmur, 2018, 2020; Richardson, 2020). The proliferation of coworking spaces —as flexible places that embody all of these elements — and the growth of coworking space providers in cities across the globe are a manifestation of these changes.

The proliferation of coworking spaces is perhaps the most obvious manifestation of these broader changes in ways of working and labor market flexibility. Coworking spaces are often considered model workplaces for the self-employed and freelance workforce (Brown, 2017; Merkel, 2015). They are also seen as an antidote to isolation — an opportunity to broaden social and professional networks by sharing resources and "working alone together" (Richardson, 2016, 2017; Ross and Ressia, 2015; Spinuzzi, 2012). Coworking, like flexwork, is not new, but has been popularized by high-tech, digital workers of Silicon Valley (Gandini, 2015). Google's playful offices mirror the aesthetic of coworking spaces, furthering the notion that such workplace layouts are attractive to "digital nomads". However, coworking is intended as a cost-saving strategy, which highlights the irony of broadcasting coworking as a feature of innovative and lucrative occupations.

What is more, coworking is permeating office real estate markets as a "disruptive" way of managing and reviving workplaces (Arora, 2017; Green, 2014; Sargent et al., 2018; Yang et al., 2019). Unused historic and sacred sites are also coveted as potential coworking sites and investment opportunities (Wright, 2018). In other words, coworking has become a branding strategy, aligned with city visions and creativity-orientated development policies (Armondi and Di Vita, 2019). However, researchers have already warned of the dangers of speculative real estate development based on a fundamentally unstable labor market (Moriset, 2013; Weber, 2015). For this reason, the commercialization and support of coworking through creativity and innovation-oriented development policy negates the downsides of flexible work (Merkel, 2019). Similarly, flexwork as a corporate workplace management strategy obscures the darker sides of such work arrangements.

While literature on coworking spaces continues to emerge, critical discussions rarely (to my knowledge) extend to flexwork strategies and how they, on the whole, exacerbate the problems and paradoxes of flexible labor markets by permeating office-based work and real estate. This paper therefore contributes to urban planning literature by extending the discussion to include flexwork. It draws from interviews with real estate professionals, corporate consultants and city planners in Canada's start-up hotbed in Ontario, which has been the home of some of Canada's leading digital companies and the testing ground of new workplace trends.

7.3 Data and Methodology

Interviews

This paper draws from fieldwork and 20 in-depth semi-structured interviews with key informants such as corporate consultants (7), real estate professionals (6) and city planners (7) conducted in KCW over a period of six weeks (mid-March to mid-April, 2019). Standard practice suggests a sample size of 15 to 30 interviews with key informants as sufficient for gaining insight on key themes, focusing on the description rather than distribution of trends. The corporate consultants are employees at brand-name companies (4) and local innovation centers (3), and reflect on broader trends in ways of working in the knowledge-intensive and digital work community. They also reveal how these trends impact the use of space for work and why flexwork is considered desirable for companies. Most have over a decade of consulting experience and offer advice to start-ups, scale-ups and established "traditional" companies looking to attract digital skills and talent.

Real estate professionals build on this information to provide an overview of broader changes in patterns of industrial location across KCW. These professionals have long-term (five to 10 years) of experience in the field and are employees at real estate service companies operating at multiple geographical scales (i.e. across Canada and beyond). This is especially important because it allows for discussions on how this case differs from commercial real estate markets elsewhere. These professionals are senior brokers (3), senior analysts (1) and vice presidents (2) at their respective places of employment. Finally, the planners are working full-time for the city governments of Kitchener (4), Cambridge (1) and Waterloo (1), as well as the broader region of Waterloo (1). Focusing specifically on economic development, the city

planners reveal the extent to which their respective government offices are aware of the broader changes in ways of working and how they are affecting real estate markets. What is more, three interviewees are heads of their respective divisions, and one interviewee is commissioner at the regional government. The remaining planners are officers with at least five years of experience working for the city government. Their roles and experiences enable them to speak about how (and if) they can plan for economic performance against the backdrop of these changes.

In sum, the interviewees have been purposefully selected (criterion sampling) on the basis of their seniority and expertise. The objective has been to gain as much detailed insight as possible on the biggest shifts in ways of working and places of work, and to interrogate the extent to which planners are aware of these changes. What is more, the interviewees' respective high-level roles and perspectives offer unique insight into how KCW has been changing in terms of workspaces, why, at what rate, and what the role of planning has been in enabling and/or supporting these changes.

The interviews were conducted in person and lasted up to two hours. They were audiorecorded and later transcribed, coded and analyzed using qualitative research software. There were two rounds of coding —deductive and inductive — to scan the interviews for existing and emerging concepts. The findings presented in this paper focus mostly on emerging concepts. Also included are observations from fieldwork, which consisted of tours of model and prototype workplaces "of the future". For confidentiality reasons, excerpts are assigned a generic alias identifying only the profession of the interviewee.

Site Selection

High-tech industries (and supporting services) have been clustering in KCW for some time. In fact, the tri-city area has been considered a success in transitioning from a manufacturing to a knowledge-based, start-up economy (Filion et al., 2015). Each city has an innovation district or its equivalent (Data District and Idea Quarter in Waterloo, Innovation District in Kitchener), innovation centers (Grand Innovations Centre in Cambridge, Communitech in Kitchener, and Communitech's new Data Hub in Waterloo) and incubators (Velocity and Accelerator Centre) to help tech- start-ups "scale up". Digital skills tend to concentrate in downtown Kitchener, with supporting business services and educational facilities in Waterloo. Cambridge still has a strong

manufacturing base with plans to transition into additive manufacturing, prototyping and automation. On the whole, the tri-city area is looking to attract talent (locally and globally) so as to build a brand strong enough to rival Silicon Valley.

The Waterloo region, together with the Greater Toronto Area is home to 15,000 tech companies, 200,000 tech workers and 5,200 tech start-ups (The Corridor, n.d.). Google Canada moved its research and development offices to downtown Kitchener and recently announced new plans for expansion, which is said to include a start-up incubator and community space (Armstrong, 2020). Deloitte has also relocated from its suburban location in Waterloo to downtown Kitchener, setting up a "prototype office of the future" that is part of a nation-wide strategy to "provide increased flexibility and choice around how people work by using design and technology to remove physical barriers, providing a more collaborative, innovative and productive workplace" (Deloitte Canada, 2018). Another consulting firm, EY, relocated to a one-of-a-kind net positive energy building in Waterloo, experimenting with flexwork strategies so as to offer a "flexible, fluid work environment with sleek aesthetics and enhanced technology, delivering EY's people a space that reflects the firm's inclusive culture and enables high-performance teaming" (EY Canada, 2016).

In sum, KCW is an ideal example of the latest trends in the spatial organization of hightech and digital skills in Canada. When combined, the perspectives of experienced real estate professionals, corporate consultants and urban planners offer unique insight into how emerging trends in flexible labor markets have been reflected in space.

7.4 Results and Discussion

This section presents the key themes that have emerged from the interviews and fieldwork: flexwork as a talent attraction strategy, flexwork as a cost reduction strategy, and, finally, flexwork as a planning conundrum. In sum, flexwork reduces the amount of space required per worker, thereby reducing the need for a lot of office space. When presented as a co-working strategy, flexwork allows companies to piece-off segments of their office space and sublet these segments as temporary workplaces to start-ups in the area. This encourages landlords to raise their rents, making offices more expensive on the whole. This, in turn, exacerbates the need for flexwork and flexible (or short-term) leases with similar effects on office real estate prices.

Flexwork: a talent attraction strategy

As part of their role, corporate consultants explore ways by which a company can innovate irrespective of its level of maturity. The goal is to help start-ups, scale-ups and established "traditional" companies (long-standing businesses like insurance) explore the digital world for solutions to increase effectiveness, efficiency and improve culture and talent attraction. Although such companies tend to be more risk-averse and offer longer-term employment, they struggle to attract digital skills and talent: they are not "interesting enough", are "too siloed" and offer little room for developing "new and exciting" products. Digital skills are crucial to these companies for two reasons: one, newly digitized operations require operators, and two, in order to explore digital solutions applicable to their business, they require developers:

"...because they need to convince people to do not what [has been done], but something different in the future. And then also realize that they are going to be in a very competitive market for top talent... So, organizations are looking at themselves and saying I struggle to attract because the job is regimented and the space, the way work, and the constraints of the jobs and roles and job descriptions and onboarding manuals are too constrained." (Corporate Consultant 3)

The trend is to consider the employee as a consumer. The upper echelon of digital talent "shops" for best places to work, and space layout and design are what companies tend to look at first. And indeed, in-house corporate consultants discuss the changes they adopt so as to improve their overall appeal and transition from financial services to fintech and digital consulting. Their employees want the freedom to move around within the office, and the more relaxed café-like feel of a modern-day coworking space – they no longer want to be tied down to a specific desk. Consequently, cubicles and individual desks are replaced by long coworking desks, and lockers are provided for personal storage. Open, "cool" spaces resembling cafés and bars replace cafeterias, and there are spaces resembling phonebooths for activities that require privacy. Interestingly, these booths are equipped with seating that is specifically designed to cause discomfort and encourage the user to move on within the hour. Some booths have treadmills attached to a standing desk with docks, extensions and plugs for laptops and phones. However, according to corporate consultants at innovation centers, these cosmetic fixes must be supported with a flexwork strategy:

"It's all about the orientation – there is nothing wrong with sex appeal and having something that draws people in, but if there isn't a stake, people won't stick around...

They will revitalize [space] and then the person comes in and they hand them the same manual, a lock-down laptop and the same restrictions, roles and incentives – all those structures haven't been changed and [so people] will turn around and go back out the door..." (Corporate Consultant 4)

Because flexwork strategies have to take into account the business, the industry and visions for growth, there is no one-size-fits-all approach. Nonetheless, a flexible workplace culture is considered important for talent attraction. Companies are encouraged to ask themselves what they want to be, what they want to do, and who they need in order to do it; and they need to balance that with a growing desire for autonomy. Interestingly, freelancing and gig work was brought up at the mention of autonomy, and according to a consultant at an innovation center, gig work is a growing segment of tech-based work. Whether this is desirable or not is unclear.

Companies address the need for worker autonomy through changes in workplace culture and strategies that transfer responsibility onto the worker. For example, at a leading fintech company, the workplace culture is based on three principles: "Your work, your way", "Unite to include", and "Leadership at every level" (Corporate Consultant 1). These three principles are reflected in the office layout: unassigned, coworking desks; new, trendy moveable furniture; spacious social areas, and moveable walls that also serve as whiteboards for brainstorming. Every area is equipped with state-of-the-art technologies and employees can check-in and checkout of areas on mini iPads by the doors. This particular office currently employs more people than it has the physical capacity for, and that is not an issue because workers are not required to be at the office on all workdays and have flexible hours. Some employees, especially in accounting and audit, are multi-locational and are away for months at a time. As a result, even though there are more employees, less space is actually required per employee — the workplace actually shrinks even as the company grows. I now turn to conversations with real estate professionals, which reveal that in addition to the "shrinking office", trends include flexible leases and licenses to sublet without approval from the landlord.

Flexwork: a cost reduction strategy

Real estate professionals are asked to describe and reflect on the major trends and shifts in the office market — specifically offices for service sectors — that they have observed over the past
ten to fifteen years in KCW. The purpose of this is also to understand what the situation was prior to Communitech, the arrival of Google and the transformation of downtown Kitchener. Another objective is to discuss whether there were any specific spatial patterns pertaining to the location of knowledge-intensive companies such as finance and insurance.

Deloitte and EY are frequently brought up as ideal examples of what has been happening: two large players in the same industry that chose different locations to signal their transition into fintech. Deloitte is now at the highest-priced office space in downtown Kitchener, and EY is an anchor tenant at "Canada's greenest building" in the suburban David Johnston Research and Technology Park. Part of this is culture – wanting to be different, wanting a change. The other part is "activity-based planning" – a design strategy that responds to the individual worker and where certain work activities can be performed. More specifically, this strategy looks at how and where work activities (e.g. writing, communications, networking and so forth) are being performed, which is then fed into the design and layout of the workplace.

Activity-based planning allows for more flexible uses of space, so the office is not just shrinking, but is also expanding on a need-to basis — in other words, the office increasingly resembles a Tetris game, whereby pieces are assembled and disassembled continuously. According to real estate professionals, this flexibility has made it possible for companies to spend more on premium locations by needing less space per worker. What is more, this flexibility translates into flexible leases. The latter is especially important for start-ups and scaleups that lack the capital of industry players like Deloitte and EY and cannot afford the rising rents.

"Today those costs are higher. In our marketplace this is an issue because our start-ups, they don't have the capital to commit to a timeline. Coworking serves a portion of that need, but one of the things with tech [is that] subleasing can be cumbersome. Everyone has rose-colored glasses – 'we're going to grow' – but part of the conversation is flexibility that allows them to turn their own space into coworking. [It's about getting] to license the space without approval from the landlord." (Real Estate Professional 4)

Pushing property owners and developers towards flexible deals at a fixed cost has been a challenge. Meanwhile, larger companies are willing to pay more for flexibility even if it means having less space, and this willingness to pay is what eventually makes property owners and developers amenable to flexible leasing arrangements — in other words, they see this as an opportunity for higher rent extraction.

"So, it's not inexpensive but it's flexible. They're willing to invest in that quality and that flexibility and it's the same thing with the coworking. You pay a premium to be in a coworking space. But it's flexible. They love that. That might be short, you know. Three or six months or even less in terms of termination options. So, they're paying a significant premium to be in that space, but it gives them flexibility." (Real Estate Professional 2)

According to another professional: "It's like online dating: they want the options without the commitment" (Real Estate Professional 3). The real estate industry seems to respond to these trends by advocating for adaptability and layout changes. As a result, condo developers are looking at integrating coworking spaces into buildings. Long-standing insurance companies, like Manulife, are also partaking in the trend. Manulife recently renovated and vacated its large downtown Kitchener location, and plans on leasing the space out piece by piece. Some of it is expected to turn into coworking spaces. This is part of a larger strategy to consolidate operations to fewer locations¹⁵. According to a Manulife employee, remote work makes this possible, and is indeed one of Manulife's key selling points.

"[Long-standing] organizations are doing different things, right? And the newer companies, I would say, will know where they can take advantage of space that has been vacated by [an older] company for good reasons or for bad reasons. Maybe they lost all their money and they figure this space, or they've raised lots of money or are growing quickly. So, backfilling those cool renovated spaces – there's high demand for that in the companies that are trying to be leaner and nimbler, and find those sub-leases. So, again, I think it's, you know, a cultural thing for the company in terms of who they want to be and what they want to." (Real Estate Professional 2)

Workplace culture is important to companies. Indeed, this chimes with what corporate consultants say about the pull of "cool spaces" to rapidly expanding start-ups. What is interesting, however, is how existing, established companies see "coolness" as an opportunity to transform and sublet some of their spaces for profit. What is more, it is a way to incentivize workers to "get on board" with a strategy that is – at its core – about managing costs:

"...part of that is employers keep saying that it's collaboration, but a lot of it is expensive real estate. As real estate gets more expensive, the spaces that the employer is willing to pay for decreases significantly, so that is probably the number one thing that we have been seeing. [Just in terms of housing], prices have increased by 50 percent last year... its' unbelievable." (Real Estate Professional 1)

¹⁵ This is also happening in the food and beverage industry in Canada. Hershey's has undergone a consolidation process whereby it has kept its plants in British Columbia and Quebec but has kept only one corporate office in Mississauga, Ontario out of at least ten that it had across all of Canada. Employees from these former locations continue to work for Hershey's but do so remotely and list the Mississauga office as their corporate address.

In sum, some companies turn to flexwork for branding and change, others for consolidation and cost-cutting, and others use it as a risk-aversion strategy. No matter the motive, certain kinds of spaces – cool, flexible, easily dismantled and just as easily assembled – are in demand. The real estate industry seems to be supportive of these changes. The next section looks at how planners have been reacting to these changes in the use of workplaces.

Flexwork: a planning conundrum?

KCW on the whole is leaning towards amenity-based development and densification of core areas through social and cultural programming and accessibility. This is a common talent attraction strategy, championed by Richard Florida, whom most planners often credit for their ideas. On the subject of office real estate, while planners are cognizant of the changes taking place – the demand for smaller spaces at better locations with flexible leases that offer the opportunity to expand or shrink – there is a sense of defenselessness against these "market forces and a hope that the market will sort itself out" (City Planner 5). Tech talent support and attraction remains a key priority. This entails supporting incubators like Communitech and Velocity in their efforts; finding space for start-ups and scale-ups; help established owner-occupiers "repurpose" their space for rent extraction; and help developers meet their profit margins by helping them find tenants.

"I feel what was good news to us is that when [Manulife] looked at the two major landholdings here, they knew they wanted to go to one... But you know, when you look at our ecosystem, you're talking about 300,000 square feet. There aren't too many companies that can take on that much... they'll need to figure out how to subdivide that into much smaller spaces. Which I think has its own pros and cons. Obviously with one tenant one operator is great. But there's also a value of having multiple companies within a space that have to interact, to share facilities. And, so, yeah. There's no point in predicting what will come, but just know benefit can be gained from either perspective." (City Planner 2)

Blackberry's rapid growth and slow demise is seen as a cautionary tale among planners. Blackberry was, at its peak, the largest owner of office real estate in the Waterloo region. Following its crisis, a significant portion of the buildings was sold to the University of Waterloo. This deal — a bailout of sorts — was brokered by the municipal government and the real estate service company CBRE in an attempt to minimize the shock to the local real estate market. Still, some buildings remain empty and account for the 13.7% overall vacancy rate in the city of Waterloo. This was a big financial hit for the municipal government, given its own stake in the spatial and economic expansion of Blackberry. Learning from that experience, planners find that it is important to make space flexible so as to accommodate expansion and contraction on a need-to basis. However, repurposing should be versatile enough and leasing should be flexible enough to help vacated premises get reabsorbed by the real estate market quickly. Repurposing so far has revolved around smaller, flexible office spaces and coworking spaces — even condo developers are integrating coworking spaces into their plans, and large companies are disintegrating their assets and transforming some of them into coworking spaces. What is more, another insurance company, Sun Life, is looking transform its spaces into temporary residential units:

"The evolution of workspace we will continue to see, but these companies are major real estate landowners as well, and they're selling off land and redeveloping land and making money at it as well. So, Sun Life [Financial] is selling off land to build condos. Sorry, rental apartments. So, again a very smart move to be diverse for that group. They own other office buildings that they're experimenting in, in terms of flexible spaces, to test the market with their land holdings so many forms...they own a tremendous amount of property. So, they're understanding this market and other markets. So, I'd say that they are incredibly important to this community, but it is evolving." (City Planner 2)

While planners seem amenable to companies exploring ways by which they can make the most out of their real estate, there are still important factors to consider, such as land-use regulations and how much planners can influence given the Planning Act of Ontario¹⁶. One planner said that the Act limits them from doing anything other than supporting the business community (City Planner 5). Another planner spoke at length about how time-consuming it is to alter zoning by-laws: by the time amendments get adopted into legislation, changes may already be underway, so the solution is to advocate for mixed-use zoning and a hands-off approach to how companies handle their leases:

"... [the goal] from an economic development perspective is trying to protect the public interest, but at the same time be flexible enough so that we don't have to drag people through some sort of planning application or approval process [just] for the sake of doing that." (City Planner 6)

¹⁶ Provincial legislation that determines, essentially, the extent to which planners can influence land-use planning. A key component of this act is the need to align planning decisions with provincial policy objectives. What is more, the degree of power that is delegated to municipalities is determined by their relative position within a hierarchical structure of cities (i.e. upper tier and lower tier municipalities).

It is worth mentioning that over \$1 billion (Canadian) worth of building permits were issued in 2018 for the Region of Waterloo (Region of Waterloo Community Planning Report, 2019), and that a lot of these projects are condo developments with mixed-use functions along the LRT, containing — among other things — flexible workspaces (City Planner 2).

Planners in KCW seem to have less influence over office and residential real estate than companies and developers, but they welcome flexible uses of space so long as this prevents another Blackberry situation: "I think our challenge is to remember where we were 10 years ago and never forget that. And, you know, we can't control where the private sector goes, but we can always be ready to adapt" (City Planner 5).

This laissez-faire approach to real estate does indeed offer companies more "control" over their real estate — in other words, it offers alternative uses of space that better suit their culture and financial capacity (thus also avoiding underused, vacant spaces). However, it seems to neglect the fact that these recent changes have an impact on office real estate prices in KCW. At this point it is not difficult to imagine a scenario in which these Tetris offices produce markets that are tougher to regulate, buildings that are difficult to manage, and tenants that are harder to protect.

7.5 Conclusion: Takeaways for Research and Practice

The purpose of this paper has been to broaden the critical discourse on the spatiality of new ways of working beyond coworking spaces to also include flexwork. Focusing on Canada's "Silicon Valley North", in-depth, semi-structured interviews with corporate consultants, real estate professionals and city planners reveal that flexwork strategies tend to be adopted as a talent attraction strategy, though cost-cutting seems to be of equal, if not greater, import. Eager to appease the industry, city planners have seen flexibility (of both workplace layouts and leases) as an opportunity for better, more effective real estate perspective, flexwork as a cost-cutting strategy translates into a higher demand for flexible leases. Some companies have been willing to pay more for this flexibility; therefore, the overall value of office space had increased, driving up

office rents. This shows how the adoption and adaptation of flexible working into a corporate office management strategy can be problematic.

City planners have responded to this by issuing more building permits and pushing for mixed-use zoning. However, considering that flexwork also includes mobile, multi-locational and remote work, it is likely that these spaces — old and new — face a higher risk of vacancy. City planners generally feel limited in their ability to influence how companies and developers use their space, especially considering that these changes are often perceived as characteristic of innovation and creativity, thereby feeding into broader innovation-oriented development policies. This calls into question the nature of innovation-driven policies as well as the effectiveness of planning tools to ensure that corporate decisions such as this are in the interest of the public in the longer term.

This builds on the growing body of literature on coworking spaces, which highlights the paradox of adopting a coping strategy as a talent attraction and retention strategy. In a sense, it is a form of "austerity urbanism" (Harvey, 2012; Peck, 2012) in which a premium is placed on adaptations of flexible work arrangements and coworking as a way of coping with a volatile and increasingly uncertain economy (Fast et al., 2019). However, as in the case of coworking spaces, corporate and institutional support of flexibility neglects the downsides of flexibility and plays up its financial benefits.

In the absence of tighter rental market regulations, the willingness to pay more for flexibility will only continue to drive up office rents. In response to these higher prices, companies may be incited to explore *even more* flexible workplace solutions (such as permanent remote work) and other micro leasing options (renting out meeting rooms, for example). Parenthetically, this is why many workplaces are already turning to coworking as their chosen workplace design. In sum, the Tetris office is in a bind: since it is also marketed as a talent attraction strategy, flexwork as a cost-saving strategy ends up exacerbating rather than mitigating high office rents.

Understanding these paradoxes is important for planners in Canada and beyond. First, if brand name companies like Google, Deloitte and EY, to name a few, are considering flexwork, their willingness to pay for flexible leases will be higher than that of smaller enterprises or startups, making it more difficult for the latter to afford even temporary workspaces. Second, flexible leases, as well as multiple subletting arrangements, may make it more difficult to monitor who is

using spaces, how and for how long. Planners are already struggling to keep up with these changes and feel limited in their administrative capacity to influence landlords and the real estate market. This suggests that planners may need to explore stricter regulations so as to curb the rising rents.

This is especially important considering the widespread adoption of flexwork at the onset of the Covid-19 crisis. Should it become more permanent, insights on how flexwork strategies have been affecting workplaces in cities pre-pandemic may prove to be useful. Finally, because flexwork tends to be associated with creativity and innovation, it is garnering support from companies and city planners alike. In sum, without critical interrogation, flexwork will likely continue to contribute to the rising unaffordability of office space.

Finally, this paper shows the danger of adopting flexible working arrangements, such as coworking and remote working, as forward-looking and effective workplace management strategies without proper consideration of what such arrangements could mean in the longer term. While there are undisputable benefits to this flexibility, there are also downsides that affect workers, real estate and cities. More specifically, if these downsides are to be mitigated, cities need to avoid taking corporate strategies at face value. They must think carefully and critically about what kind of support needs to be in place to support workers and businesses without intensifying existing problems of affordability and access to workplaces. This paper is a starting point.

Chapter 8: Conclusion

8.1 Rationale and key objectives

Over the last two decades, MOS and Mb scholars have been highlighting an increasingly complex and dynamic spatiality of knowledge work. Mobility, flexibility and digitization have extended certain types of work beyond its designated location, such as the office. More specifically, work has been sprawling across a number of locations, producing a network of official, unofficial and connecting spaces that make it difficult to assume that work can be pinned down to a single, well-defined and fixed location. So far, economic geography scholars have seen little change in established patterns of employment and the clustering of knowledge-intensive activity in downtowns and inner-city neighborhoods. Either economic geography and planning scholars have not yet adapted the way they think about work and its spatiality to include workplace mobility, or these new ways of working are not large enough a phenomenon to warrant a paradigm shift.

Indeed, these three disciplines have varying degrees of "space sensitivity" as it pertains to the spatiality of work, and approach the subject from different angles, scales and units of analysis. This tension between approaches and scales complicates our understanding of mobile and multi-locational work and the extent to which it needs to be taken seriously by planners and policymakers. While there is potential for a stronger relationship between the disciplines, there has been little convergence on the subject of mobile and multi-locational knowledge work. There is a need for more synergy and dialogue between these disciplines so as to bridge gaps and develop a better understanding of how changes manifest on the ground — and affect living and working in cities. What is more, there is no literature, to my knowledge, that qualitatively explores a Canadian context for evidence of these emerging trends. Lastly, if work has been less attached to a well-defined location, and the boundaries of the official workplace have been getting fuzzier, planners and policymakers interested in anchoring knowledge-intensive work and talent need to start understanding how changes in ways of working are affecting the use of space for work in cities. This will reveal how cities can adapt to better support workplace mobility — and whether they should at all.

What is more, considering the pandemic-driven shift to digital, remote work, it is important to learn from existing experiences of workplace mobility. More specifically, it is important to know how and where knowledge workers have been working, and how this affects the use and organization of space for work. This dissertation presents valuable insights from knowledge workers, real estate professionals, corporate consultants and city planners that can help inform city planning objectives in the aftermath of the pandemic. What is more these findings can be used as steppingstones for future study, especially since they point out the limitations of existing ways of thinking and conceptualizing the location of knowledge work. It is important to note that not all work can be performed remotely, and not all knowledge workers have even access to technologies and working conditions conducive to remote working. These considerations are relevant should remote work (as well as other flexwork strategies) become more permanent. It is also important to stress that not all sectors and occupations can be digitized. In addition to thinking about what counts as an "essential" sector and occupation (aside from the obvious)¹⁷, it is also important to think about what types of industries and occupations cannot be performed remotely and will require more "traditional" settings. This dissertation is a starting point. It is imperative that we engage more critically with the subject of workplace mobility, learn from past experiences, and firmly evaluate what ought to be supported by cities, and what tech-driven impulses ought to be curbed¹⁸.

8.2 Overview of research chapters and key findings

This dissertation consists of four research chapters — one conceptual and three empirical — that explore workplace mobility. The conceptual chapter asks whether Big Data are well-suited for the study of workplace mobility, and does so by examining what is meant by work location. The chapter concludes that we do not know enough about workplace mobility to be able to gauge the usefulness of large data sets for enhancing our understanding of it. What is more, it stresses that

¹⁷ It is also important to note the problem of splitting the economy into essential and non-essential sectors and occupations, as each has an arguably "essential" role to play. We have already experienced a similar difficulty with "knowledge work", especially considering that all sectors have some "knowledge-intensive" components and can therefore — arguably — fit the mold.

¹⁸ *I'm lookin' at you, Twitter and Shopify.* Twitter and Canada's own Shopify have publicly announced their permanent shift to remote work this past Spring. Some offices will be kept, but for storage and recruitment purposes i.e. data storage, showrooms and social spaces.

for the time being, door-to-door approaches (i.e., qualitative interviewing and ethnography) are best suited to establish an empirical foundation from which more robust studies can emerge. The next three empirical chapters focus on the spatiality of knowledge work in Kitchener, Cambridge and Waterloo in Ontario. Forty-six interviews were conducted between 2017 and 2019, and combine the perspectives of knowledge workers, real estate professionals, corporate consultants and city planners. Chapter five combines Canadian census place-of-work data with semi-structured, in-depth interviews with knowledge workers for a better understanding of where they worked pre-pandemic. While census data confirm that work predominantly took place at the "usual place of work" and corroborate the findings of other scholars based on census-type data, there are limitations to these data that qualitative interviews highlight. Although the interviews complement these data well and show that work did indeed take place at the usual workplace, they also show that work *has been extending* beyond the official workplace to include a range of other, unofficial spaces other than one's home. The usual place of work was used *in combination* with other official (office, client location), unofficial (home, café, library), and connecting (car, bus, airplane, train as well as train stations and airports) spaces.



Figure 6. Emerging themes.

Key insights based on interviews with knowledge workers.

This dissertation shows that in addition to combining multiple locations, workers also changed their location for different durations throughout the day, the week, the month and the year. More specifically, the **frequency** with which workers changed their settings, the **duration** of time spent at each setting, and the **geography** of their mobility varied at different scales. In the case of the knowledge workers in Kitchener, Cambridge and Waterloo, the intensity of travel at different scales (international, regional and local) added to the need to be adaptable in different locations, and therefore also expanded the number of locations that were used for work over varying periods of time.

Indeed, chapter six delves deeper into knowledge workers' experiences and shows that blurring professional and personal domains have contributed to fuzzy, **blurred definitions** of the workplace and a difficulty separating official spaces from unofficial ones. What is more, this chapter shows that a number of formal work-related activities were taking place in informal settings — and vice versa. This obscures the boundaries between formal and informal spaces and will require a paradigm shift in planning and policymaking circles, especially with respect to the regulation of said types of spaces. What is more, work performed from home or on personal travels was difficult for some to qualify as work. This suggests that the amount of time spent working at home or at an unofficial workspace may be equal or perhaps even more than the amount spent working at the office.

The interviews with knowledge workers have also revealed what is important locationwise, or rather what has kept workers attached to a specific location pre-pandemic. In addition to cost and proximity, which continued to play an important role, **confidentiality and security** emerged as essential location factors, especially for digital and high-tech workers. For example, for Knowledge Workers 8 and 9 (special effects compositor and software designer) these concerns were the primary reasons for limiting their workplace mobility. Indeed, these workers were required to be at their designated workplace, even though they are best equipped to work remotely. It is important to note, though, that at the onset of the pandemic, the visual effects industry and software development were among the first to shift to remote work. It is therefore possible that security reasons were overstated, and that for these industries working at the office was driven by cultural factors (and proximity often required for creative work). It is important to

re-examine the role that these factors — security and culture — play in maintaining a physical office post-pandemic.

Also important is a *sense* of **responsibility** that most of these knowledge workers had towards their colleagues and collaborators, as well as their employers, that kept them from dispensing with the office altogether. What is more, there appears to be a **stigma** around working from home in particular.





Kitchener's "revamped" downtown Innovation District, with a brand-new LRT line and Google's expanding brickand-beam offices. Indeed, Google's physical presence in Kitchener was expanding pre-pandemic, and was expected to include community spaces. It will be interesting to see what will happen to these expansion plans if Google continues to pursue remote work options. Photo credit: Pajević, 2019.

This feeling has propelled workers to work more and for longer hours so as to compensate for their lack of presence in spaces that are typically associated with productivity. Because work from home is somewhat stigmatized, a number of these knowledge workers have stated that they worked from home less on average, even though they spent most of their evenings and weekends working from home.

It was also interesting to discover that for some workers being available online to colleagues and collaborators is enough to transform any given space into a temporary workspace, including one's car. This dependency on technology has also facilitated the **densification of work**. Not only did these knowledge workers manage different activities across different time zones, but they also juggled multiple roles at their respective workplaces. For example, Knowledge Worker 1 is a co-founder, lead engineer and head of sales at her company, and therefore balances three different sets of tasks (business, research and development, sales and

marketing). Each set of tasks has its own workplace mobility, which means that for these workers each new added role increases their *potential* for workplace mobility.

Chapter seven draws from interviews with real estate professionals, corporate consultants and city planners, in which they reflected on the latest trends, the need to digitize and to adapt spaces to better accommodate these new ways of working. They revealed that workplace **aesthetics** were increasingly deployed to attract workers and keep them working on the premises.

Image 3. Office or café? "Coffice" aesthetic in downtown Kitchener. Left: Settlement café also offers private workspaces and meeting rooms. Right: Communitech "main square" with a kitchen, self-service stations and bookable meeting rooms. Photo credit: Pajević, 2019.



Indeed, knowledge workers often spoke of welcoming a "change in atmosphere", especially of having a "fun" and "playful" space with a "good vibe" to perform their work in. Real estate professionals have said that locational centrality has become secondary to aesthetics and the availability of parking. More specifically, it didn't matter much to companies whether a location was suburban or in the downtown core, as long as it had a "cool" aesthetic and was laden with amenities:

"Oh yeah, remote work and all that changed things. They want the brick and beam, cool, flexible spaces, but they also want the flexible arrangements... so the short-term, coworking, WeWork type of deal." (Real Estate Professional 4)

This coveted aesthetic is "cool" and *flexible*. The deliberate multi-functional design allows for maximum utility of these workplaces.

Image 4. "Cool" for who?

a) Communitech reportedly has 300 start-ups "on-site". Photo credit: Pajević, 2019.



b) Deloitte's new downtown Kitchener office and prototype "office of the future". About 240 employees are based in Kitchener, but the capacity of this location is 180 due to flexwork. The office contains multiple café-like spaces, prayer rooms, showers, and exhibition spaces. Photo credit: Pajević, 2019.



c) Treadmills and "smart" meeting rooms that are designed to keep workers on the move at Deloitte. A rival fintech company in Waterloo has a similar workplace aesthetic, and the chairs in meeting rooms are designed to make users uncomfortable within the hour. Photo credit: Pajević, 2019.



d) Communitech Data Hub — a new Communitech facility in downtown Waterloo with "funky" pods for private conversations. Reportedly 40 start-ups are registered, and yet it is unknown as to how many are on-site. Photo credit: Pajević, 2019.



Their flexibility manifests in three ways: 1) flexible, agile furniture; 2) unassigned seating (hotdesking and hoteling); and 3) flexible leases. Pre Covid-19, companies were willing to pay a premium for spaces that are flexible in their layouts, allow for flexible work arrangements *and* are flexible in terms of their rentability. Landlords and developers have used this as an opportunity to extract higher rents, which has raised their overall commercial value.

This spike in costs made it increasingly difficult for local start-ups — the pride of Kitchener, Cambridge and Waterloo — to afford scaling up their businesses and establish offices of their own. For established companies, these higher rents meant more "flexwork" — less space per worker and rentable fragments such as meeting rooms and coworking areas. This has changed how workplaces were being used (portions were sliced off and rented out on a need-to basis), and the ability of some companies to afford higher office costs, thereby driving them towards *more* flexwork as a means of cutting costs. Not only does this further complicate where work is being performed, but also how spaces are used and by whom.

Meanwhile, city planners felt limited in their capacity to influence the real estate market and have been attempting to curb rising property rents by issuing more building permits and contributing to the redevelopment of brownfield sites (old factories and warehouses), like Catalyst137 (see Image 5). However, these new developments were mostly empty despite their flexibility, coolness and abundance of amenities. Local start-ups have been encouraged to use these new spaces, but — according to Knowledge Worker 1 — the rent was simply too high. Therefore, while aesthetics seem to be more important than proximity for some of these companies, for knowledge workers — especially start-ups — nothing can top affordability. For this reason, a lot of these new developments were at risk of not reaching full capacity prepandemic.



Image 5. "Cool" but empty.

In 2019, Catalyst137 was reportedly at 80 percent capacity. However, according to real estate professionals it was below half capacity. Photo credit: Pajević, 2019.

Nonetheless, city planners appeared to be optimistic about changes in work and workplaces, as well as about how companies were dealing with rising office rents. They applauded "flexwork" as a creative workplace management solution, and they appeared to be supportive of companies managing their own infrastructure as they saw fit — even if that exacerbated overall real estate costs.

According to City Planner 5, the real estate market will resolve itself, and the role of the municipal governments is to ensure that key institutions are there to secure access to venture capital and other funds, which will attract and anchor talent in the area:

"You will see emerging industries coming out of Waterloo ahead of anyone else, because they have the Quantum Valley, the Perimeter Center and a 100-million-dollar venture capital fund to help start-ups grow - this one-stop-shopping allows an ecosystem to thrive. So, it's a very unique model here and one that will open up the next wave of companies down the road." (City Planner 5)

However, this is neither unique nor a guarantee of urban growth. Especially if the circular relationship between workplace mobility and workplace costs are not being factored in.

8.3 Contribution to scholarship — literature and methods

The theoretical framework that underpins this dissertation draws from three distinct yet related disciplines — economic geography (EG), the Mobilities branch of sociology (Mb) and management and organizational studies (MOS). As a result, the findings of this research can be useful to all three disciplines as they continue to interrogate the spatiality of workplace mobility.

First and foremost, this dissertation corroborates and broadens the findings of Mb and MOS scholars regarding the increasing *extendedness* of the workplace beyond its designated location (Dale et al., 2018; Halford, 2005; Hislop and Axtell, 2007; Kingma, 2016; Martins, 2015; Taylor and Spicer, 2007). This is important because it complicates our understanding of work location: more specifically, it challenges the assumption that work can be pinned down to a single location on a map. And while some aspects of work have always been mobile — and economic geographers are well aware of this fact — the dominant paradigms that inform how cities are studied and planned rely on the assumption that work, life and play are distinct categories with their own distinct spatialities. The findings presented in this dissertation suggest

a more dynamic spatiality of work and fuzzy boundaries between these spatially distinct groups of activity.

For economic geographers the neglect of this dynamic spatiality could have been an issue of scale. Afterall, the discipline's purview informs the unit of analysis, which tends to be either at the neighborhood, city, regional, national or global scale. Indeed, some scholars have been hinting that the patterns of industrial location may be more dynamic at a finer scale (Shearmur et al., 2007). It may also be an issue of available data at the population level. Qualitative data are generally considered too context-specific, and large-scale surveys can capture workplace mobility *only to a degree*.

When combined with qualitative methods, a more nuanced understanding of workplace mobility begins to emerge. Indeed, on their own, census place-of-work data do not show where *else* work takes place in addition to the office and the home, and it does not capture changes in work location at finer temporal scales, e.g., workplace mobility throughout the day. It is important, however, not to downplay the usefulness of existing census-type data in telling us where work is *most likely* taking place. These data sources should be built upon with additional surveys that are better able to capture the complexity of workplace mobility. Especially considering the increasingly blurry definitions of work and workspaces: we could be facing a conceptual problem that may influence how individuals respond to questionnaires with strictly defined workplaces and work boundaries. Qualitative data highlight these nuances, and this dissertation is a starting point.

Indeed, this dissertation highlights the value of integrating qualitative methods and combining them with quantitative data for a more holistic perspective. Economic geography scholarship can no longer ignore changes at the finer scale, especially if these changes affect how spaces are being used — which is indeed the case here. What is more, these changes have far-reaching implications for commercial real estate, which is of interest to planning scholarship *and* practice.

From a theoretical standpoint, this dissertation stresses that the concepts that inform our understanding of work location need to be rethought. However, this does not mean that certain logics no longer apply. It is rather the opposite: workplace costs and the willingness to pay are still important considerations that inform where firms locate. However, other location factors are more important in determining where workers will *remain* for extended periods of time. The

location of knowledge-intensive establishments and employment has largely been defined through the prism of agglomeration economies — dense urban areas and clusters (Duvivier et al., 2018; Hutton, 2004; Rantisi and Leslie, 2010). And while this is still the case (offices still locate in downtowns and workers still perform their work at these locations), this is but one part of the story. Workplace mobility and its impact on extending the location of work beyond the designated workplace suggest that places specifically planned for work may not be places where *all* work activity is *actually* performed.

From a planning and policy perspective, this could signal a reduced need for large offices, as well as secondary offices — and clusters — as more work activities digitize. Indeed, the Covid-19 crisis has alerted more companies to the cost-saving benefits of reducing the number and square footage of workplaces, which could potentially leave a considerable amount of vacant office buildings in its aftermath. What is more, the sprawl of knowledge work across professional and personal domains signals a shift in the importance of residential areas as workspaces. Indeed, the reduced need for large office spaces and the projected rise in work from home will reduce the geographical scope of industrial clusters and broaden the geographical scope of work-life-play areas (See Figure 7). This chimes with emerging scholarship in planning, which suggests that the blurring work-life boundaries as a result of mobile work are becoming difficult for planners to manage and regulate (Di Marino et al., 2018; Di Marino and Lapintie, 2017, 2018)

Figure 7. The size of clusters (e.g., CBDs) versus mixed use (e.g., residential) areas in cities pre and postworkplace mobility.



Another contribution concerns the densification of knowledge work. This chimes with the growing body of literature in sociology on the impact of mobility, flexibility and digitization on the increasing permeability of work-life boundaries (Fast et al., 2019; Hochschild, 2001; Taylor and Luckman, 2018). This literature also discusses the pressures and "risks" of "liquid

modernity"(Bauman, 2005, 2013; Beck, 1992; Ekinsmyth, 1999). The insights presented in this dissertation contribute to this discussion by showing how the ability to perform remotely transforms not only workspaces but also homes for the purposes of maximizing economic utility. This also contributes to the literature on the impact of neoliberalism on society and planning (Brenner and Theodore, 2002, 2005; Harvey, 1989, 1990; Peck et al., 2009).

Finally, economic geographers need to incorporate workplace mobility in their conceptualizations of work and work location. Similarly, management and organizational studies, as well mobilities scholars, need to address the role that place has in supporting these new ways of working. A stronger relationship between these three disciplines is encouraged, as together they will offer new opportunities for conceptual and methodological advancement of the study of work and its spatiality.

8.4 What should planners do? (or contributions to practice)

"It is not my job to hold the city's hand." (Corporate Consultant 2)

Post-interview, off-the-record conversations with city planners revealed a genuine concern after the link between flexwork and rising office costs was made more explicit. The city planners felt limited in their capacity to influence the real estate market, and generally trust companies to do what is in the best interest of their business and employees. Good intentions notwithstanding, associating creativity and innovation with mobility, flexibility and digitization is oddly reminiscent of the debates surrounding post-Fordism. The idea that technologies and flexible ways of working present a solution to the crisis of capital is a neoliberal paradigm that has permeated policy, planning logic and corporate strategy since the 1970s. However, nowadays the flexibility is more acute and the tech more pervasive. By playing up their potential, the downsides of creativity, digitization and flexibility as coping mechanisms go unnoticed. What is more, these positive narratives secure institutional support and make it more difficult to divorce the problem from the solution. Coworking spaces are an ideal example: because they are marketed as creative workplace solutions for maximum efficiency and recruitment, coworking space providers like WeWork have acquired millions in venture capital funds and inducements from city governments. The demise of WeWork was foreseeable — and preventable — because

of a fundamental flaw in its business plan: coworking is a coping strategy. This dissertation shows that flexwork, as a corporate strategy for financial gain, is similarly problematic though far more subtle.

Neoliberal governance and planning with their focus on entrepreneurialism make cities susceptible to the "coolness" of these new trends. Though the focus is on tech (Big Tech like Google, Shopify and Twitter), the lifeblood of urban economies — especially cities like Kitchener, Cambridge and Waterloo — are the small businesses and start-ups. The latter have been pointing out the rising unaffordability of flexible workplaces *because* these spaces are associated with Big Tech and fintech companies like Deloitte. And with Covid-19, these companies will consider *even more* flexible and, in some cases, permanent flexwork arrangements i.e., remote work. For this reason, it is imperative that cities engage more critically with the dominant (oversimplified and over-optimistic) narratives and explore the downsides of these ongoing trends. Indeed, they must keep their dialogues with companies open, but they must also consult the workers. It is through conversations with the knowledge workers that some of these key issues start to emerge.

This means investing in research and new data sources on employment that are better able to grasp workplace mobility — especially once the pandemic has been resolved. Planners must also re-examine their toolbox and develop policy instruments that are geared towards mitigating the cost-exacerbating downsides of flexible ways of working. This requires a paradigm shift in favor of regulation and control — in this case, regulation and control of the real estate market. In Kitchener, Cambridge and Waterloo the objectives that underpin development initiatives are misaligned. Issuing more building permits may increase office supply, but it will not resolve the culprit — the *willingness to pay a premium for flexible spaces and flexible leases*. This market-based logic is less likely to generate positive externalities if the willingness is based on speculation and real estate bubbles, such as the coworking craze. Now that it is quite clear that coworking models are a real estate play, it is important to broaden that discussion to include flexwork.

While there are benefits to flexible work arrangements and digitization, cities need to consider this circular relationship between flexwork and rising office rents more seriously. The gradual disappearance of affordable space intended for a key segment of the urban economy — in this case the start-up activity — is oddly reminiscent of the displacement of artists and artisans

in cities, whose presence (ironically) and "cultural capital" was often deployed in promotional material for gentrifying neighborhoods (Catungal et al., 2009; Jenkins, 2005; Zukin, 1989). This is yet another link between the worlds of creative and tech professions, and likely an outcome of the "cultural renaissance" and "symbolic economy" that has exposed both to dwindling work conditions in cities — unless they have the means to sustain themselves. However, the privilege of sustenance is reserved for the few and usually for established brand-name companies.

These past experiences with the "cultural renaissance" and its impact on commercial real estate should not be neglected by planners, since they may offer clues on how best to discourage speculation and overbuilding of commercial real estate that is likely to be even less necessary (considering workplace mobility) once the pandemic has been resolved. Indeed, it is important to revisit market-based approaches to the management of commercial real estate — as well as the rationale and conditions that underpin subsidies and tools (e.g. tax increment financing and mixed-use zoning, both of which have pros and cons) — and question the role of developers in meeting demand as opposed to producing it (Weber, 2015). More specifically, it is not just the planning tool that needs to be re-examined, but the ethos that guides the planning profession.

With work from home on the rise, it is realistic to assume that landlords will consider increasing rents, and some cities may increase residential property taxes to compensate for the losses in downtown tax revenue. The problem with this is that it shifts the burden of taxation from businesses to employees. If this becomes a reality, then once again we are facing a "survival of the fittest" situation, wherein a limited portion of the working population will be able to afford the conditions necessary for effective and balanced work from home.

The ability of workers to keep paying rent depends on their access to more secure labor pools. With a recession on the horizon, and with casual labor permeating more sectors of the economy, it is important to secure workers' access to affordable housing, and then consider the future of the office — which is poised for some changes.

8.4 Technologies are designed to support permanent remote work — humans are not.

Thinking ahead, this dissertation shows that while the boundaries of office work have been expanding, there was still a need for office spaces. Indeed, for these knowledge workers, workplace mobility revolved *around* the office, and did not diminish the need for face-to-face

interaction, meetings and in-person collaboration. What is more, for some of these workers, maintaining a separation between private and public, official and unofficial spaces — including a separation of the technologies that they use for work from those they use for other purposes — has been paramount. Given the difficulties experienced by remote workers nowadays, this separation is likely to become more important, and a valid reason to at least partially return to the office once the pandemic has been resolved. Indeed, the recent, pandemic-driven shift to remote work has also highlighted the conditions that need to be in place in order for work to be performed, such as more room and quiet spaces, tech specs and amenities, as well as a range of supporting services not the least of which is daycare.

City planners need to learn from these existing experiences with workplace mobility and look into how remote work is likely going to affect the use of offices in the future — reduced functions in favor of more flexibility — and how this is likely to affect rental agreements and costs. Moving forward, city planners need to be prepared to face the following challenges: 1) the tendency to offer space as a service, thereby enabling companies to become landlords, and 2) the tendency to offer flexibility at a premium. These are likely to become more pronounced in the near the future and will affect not just commercial real estate but also how city economies will function.

Indeed, workplace mobility seems to be affecting the city in a manner resembling the "Tetris Effect". The "Tetris Effect" is a term used to describe the psychological effects of playing Tetris for prolonged periods of time. Individuals suffering from this were unable to stop thinking about the game long after they stopped playing it, and would find themselves mentally arranging and re-arranging the pieces to fill vacant slots and attain maximum points. A similar suffering seems to be affecting workers and companies, as this type of arranging and rearranging has been happening in places across personal and professional domains for the purpose of reaching maximum economic utility. As more work activities digitize, and workplace mobility intensifies, not only will it be difficult to understand where what types of work activities are taking place, but also how work is being segmented. As economic geographers we have relied on space for clues, but could a spatial division of office-based labour in the digital, remote work future be just a footprint in the sand?

It is likely that workplace mobility will continue to include an office in the future. However, given that the spaces encompassed by workplace mobility have a temporary, transient

nature, it is likely that these offices will not have the same function, utility and size as before. If workers frequent the office for only a few days in a workweek, the need for larger spaces will diminish. Instead, we will have Tetris Offices — assembled and disassembled on a need-to basis. In an ideal scenario, planners will discourage premiums on flexibility, and the city will work together with business and residents to come up with better uses of these spaces that will keep the public coffers from emptying out (without adding more burden onto the employee¹⁹).

Canadian cities will feel the recession, and they will likely have to accept a significantly reduced budget at their disposal. Even then, their focus must remain on building trust with residents and businesses through dialogue and policies based on lived experiences rather than projected benefits and speculation. The pandemic has revealed a gap in communication between the city and its residents. Because of this gap, there are many blind spots that prevent the city from understanding why workers may not be returning to the office in the same capacity as before. Indeed, firms have made significant investments to support the adjustment to remote work, which they may be reluctant to undo once the pandemic has been resolved. And while there will still be a need for the office, its purpose may be significantly reduced to accommodate only a specific set of activities for limited periods of time. Parenthetically, the same communication gaps may prevent the city from understanding why many workers will struggle with remote work — and why some do not have that option at all.

8.5 Concluding remarks

To end on an optimistic note: cities have faced crises and changes before. From Fordism to post-Fordism, from a manufacturing-oriented to a service-based economy, from the internationalization of finance to the rise of digital skills — there have always been causes for concern and periods of restructuring. For example, following the 2008 financial crisis, Warsaw's downtown and office-laden inner-city neighborhoods were in dire straits. One of these declining inner-city neighborhoods — with their gloomy, towering office buildings — was nicknamed "Mordor" (after the realm of evil in *Lord of the Rings*). In recent years, smaller digital firms and start-ups occupied the vacated office buildings because of the low rents. "Mordor" became the

¹⁹ This refers to the recent proposal of the Deutsche Bank to tax remote workers (Galouchko, 2020).

area's unofficial and unexpectedly successful *bottom-up* branding strategy. It's a tale as old as time, of decline and of renaissance.

The post-pandemic era will be another chapter in the storybook. Downtowns may change (their qualitative landscape will), but the role of place to root and bring people together will not, just as it had not in the past. For now, solutions need to be focused on helping small businesses remain active with the support of tech — and without letting tech wax lyrical about a future in which remote work is permanent. The tech may support it, but the human psyche likely will not.

The value of face-to-face interaction and the social aspects of work has been made clearer. And while the boundaries of the office have been extending, face-to-face interaction and friendly office gossip will be among the reasons for maintaining an office location, even though these offices themselves may look different. What is more, with prolonged remote work the downsides of blurring private/public boundaries will become more pronounced, including concerns over privacy, digital surveillance and overall psycho-social anxiety over being kept in one place. It is also realistic to expect resistance to change in remuneration structures that Facebook has already alluded to — commuting and amenities are typically factored into salaries, and with work from home companies will look to cut those costs, without thinking about the costs that are incurred on personal budgets. This has already been the case for freelance and creative workers²⁰.

It is difficult to predict what other changes in corporate strategies will occur and how they will affect workers. However, what is certain is that by isolating workers from one another, companies are reducing these workers' ability to bond and reflect on shared experiences and, if necessary, collectively organize to demand changes. More specifically, a shared workplace is not just important for collaboration and exchange of ideas, but also for collective action that holds companies — and cities and governments — accountable.

²⁰ See Bologna, 2018; Taylor and Luckman, 2018; Vinodrai and Keddy, 2015.

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Appendix

Example Semi-structured Interview Guide for Knowledge Workers

Nature of work

What is your profession and what is your current role at the place of your employment?

For how long have you held this position?

Is your work mobile and flexible? (see how interviewee defines "mobile and flexible work" and if needed prompt with flexible schedules and the ability to work from multiple locations)

What kind of activities do you perform as part of your role? (prompt with examples of tasks e.g., reading, writing, communications, data analysis, etc.)

Technology and "wireless mobility"

Do you rely on technology to perform your work? (prompt: software, hardware)

What types of technologies do you rely on?

Are there any activities that you perform that do not require technology?

Travel and commuting

Where do you live?

How do you get to work?

Do you work whilst commuting? (prompt: phone calls, emails)

Do you travel for work?

How often do you travel for work during the day and during the week?

For how long are you away from the office when traveling?

How often do you travel for leisure?

How long, on average, are your personal trips?

Do you work while you're away? (If yes, ask what kinds of activities and for how long)

Typical workday

Could you walk me through your typical workday? (Prompt: do you check your email in the morning?)

Could you walk me through the same day, but only focusing on where you perform your work activities?

Location

Where else do you work other than the office? (Prompt with locations mentioned so far)

Why do you work from these locations?

How often do you work from these locations during the day?

How about the week?

And the month?

Where do you work when you're traveling?

What are some of the constraints you face when selecting an appropriate location for work?

General

For how long have you been in the workforce?

In your experience, has work become more mobile and flexible? (Prompt: what are some of the key changes in how you work over the years?)

What about work culture?

How do you feel about mobile and flexible ways of working? (And why?)

Example Semi-structured Interview Guide for City Planners

What is your current position and role at the City?

What is the City's current focus as it concerns economic development?

What are some of the challenges that the City has been facing regarding the attraction and retention of talent?

What are the key trends that the City has been observing over the past five-to-ten years? (Prompt: location of work, spaces and places in demand)

What about broader labor market changes? (Prompt: project-based, gig economy, freelancing)

How is the City addressing these trends?

How are ongoing activities (real estate developments e.g., Deloitte and Google) affecting the City's current objectives?

How is the City addressing the demand for flexible spaces? (Prompt: coworking)

Based on your experience, what do you think should be the main concern for planners as it pertains to economic development and the location of work? (Long term and short term)

Example Semi-structured Interview Guide for Real Estate Professionals

What are the trends that you are seeing with respect to office real estate? (Over the last 5-10 years) (Prompt: suburban vs urban locations, types of spaces)

Is there variation across industries with respect to the types of spaces and locations they look for? (Prompt: law firms, finance and tech firms — what do they want?)

What about the real estate sector? (Discuss interviewee's own personal experiences)

What would you say influences or affects these real estate changes?

Relative to other countries, like the USA for example, where is Canada with respect to these trends? And Kitchener, Cambridge and Waterloo?

How much of the industrial space is being converted into office space?

How do you classify repurposed old buildings, like the tannery, for example? (Prompt: Class A office space? Class B?)

What seems to be vacating? (Who are these spaces going to be leased out to?) (Prompt: Blackberry)

How do you see office real estate changing in the next five-to-ten years?

How do you see the Innovation Corridor affecting the market?

In your experience, how has the real estate market been adapting to changes in ways of working? (Prompt: mobile work, flexible work, remote work)

Example Semi-structured Interview Guide for Corporate Consultants

What is your role? (And purview)

In what areas (organizational, managerial, spatial) do you specialize and how do you help organizations? (And what kind of organizations?) (Prompt: established companies, start-ups)

What are the key priorities that you find most companies face nowadays? (Prompt: "disruption", future of work)

What are the key priorities from the perspective of talent?

What are the key trends in ways of working that you have observed over the last five-to-ten years? (Prompt: mobile work, flexible work, broader labor market changes)

How has this affected individuals?

How has this affected workplaces? (What is the role of space (and place) in light of these ongoing changes?)

What are the opportunities offered by these changes?

What are the challenges posed by these changes?