# Methods for Uncovering Discourses That Shape the Urban Imaginary in Helsinki's Smart City

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In modern urban environments the technologies that are basic to everyday life have become further embedded in that life. Smart cities are one example of the acceleration of technological change in order to engage with urban sustainability challenges, with Artificial Intelligence (AI) tools as one mode of engagement. However, the discourses through which cities engage with smart city growth and management can have long-term consequences for diverse knowledge held within the imaginaries of situated smart urbanism. As the city of Helsinki increasingly focuses on sustainable smart city initiatives, concurrent research suggests that smart urbanism is at a crossroads, where developers must decide how smart cities choose to engage with its residents' knowledge. This research sets out to ask, how are top-down smart city interventions communicated on Twitter (de)legitimizing diverse knowledge in situated smart urbanism? We draw from Foucaudian theory to identify which discourses are elevated, through statements posted on the social media platform Twitter. By answering this question, our goal in this paper is to examine how Foucault's methods can be used to highlight unseen assumptions about smart urbanism in Helsinki. Our objective is to identify overarching narratives and potential contested conceptualizations of smart urbanism in Helsinki. With our methods, we contribute a novel angle to surfacing power relations that are becoming evident in the development of AI-governed smart cities.

Keywords: smart cities, urban imaginaries, discourse analysis, subjectivities, Twitter discourse, Foucault

## INTRODUCTION

Observing the slow pace of international efforts to forestall the impacts of climate change, the Intergovernmental Panel on Climate Change (IPCC) has recommended further research on the impacts of climate change in urban areas, and an increased focus on adaptation and resilience strategies for cities (Revi et al., 2014; Masson-Delmotte et al., 2021). With the United Nations projecting two-thirds of the global population to live in urban regions by 2030, a range of adaptation strategies have come to the fore, focusing on frameworks including and intertwining smart growth, nature-based solutions, zero and low-impact technological solutions, and social justice in urban

sustainability (Artmann et al., 2019; Kremer et al., 2019; Anguelovski et al., 2020; Cousins, 2021). Critically, the potential for conflicts and synergies between AI-guided economic growth and standards of livability (Allam and Dhunny, 2019) has emerged as a field for future research in smart urban governance. Competing interests in smart city development often lead to an overemphasis on innovative technological solutions, while obscuring infrastructure and social needs that are at once less glamorous and basic to daily urban life (March and Ribera-Fumaz, 2016; Irazábal and Jirón, 2021).

Left unaddressed, the complexities of interacting urban, national, and international governance strategies, combined with individual- and community-level efforts and discourses to combat climate change often result in the depoliticization of urban spaces and power mismatches that threaten socio-ecological justice on the ground (Kitchin et al., 2016; Rossi, 2016; Norman, 2018; Safransky, 2020), emphasizing the political tensions inherent to sustainable urban development (Bulkeley and Betsill, 2005; Martin et al., 2018; Yigitcanlar and Cugurullo, 2020). As will be discussed below, power exists within louder discourses focusing on economic growth and technocentric solutions to sustainability, which mediate urban imaginaries, and thus discredit quieter narratives and limit the potential for socially just urban sustainability (May and Perry, 2017; Dunn, 2018; March, 2018). City planners, who often hold power over expert knowledge production, have also paid less attention to the diverse territorial knowledges in contested spaces that can constitute forms of situated urbanism (Jirón et al., 2021). These discourse producers in turn feed neoliberal trends in city growth that have been problematized throughout the urban planning literature (Weber, 2002; Tochterman, 2012; Grossi and Pianezzi, 2017; Cardullo and Kitchin, 2019b; Burns and Andrucki, 2021).

## The Autonomous Smart City

The lack of a coherent definition for smart cities has been noted repeatedly in sustainable urban planning literature (Mora et al., 2017; Cugurullo, 2020; Burns et al., 2021). However, it is usually understood as a proliferation of information and communication (ICT) technologies, and technocratic and market- driven solutions to urban governance, underpinned by a trust in the pragmatism of smart technologies (Kitchin et al., 2015; Cugurullo, 2020). Networked devices collecting data in all urban spaces and at any time have contributed to new fields of research on situated urbanism and the "real-time city" (Barns, 2012; Jirón et al., 2021). However, critiques of smart urbanization have pointed to contrasting ideas about dominant narratives in *what* makes a city smart ("science" and "efficiency"), and the practical social end environmental implications for *how* a city could be made smart (Buiani, 2020; Cugurullo, 2020; Irazábal and Jirón, 2021). For example, recent scholarship has highlighted the altered social relations developed in the neoliberal conception of the smart city (Kitchin et al., 2019). It has also been questioned how much resilience strategies reliant upon smart urbanization alleviate socio-environmental inequalities and promote justice (Kaika, 2017; Kitchin et al., 2019; Kremer et al., 2019; Safransky, 2020).

In the case of smart cities, economic growth often becomes a primary goal through technological innovation and efficiency, while simultaneously undertaking to improve quality of life (Artmann et al., 2019; Cardullo and Kitchin, 2019b). However, scholars have noted threats to justice as a result of AI-led smart governance, including an increased focus on the wellbeing of affluent communities, marginalization and loss of empowerment, elevation of consumerist cultures, and promotion of neoliberal economic growth, all while in fact neglecting environmental protection (Zuboff, 2015; Martin et al., 2018; Yigitcanlar and Cugurullo, 2020).

For example, while the provision of digital solutions through urban green infrastructure (UGI) has been promoted as a way to accelerate co-benefits for people and nature, automated UGI solutions can come with trade-offs associated with reduced empowerment and representation in urban landscapes (Gulsrud et al., 2018). Social impacts were found in the case of Dublin, where residents were encouraged to take a more passive role in their relationship with the urban environment, with a focus on consumption choice rather than civil rights (Cardullo and Kitchin, 2019a). Further research in Dublin suggests that Living Labs, meant to foster digital innovation through co-production, may compromise autonomy *via* civic paternalism over community ownership of solutions to urban problems (Cardullo et al., 2018). In her 2019 book, Zuboff highlights more abstract risks to individual rights: those of the "*right to the future tense* and the *right to sanctuary*" (Zuboff, 2019, p. 54). Additionally, a recent survey of expert stakeholders in research, policymaking, and management found that despite the weight placed on the perceived benefits of robotics and autonomous systems (RAS) in environmental monitoring, efficiency of infrastructure, etc., there is less understanding about and focus upon the potential threats posed by these technologies to socio-ecological-technological systems including but not limited to loss and over-intensive management of green spaces and biodiversity, reduced complexity in human-environment interactions, and changes in how individuals value ecosystem services (Goddard et al., 2021). In order to draw these complex lines of inquiry together, we chose to examine more closely the discourses that are developed within the case study of smart urbanization in Helsinki. For this reason, we have utilized urban imaginaries as the theoretical platform on which to politicize questions about discourse in Helsinki's smart city, further detailed below.

## The Smart Urban Imaginary

Despite the risks outlined above, discussions about the future of AI-governed smart cities remain limited without also engaging with human imagination and the ongoing quest for the smart utopia (Söderström et al., 2014; Datta, 2015; Grossi and Pianezzi, 2017). The role that imagination plays in developing the city (an inherently creative effort), must not be overlooked when considering how sustainability is conceptualized in urban regions (Lindner and Meissner, 2018). As a critical theoretical framework for understanding urban spaces, Lindner and Meissner refer to the urban imaginary as a concept which acknowledges how space is "*simultaneously* material, conceptual, experienced, and

practiced" (Lindner and Meissner, 2018, p. 2), building upon a general conceptualization of imaginaries that "at once describe attainable futures and prescribe futures that states believe ought to be attained" (Jasanoff and Kim, 2009, p. 120). Imaginaries about what the (smart) city is and what it can become in the future are reproduced and legitimized in multiple sites and by multiple authors (Wiig, 2016; Glass, 2018; Zukin, 2020). As Jasanoff crucially hints toward, the interrelationships between urban imaginaries and entities of power are an important entry point for examining how spaces and discourses mediate behavior (Jasanoff and Kim, 2009; Lindner and Meissner, 2018).

## Analyzing Discourses About Urban Planning on Social Media

There has been much written on theoretical and case study-based critiques regarding smart city growth which examines the economic, environmental, and social effects of such projects (Colding et al., 2019; Artyushina, 2020; Irazábal and Jirón, 2021). A developing line of inquiry is *how* city governments are able to legitimize certain discourses [disciplinary sites "which (constrain *and enable*) writing, speaking, thinking"] (McHoul and Grace, 1993; Hook, 2001) over others, through discourses on social media platforms. Common terms used in Twitter discourses have been analyzed in previous studies examining, for example, how the COVID-19 pandemic should be handled in policy spheres (Wicke and Bolognesi, 2020), and the legitimization of discourses surrounding the UK's handling of its refugee crisis (Bennett, 2018). In the case of urban planning, these discourses shape an implicit understanding of good and desirable futures, and further entrench the urban imaginary (Jasanoff and Kim, 2009). However, here we acknowledge research complementing the development of urban ontologies, which notes that politics should not be considered as a background force, controlling human behavior; human agency is also a factor (Magnussen, 2011).

Discourse analyses on bodies of Twitter data have been used in multiple urban and environmental planning contexts; for example, past research has identified alternative stories about the smart city as told by creative skilled migrants (Monachesi, 2020), assessed public engagement in the management of protected areas (Bhatt and Pickering, 2021), and analyzed the psychological benefits of urban green space use (Plunz et al., 2019). Additionally, recent literature has begun to use Twitter discourse analyses to ascertain how discourses in urban planning and natural resource management are constructed between planners and the public (Williamson and Ruming, 2017; Boyer et al., 2021). Twitter has also been used to gather public perceptions on the relevance of automation, robotics, and AI-managed urban planning for their community (Yigitcanlar et al., 2020). Outside of explicit studies on discourse, past research has also examined human behavior and spatio-temporal activity on Twitter for the purpose of informing urban planning (Resch et al., 2016; Garcia-Palomares et al., 2018).

## Helsinki and Its Smart City Interventions

As of 2021, Finland's capital Helsinki had a population of 658,595 people (Tilastokeskus, 2021). Urban planning decisions are handled by the city council, an 85-member body chosen in municipal elections held every 4 years (City of Helsinki, 2021). The City of Helsinki currently pursues sustainable urban development by focusing on smart initiatives which develop upon economic, environmental, and social capital (Region). The Helsinki City Strategy has been linked to the UN Sustainable Development Goals, and is using smart city initiatives in areas of action including Decent Work and Economic Growth (SDG 8) and Climate Action (SDG 13) (Jaakola et al., 2019). The city of Helsinki's living lab company Forum Virium supports the development of smart technologies and organizes innovation competitions and funding (Hielkema and Hongisto, 2013). In particular, the company places a heavy emphasis on its Agile Piloting Programme, which aims to fast track the development of tech solutions through active experimentation for the benefit of Helsinki residents (Spilling et al., 2019). The city of Helsinki is also a member of the Six-City Strategy (abbreviated as 6Aika), a national effort between the six largest cities in Finland to develop urban areas sustainably, organized by Forum Virium. The strategy operates on the goals of "open innovation platforms, open data and interfaces, and open participation and customership" (Anttiroiko, 2016, p. 10).

Overall, Helsinki has been recognized internationally for its efforts in smart city construction (Mora et al., 2019). However, while it has been frequently acknowledged that there is no "one size fits all" approach to smart city development and its services (Kitchin, 2015; Allam, 2018), international metrics may miss certain social nuances. Past research has found in Santiago, Chile that urban planning interventions involving the smart city are often little more than placebos for cities to participate in worlding exercises, while minimally addressing urban problems (Jirón et al., 2021). Jirón et al. (2021) work upon the concept of *situated urbanism*, wherein local knowledges, and by extension narratives, are linked to spaces of being and thinking, and are necessarily "multiple, incomplete, and strongly attached to place" (Jirón et al., 2021, p. 615). In using this concept, they find that certain knowledges, narratives, and ways of thinking can be discarded by these smart urban interventions (Jirón et al., 2021). Normative assumptions about smart urbanization often lead to an unbalanced focus on economic growth and efficiency (Grossi and Pianezzi, 2017; Irazábal and Jirón, 2021). Further, city-level aspirations for worlding, or the integration of local economies in global capital flows, especially through smart city interventions, has the potential to create tensions with provicializing trends which can promote alternative urbanization narratives (Baker and Ruming, 2015; Burns et al., 2021; Irazábal and Jirón, 2021).

Yet, while these studies have acknowledged the role that Twitter plays in (dis)empowering public discourses in urban planning, what is less emphasized in the wider urban planning and sustainability transformations literature is how power is exercised by city governments to (de)legitimize certain narratives through Twitter, therefore influencing urban imaginaries and situated urbanism. While plans for urban development and redevelopment have been recognized as sites for urban planners

to exercise power in capital accumulation and value extraction (Weber, 2002), Foucauldian methods have not yet been utilized to uncover their effects on situated urbanism.

Given calls for further research into how smart city discourses are being negotiated on the ground (Evans et al., 2019), it remains important to challenge the assumptions about Helsinki's techno-centric approaches to urban dilemmas. The technologies of smart urbanization are simultaneously social and political (Jasanoff and Kim, 2009), and the sharp contrast between a perceived lack of individual autonomy and a more general perception of autonomous and neutral smart technologies signals a need to further explore the consequences of this dichotomy (Hernández-Ramírez, 2017). As the City of Helsinki proceeds with smart urbanism, its power as an institution in part shapes how city residents talk about and perceive themselves within the smart city. In response to the above research gap, this study sets out to ask, how are top-down smart city interventions communicated on Twitter (de)legitimizing situated smart urbanism?

By answering this question, our goal in this paper is to examine how Foucault's methods can be used to highlight unseen assumptions about smart urbanism in Helsinki, which circumscribe the potential for what Jiang et al. (2020) refer to as "smart urban governance," in which the social context of urban problems are identified as a precursor to technological solutions (Jiang et al., 2020). Our objective is to identify overarching narratives for smart urbanism in Helsinki, and potential contested spaces encapsulated by the concept of situated smart urbanism. With our research, we contribute a novel case study that contributes to evidence of power relations that are becoming evident in the development of AI-governed smart cities.

## METHODS

### Foucault in Urban Planning

From a Foucauldian perspective, certain "regimes of truth" are promoted over others when taken in the context of wider "conflicts over meaning that are linked to power" (Jacobs, 2006, p. 44). We contend that Michel Foucault's theories on truth and power are particularly relevant in the context of AI-governance, theories which posited that the concept of an autonomous individual is not possible under the pressures of social structures and discourses (Bevir, 1999). But while power and knowledge are inherently related for Foucault, power does not necessarily lead to relations of dominance and submissiveness; rather, power structures are horizontally networked, producing a system through which an individual becomes known, and is thus placed under a system of power (Mashhadi Moghadam and Rafieian, 2019).

Foucauldian conceptualizations of discourse analyses span a broad range of methods, yet there is agreement that this perspective is interested in knowledge production and the shaping of reality, rather than a strict focus on linguistics (Feindt and Oels, 2005; Sam, 2019). This approach to discourse analysis therefore rests on a foundation of social-constructivist and post-positivist interpretations of meaning (Leipold et al., 2019). This research uses Hajer and Versteeg's definition of discourse as "an

ensemble of ideas, concepts and categorizations through which meaning is given to physical and social realities, and which is produced and reproduced through an identifiable set of practices" (Hajer and Versteeg, 2005, p. 175).

In this sense, Foucauldian perspectives have been applied to past urban planning literature, including assessments on the reformulation of collectivist forms of urban governance (Stenson and Watt, 1999), analyses on the relationships between discourses on social reform and urban planning efforts (Mele, 2000), and inquiries into how different understandings of urban realities shape policies governing ethnic diversity (Hoekstra, 2018). Foucauldian theory has also been used to analyze discourses produced by experts in the smart urban planning field (Wang, 2017). However, as noted above, Foucauldian methods have not yet been used to research how regimes of smart urban planning impact situated urbanism. Thus, the novelty of this research rests in an approach to discourse analysis derived from Foucault's theories on *archaeology* performed on Twitter statements produced by accounts related to Helsinki's smart urban planning regime.

### Desk Research

In order to illustrate the context of the research setting, it is necessary to begin by problematizing and conducting background research on urbanism in Helsinki (Hajer, 2006; Arribas-Ayllon and Walkerdine, 2008; Wiig, 2016; Sam, 2019). The advantage of this is to repoliticize the (smart) city by acknowledging the normative values of diverse interests, and the imaginaries which overwhelm alternative narratives for urban futures (Bunders and Varro, 2019; Schuilenburg and Pali, 2020). The purpose of this section is not to provide a comprehensive historical account of Helsinki's urban history, nor is it to imply a strictly causal relationship between institutionalized urban planning of the past and present. Rather, by acknowledging that discourses are produced and reproduced in multiple sites (Wiig, 2016; Glass, 2018), we aim to draw together diverse perspectives to paint one possible picture of Helsinki as a city. This possible picture amounts to a step in "diagnosing" the present of Helsinki's urban planning (Kendall and Wickham, 1999a). We focused our research on a review of urban planning articles, insights from critical literary and cinema arts, and documentation on Helsinki's smart city initiatives.

### Problematizing Helsinki's Urban History

Since the 1860's, Helsinki's history as an industrial hub has grown, starting as a natural harbor connected by railway to the core of Finland and St. Petersburg (Kervanto Nevanlinna, 2016). This trend accelerated with the 1915 Munkkiniemi-Haaga Plan and the 1918 Greater Helsinki Plan, through which city planners Bertel Jung and Eliel Saarinen played leading roles in detailing Helsinki's expansion (Kolbe, 2016). These plans aimed to solidify Helsinki's position "as a city that belongs within the Western European cultural sphere" (Niemi, 2016, p. 54), detailing "a clear vision of an administrative, commercial and industrial capital city of Finland" (Kolbe, 2016, p. 148). This initiative grew following independence in 1917, and Helsinki's prominence as an industrial core increased, with employment in industrial sectors increasing

through the postwar years until the mid-1960's (Niemi, 2016). However, artistic expressions of the period indicate how poverty was woven into Helsinki's urban memory of the early twentieth century; urban literature from this period explores the sensory world of working class environments, cultural representations that are no longer visually present in the city, but persist in writing (Laine, 2019). Yet, efforts to display a modern image for the 1952 Olympic Games became central to Helsinki's outward identity during this period, with modern transportation and sports facilities linking stable values to future ideals (Niemi, 2016).

From the 1980's, centrally located sites for seaports and factories became desirable areas for cultural centers and habitation, spurring waves of gentrification that continue today (Kervanto Nevanlinna, 2016). Following a period of economic growth in the 1980's, the Finnish mark was tied to the European Currency Unit, driving up unemployment rates—concurrently, filmmaker Aki Kaurismaki was directing films including *Calamari Union* and *Drifting Clouds*, melancholy depictions of the living conditions of ordinary people in Helsinki (Bacon, 2016). In particular, *Calamari Union* serves to portray the stark contrast between the working-class lifestyle in the Kallio neighborhood, compared to that of affluent dwellers of Punavuori (Seppälä, 2017). Following the restructuring of industrialism, factories that were once used as promotional material for Helsinki are less relevant, as European cities looked toward new forms of urbanism (Kervanto Nevanlinna, 2016).

Present-day Helsinki has set itself with the task of becoming "the most functional city in the world," and city planners now are making efforts to collaborate internationally in search of digital tools to make residents' lives easier (City of Helsinki). This is concurrent with an increase in residents of international backgrounds, with 13.5% speaking a language other than Finnish or Swedish in 2015 (Helminen, 2016). Yet there is a degree of tension acknowledged by research on Helsinki's urbanization, which points to a paradigm shift in the way that Helsinki understands urbanity; namely, a to a more dense, cultural hub, which also strives to mitigate segregation (Lilius, 2021).

The city's digital innovation company Forum Virium places emphasis on Agile Piloting, through which tech startups can collaborate with residents and urban planners to "co-create" new sustainability technologies (Spilling et al., 2019; Spilling and Rinne, 2020). Yet, while the public-private partnerships formed through Helsinki's smart city development can foster collaboration and participatory governance over urban planning, increased digitalization in Helsinki has been critiqued for eroding job security (Lönnqvist and Salorinne, 2020). Meanwhile, representations of urban Helsinki in modern literary culture by Mikko Rimminen explore the simultaneous unfolding of reality and imaginary; his trilogy narrating the development of a post-apocalyptic version of Helsinki, testing the reader's understanding of the urban environment and its development (Ameel, 2020). These counter-discourses serve in opposition to, for example, discourses produced by Hannu Mäkelä's book *HyvaJatka*, commissioned by the City of Helsinki to celebrate the development of smart Jätkäsaari neighborhood and distributed

to all residents moving into the area (Ameel, 2020). In effect, the development of these contrasting perspectives between the imaginaries of Helsinki's urban planners and working class serves to illustrate a contested urban space.

## Corpus of Statements

An archive in its colloquial sense can denote a collection of documents kept physically or online, organized but not logically connected. Yet for Foucault, the archive is a site of the production of knowledge, determining not only what can be said, but also what cannot be said; as he and Jacques Derrida note, it is therefore an essential tool for political power (Manoff, 2004). The archivization process and its technologies also have the power to determine what is archived, and consequently, what knowledge is considered legitimate (Manoff, 2004).

We decided to develop our corpus by mining Twitter as a source of statements, as it has become evident that Twitter can be used as a tool for users to shape modern political discourse (Masroor et al., 2019; Pond and Lewis, 2019; Breeze, 2020), and consequently, a tool to shape individual subjectivities (Persson, 2017; Boler and Davis, 2018). While the analysis of discourse using Foucault's methods has been accomplished (if not under an established set of guidelines), the acknowledgment of Twitter as an archive of knowledge is a relatively new method [see for example Sam (2019)]. The use of Twitter as a corpus of statements is appropriate for many reasons, primary among them addressing what is perceived to be one of Foucault's core questions: "Who are we today?" (McHoul and Grace, 1993), but also to acknowledge Twitter's potential as a "form of social control and social possibility" (McHoul and Grace, 1993, p. 26).

We applied for a license to use Twitter's Application Programming Interface (API) for researchers in March 2021. Using Twitter's Developer License and the Tweetsearcher tool developed by the University of Helsinki's Digital Geography lab, we were able to retrieve an original dataset of ∼23,000 Tweets and Retweet *via* Python (Väisänen et al., 2021). We decided to source these Tweets from accounts directly linked to the City of Helsinki's smart urbanization agendas (**Table 1**). Our purpose behind this decision was 2-fold; firstly, while we acknowledge that Foucault's theory of power and knowledge structures power relations as horizontally networked rather than constructed as a vertical hierarchy, we assert that the city's power as an urban planning institution has partial responsibility for shaping not only discourses but the physical spaces they discuss (Mashhadi Moghadam and Rafieian, 2019). Thus, the city has a unique hold over imagined and constructed spaces in Helsinki that merits further analysis. The second reason is practical in nature. When mining Twitter data, deliberate choices must be made in order to limit what can become an endless stream of information (Sam, 2019). Thus, while this dataset excludes accounts held by individuals, public organizations, and the city of Helsinki's other Twitter accounts discussing sustainability in general terms, we are able to center on a specific perspective about the city of Helsinki's smart urbanization agenda. All posts by the accounts were pulled from their join dates until May 25th, 2021.

**TABLE 1 |** Body of Twitter statements derived from the above accounts.

| Corpus of statements derived from | | |
| --- | --- | --- |
| Account handle | Account name | Join date |
| @FiksuKalasatama | Fiksu Kalasatama | April 2015 |
| @ForumVirium | Forum Virium Helsinki | November 2009 |
| @HBH HQ | Helsinki Business Hub | April 2013 |
| @HELilmasto | Helsingin Ilmastoteot | April 2014 |
| @HelsinkiSmart | Helsinki Smart Region | May 2016 |
| @SmartClean FI | Smart and Clean | June 2016 |

## Analysis

Using Foucault's approach requires an understanding of how his theory could be viewed as a toolbox of instruments to be applied to certain lines of inquiry. From here, the application of the theory is not the goal in itself, but rather its use as a means of understanding a specific problematique (Garland, 2014). While we have stated that there is not a single set of requirements for applying Foucault's theory in discourse analysis, past researchers have suggested methods for accomplishing this (Kendall and Wickham, 1999b; Arribas-Ayllon and Walkerdine, 2008; Bourke and Lidstone, 2015). This research draws from methods used by Sam (2019), in which the context of the case study drives analysis (Sam, 2019).

## Archaeology

Once the corpus of statements was finalized, we used Python to execute the first round of analysis, based on Foucault's archaeology (Foucault, 2013). The code can be found in the public repository (https://github.com/hcorinna/smartHEL). The purpose of archaeology is to "look for relationships between and among different statements", in order to look for changes, mutations, and (in)consistencies (Sam, 2019, p. 343). In this phase, we took care to maintain that our analysis was noninterpretive and non-anthropological, terms used by Kendall and Wickham to mean that the Tweets were analyzed only on the basis of their content, rather than authorship or time context (Kendall and Wickham, 1999b).

We began by dividing the corpus into sets of original Tweets and Retweets. We then created a list of the top 50 most common terms in Tweets and Retweets. In order to clean the results, we removed stop words, or commonly used words in English and Finnish, as well as punctuation and numbers (see **Supplementary Material** for coded list of stop words). Using a grounded theoretical approach, we used open coding methodology to categorize these most common terms based on discernible themes (Bryman, 2016; Kennedy and Thornberg, 2018). The most common terms were divided into the functional categories shown in **Table 2**. Following Hyland, we also developed subgroups of text strings composed of the top 50 most frequent strings of four words (fourgrams) of Tweets, as these are more common than five-word strings, and offer more structural and functional clarity than three-word strings (Hyland, 2008). The most common terms and

**TABLE 2 |** Iterative categories of most common terms and hashtags for Tweets and Retweets.

| | |
| --- | --- |
| Cities, regions, and neighborhoods | References to neighborhoods, cities, regions, etc. which imply action at a particular geographic scale |
| Future, time | References to time scales which imply action at a particular time scale in the present or future |
| Transportation | References to mobility needs and action items |
| Accounts | References to other accounts (or "mentions") |
| Communications, transparency | References to events or notifications implying a sense of transparency about smart city initiatives |
| Smart | References to the smart city and data capabilities |
| Intent, action | References to projects or events for community participation |
| Business, jobs | References to business or job growth and development |
| Focus words | References to Helsinki's position as global smart city |

**TABLE 3 |** Iterative categories of most common fourgrams for Tweets and Retweets.

| | |
| --- | --- |
| Subject-oriented | Explanations of activities and experiences in the real world, including location, procedure, quantification, description, topic |
| Text-oriented | Regarding the organization of the Tweet content and its meaning as a message or argument, including transition, resultative, structuring, and framing signals |
| Participant-oriented | Clarifying focus on reader or writer of the Tweet, including stance and engagement features |

fourgrams included references to other accounts (mentions) in order to maintain contextual clarity, and excluded hashtags. This method is also referred to as composing lexical bundles, or "words which follow each other more frequently than expected by chance, helping to shape text meanings and contributing to our sense of distinctiveness in a register" (Hyland, 2008, p. 5). In academic writing, lexical bundles and keyword frequencies have been found to communicate the identity of the speaker and establish certain truths about the content at hand (Hyland, 2010). The most frequent fourgrams in the corpus were divided into the functional categories derived from Hyland (2008): subject-oriented, text-oriented, and participant-oriented (**Table 3**). In addition, we examined the number of followers for each account, and an iterative analytical process that utilized the conceptual groupings of common terms, fourgrams, and hashtags in Retweets.

Previous studies on Twitter discourse have established the linguistic and cultural importance of hashtags in communicating social movements and identities (Konnelly, 2015; Reyes-Menendez et al., 2020), as well as the role of the hashtag in what (Zappavigna, 2012) refers to as "searchable talk," or signals toward the performative nature of social movements (Brock, 2012). Because of this, we decided to analyze groups of hashtags separately from Tweet statements themselves, using the same iterative coding process as for the dataset of most common terms. We decided to preserve instances of the same word in Finnish

**TABLE 4 |** Discourses in Tweets and Retweets as reflected by top 50 most common terms.

| Dominant discourses—common terms | | | | |
|---|---|---|---|---|
| Categories of common terms | Tweet frequency | Tweet frequency in % | Retweet frequency | Retweet frequency in % |
| Cities, regions, and neighborhoods | 5,424 | 42.07 | 3,413 | 30.13 |
| Future/time | 775 | 6.01 | 642 | 5.67 |
| Transportation | 223 | 1.73 | 308 | 2.72 |
| Accounts | 708 | 5.50 | 3,751 | 33.12 |
| Communications, transparency | 1,358 | 10.53 | 0 | 0 |
| Smart | 1,950 | 15.12 | 939 | 8.29 |
| Intent/action | 1,152 | 8.84 | 1,187 | 10.48 |
| Business | 843 | 6.54 | 415 | 3.66 |
| Focus word/superlative | 460 | 3.57 | 671 | 5.92 |
| **Total** | 12,893 | 100 | 11,326 | 100 |

*Categories of common terms were defined through inductive coding.*

**TABLE 5 |** Discourses in Tweets and Retweets as reflected by top 50 most common hashtags.

| Dominant discourses—hashtags | | | | |
|---|---|---|---|---|
| Categories of hashtags | Tweet frequency | Tweet frequency in % | Retweet frequency | Retweet frequency in % |
| Cities, regions, and neighborhoods | 2,864 | 42.22 | 1,752 | 36.85 |
| Transportation | 496 | 7.31 | 178 | 3.74 |
| Smart | 2,311 | 34.07 | 2,266 | 47.66 |
| Climate and Health | 641 | 9.45 | 316 | 6.65 |
| Jobs | 471 | 6.94 | 243 | 5.11 |
| **Total** | 6,783 | 100 | 4,755 | 100 |

*Categories of common hashtags were defined through inductive coding.*

and English recorded twice in the same list (for example, the hashtags "avoindata" in Finnish and its translation "opendata" in English were counted 176 and 129 times, respectively). Following a similar iterative approach to coding common terms, we then divided the list of hashtags to into common conceptual groupings (Bryman, 2016; Kennedy and Thornberg, 2018).

# RESULTS

## Consistency

Narrative consistency about smart city development took shape in Tweets and Retweets through the use of common terms, fourgrams, and hashtags. **Table 4** displays how original Tweets that referred to specific cities, regions, and neighborhoods were

**TABLE 6 |** Functions of fourgrams in Tweets and Retweets.

| Text functions—fourgrams | | | | |
|---|---|---|---|---|
| Functions of fourgrams | Tweet frequency | Tweet frequency in % | Retweet frequency | Retweet frequency in % |
| Topic-oriented | 590 | 63.30 | 209 | 62.20 |
| Text-oriented | 116 | 12.45 | 45 | 13.40 |
| Participant-oriented | 226 | 24.25 | 82 | 24.40 |
| **Total** | 932 | 100 | 336 | 100 |

*Function categories were derived from Hyland (2008).*

the most common theme (42%). Within this category, the majority of these geographic scales of place referred to Helsinki or Finland (63%), and with relatively few terms referring to international regions or the world overall (10%).
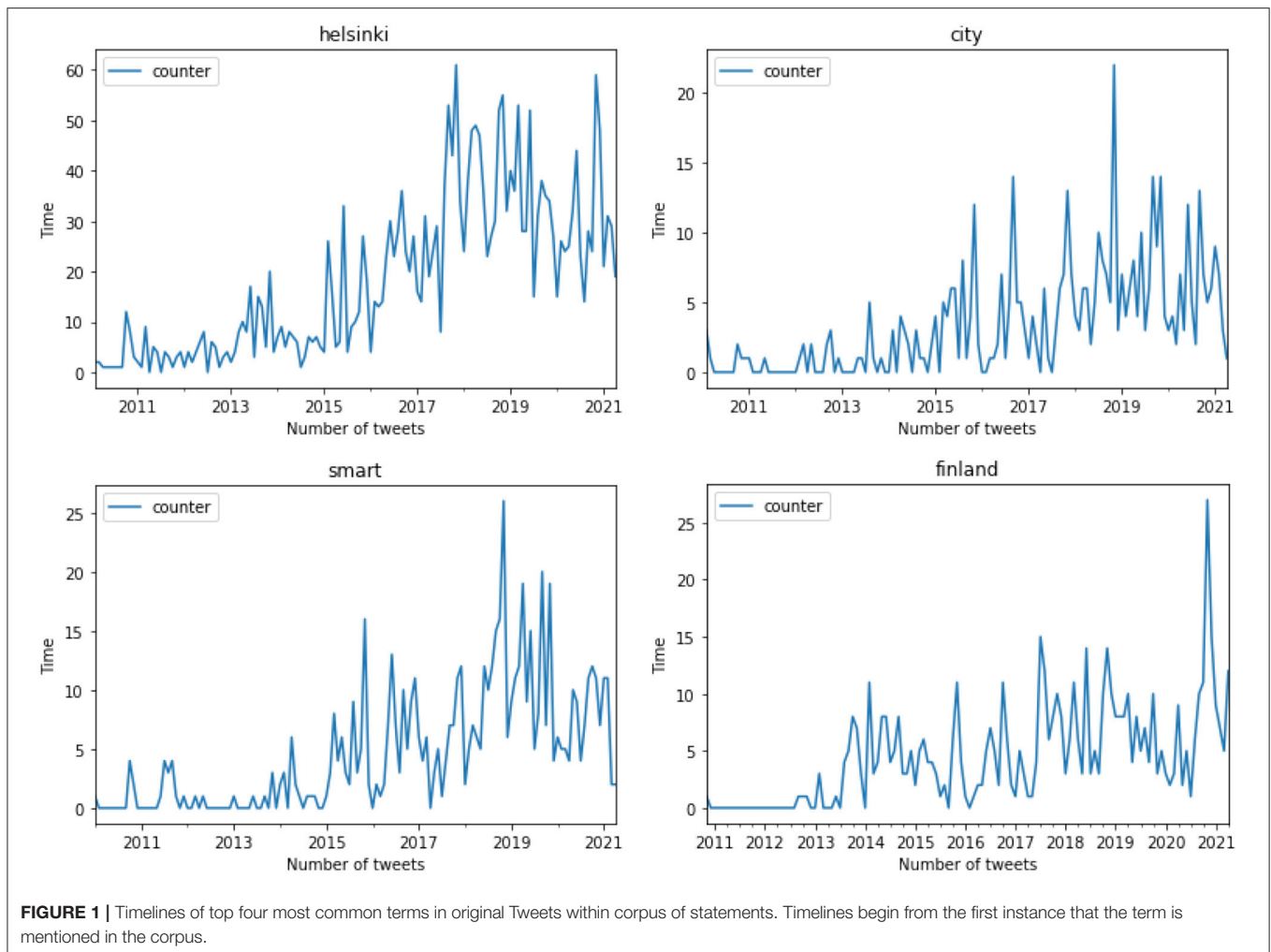
Under Retweets, the most common terms were mentions to other Twitter accounts, including those of politicians and pilot projects (33%). Most of these mentions referred to @ForumVirium; however, excluding this account, other mentions predominantly focused on individuals related to smart Helsinki and politicians in support of these plans. Similarly to original Tweets, cities, regions, and neighborhoods were a common theme (30%) that emerged from the discourse (**Table 4**).

The common discourses in original Tweet hashtags were found in geographic scales (42%) and references to smart technology (34%). The neighborhoods most commonly referenced in the corpus were Jätkäsaari and Kalasatama, two test-bed neighborhoods which are the sites for Forum Virium's Agile Piloting Programme. While the category of geographic scales held the majority in terms of frequent discourses, the Smart category held more varied hashtags (22 separate instances). Hashtags in Retweets followed a similar pattern, with references to smart technology occuring most frequently (47%), and hashtags of cities, regions, and neighborhoods occurring at 37% frequency (**Table 5**).

Functions of fourgram phrases in Tweets and Retweets were commonly oriented toward "subjects," or explanations of activities in the real world (63 and 62%, respectively) (**Table 6**). Similar patterns of fourgram functions were seen overall when comparing across Tweets and Retweets, which were less likely to be focused on participant engagement or transitions within text (**Figures 5**, **6**).

## Mutations and Change

In the years following the release of the Helsinki City Strategy 2017–2021, Tweets and Retweets about smart city initiatives in Helinki increased (**Figures 1**, **2**). Following the release of this strategy, Retweet discourses surrounding the City of Helsinki's innovation company, Forum Virium, also gained a foothold. These discussions also emerged at a similar time to hashtags "avoindata" and "iot" (**Figures 3**, **4**), popular search terms and hashtags that imply the linkage between smart city development and technological innovation. Over time, original

**FIGURE 1 |** Timelines of top four most common terms in original Tweets within corpus of statements. Timelines begin from the first instance that the term is mentioned in the corpus.

Tweets discourses have become more Helsinki-centric, and lean heavily on its smart city initiatives. However, discourses derived from Retweets tended to peak on the topic of Helsinki and the smart city in about 2016–2017, after which discussions tend to focus more on projects associated with this goal.

## Contradictions

There were little or no indications of contradictory statements to be found within or across sets of Tweets and Retweets. The lists of most common terms, fourgrams, and hashtags all followed a similarly consistent narrative and change over time, which focused on technological solutions and innovation capacity to find solutions to urban problems, including carbon emissions, public transportation, and climate change adaptation.
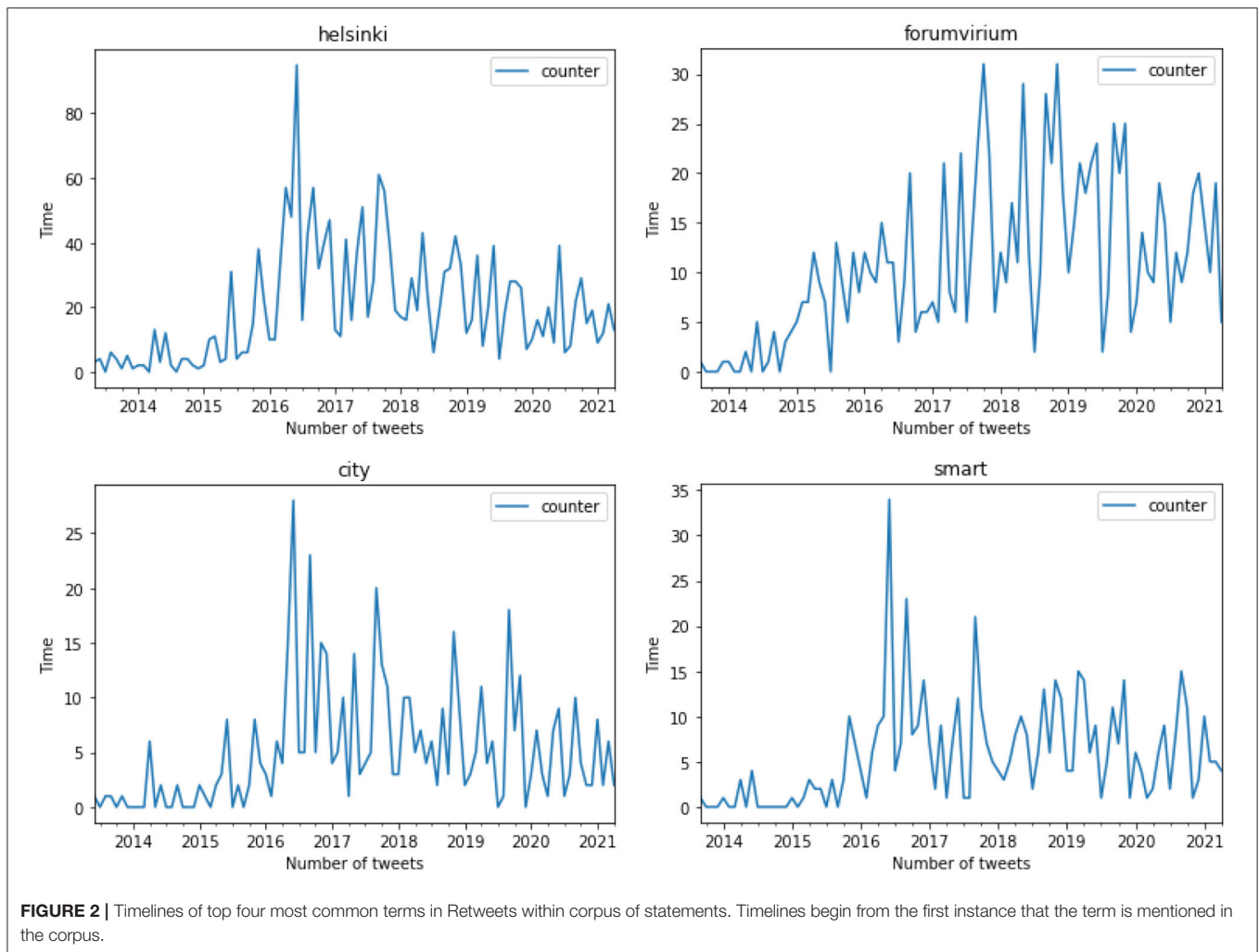
## Authority and Legitimacy

In terms of overall original Tweets, @ForumVirum is the oldest account (**Table 1**), has the largest amount of followers (over 4,800), and has control over narratives related to smart city growth, and projects related to finding solutions for climate change adaptation and mobility. In contrast, @HelsinkiBusinessForum had more control over narratives related to corporations invested in solutions to climate

change. This pattern was similar in the set of Retweets. However, @ForumViriumH and @FiksuKalasatama more frequently elevated the narratives of Twitter accounts held by individuals related to the management of Forum Virum and Smart Kalasatama. The relationship between knowledge and power is exercised here by promoting circular discourses, or strategically retweeting accounts with a confirmatory bias.

## DISCUSSION

This study set out to uncover potential discourses that are elevated or delegitimized by the City of Helsinki's Twitter accounts regarding the use of artificial intelligence in smart urban development, its contribution to situated smart urbanism in this corpus. Our methods, derived from Foucauldian theories on discourse, allowed for an iterative approach to analyzing our corpus of statements. While the purpose of this paper is not to identify each narrative thread taking place within the corpus, we were able to highlight some of the louder discourses occuring on Twitter through the application of *archaeology*.

**FIGURE 2 |** Timelines of top four most common terms in Retweets within corpus of statements. Timelines begin from the first instance that the term is mentioned in the corpus.
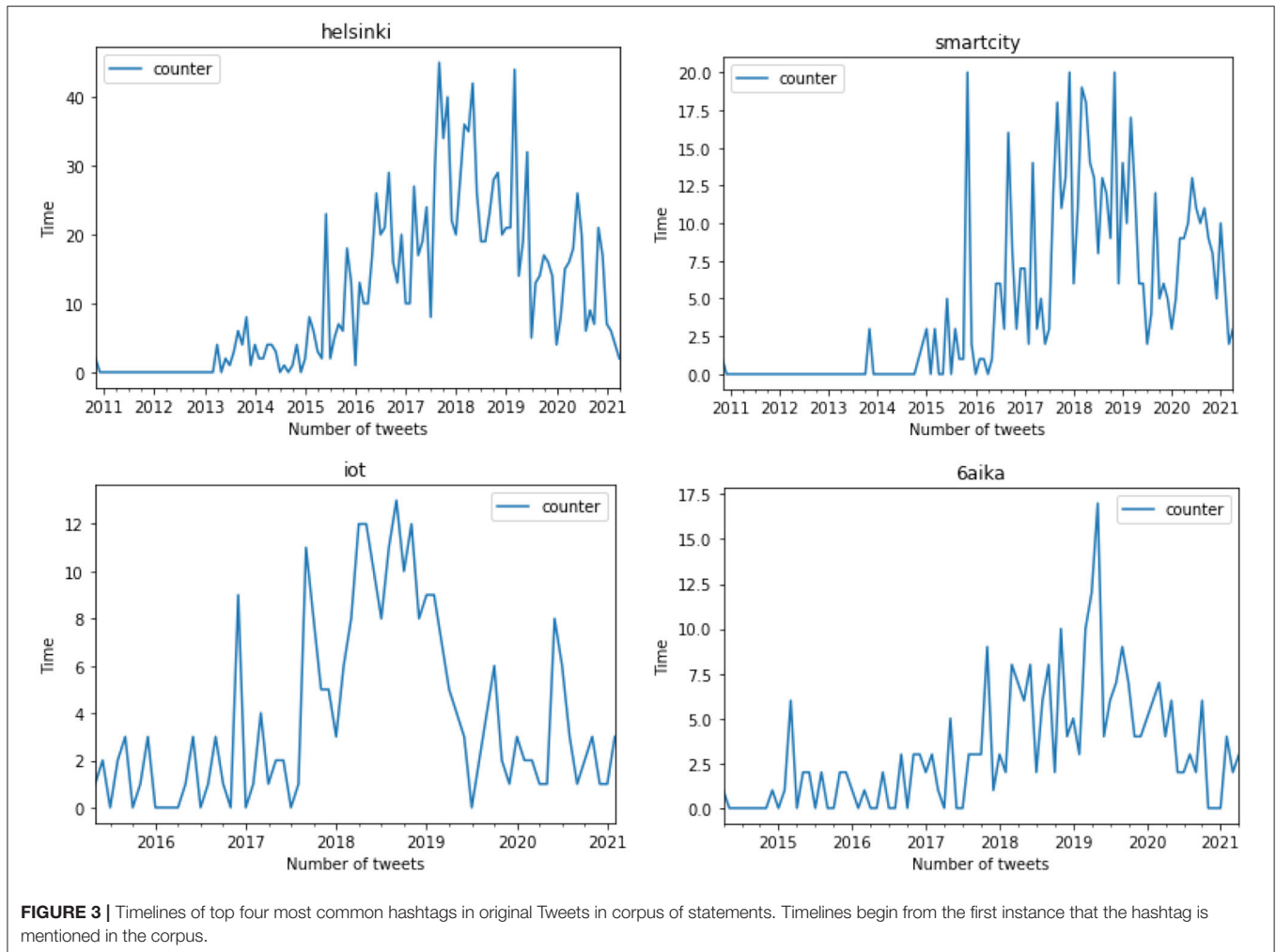
Our study found that the narratives presented by the city of Helsinki were consistent over time, and followed a pattern consistent with the progress of Forum Virium and the development of the Kalasatama and Jätkäsaari neighborhoods. Our corpus gave no indication of contradictory statements within Helsinki's smart goals, which is likely a reflection of a focused agenda with more or less intentional outcomes. However, while there was no indication of contradictory statements in lists of common terms, fourgrams, and hashtags, this does not mean that the corpus as a whole did not contain contradictions. Rather, it is indicative that the louder narrative surrounding Twitter statements from the City of Helsinki is one centered upon technological innovation.

## Urban Competition

Our analysis of dominant discourses in common terms suggests a strong focus on smart urbanism in Helsinki specifically, and its effects on Finland as a whole. While it is to be expected that the City of Helsinki's Twitter accounts would center discourse on the development of its own urban region, it is telling that there is little discourse related to the cooperative or collaborative impact of smart development in Helsinki on other cities in Helsinki and around the world. While 6Aika is a frequent hashtag in our corpus of statements, the city of Helsinki does not frequently refer to other Finnish cities in terms of common words, fourgrams, or hashtags. The lack of collaborative discourses implies a desire on the part of the City of Helsinki to make the region more competitive nationally and globally, despite public efforts to create a nationally unified smart city goal. Overall, this follows patterns discussed in previous smart city literature, in which the smart agenda is seen as conducive toward a corporate-driven competitiveness on an international stage (Herrschel, 2013; Hollands, 2015b).

In a narrower geographic scale, our analysis on discourses involving hashtags also suggests that the City of Helsinki's focus on smart growth leans heavily on pilot neighborhoods (Kalasatama and Jatkasaari), for testing solutions to urban problems including public transportation and energy use. These neighborhoods are also the focus sites for Forum Virium's Agile Piloting Programme, which aims to increase

**FIGURE 3 |** Timelines of top four most common hashtags in original Tweets in corpus of statements. Timelines begin from the first instance that the hashtag is mentioned in the corpus.

the competitiveness and experimental nature of Helsinki's tech startups (Hämäläinen, 2020). Indeed, past studies researching frameworks for smart city design in Helsinki observe a high degree of focus on the development and experimentation of digital technologies, including artificially intelligent city services (Hämäläinen, 2020). However, it is unclear whose knowledge is used to defined the urgency of these urban problems. For example, collaborative efforts have been made to develop a more streamlined healthcare system for the Kalasatama neighborhood through community workshops, and make public city decision- making documentation through the OpenAhjo app; however, these bottom-up, collaborative approaches are not central to this study's corpus. Additionally, it is not transparent who was invited to participate in these collaborations, and whose needs are prioritized in smart innovations that, while contributing to open data platforms for Helsinki, are not necessarily a priority for average residents.
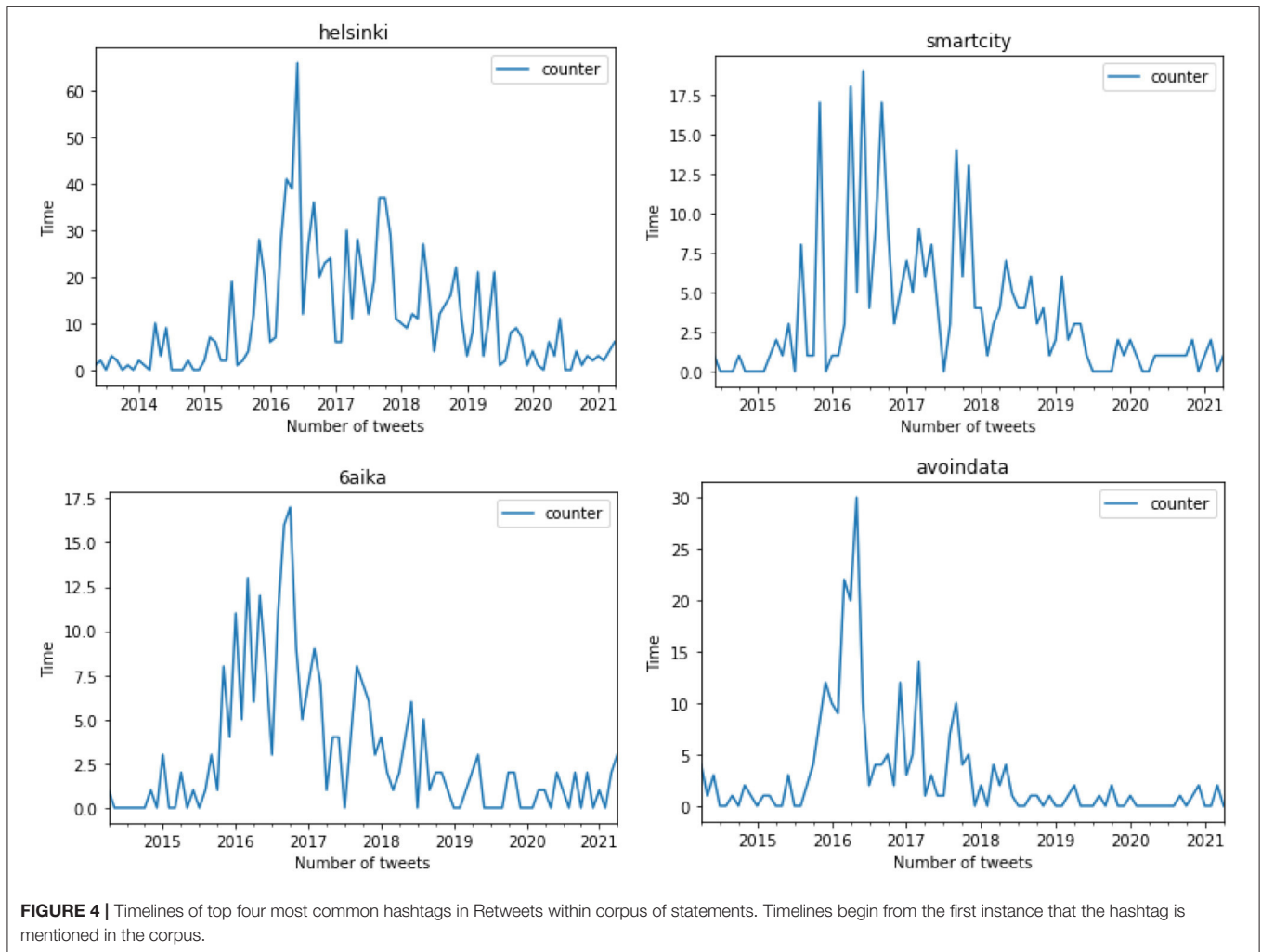
In this sense, our results confirm past research on the coded (in)visibilities of the smart city, and highlights again critical questions about who participates in vision-making and practical implementation of the smart city (Burns and Andrucki, 2021).

These findings also return us to the assertion of our desk research, in which the imaginaries and knowledges of the working class are not necessarily the visions which direct the development of the smart city. With current research highlighting the right to the (sustainable) smart city and the potential for bottom-up approaches to smart governance (Cardullo et al., 2019; Heitlinger et al., 2019; Kitchin et al., 2019), it is becoming increasingly imperative that these issues are addressed by urban planners.

## No Looking Back

There is also little if any reference to the past of Helsinki's urban development, and how current plans for the smart city relate to lessons that have been learned in the past. The initial, and indeed logical, interpretation of this may be in part due to the nature of Twitter as a site for content production for current events. However, while future-oriented projects spur innovation and break boundaries in technological growth, the lack of recognition of Helsinki's urban past, and critically, *urban problems of the present*, risks denying history in favor of louder desirable futures.

This pattern is observable in our analysis of fourgrams, which use a tone advertising the future of smart growth

**FIGURE 4 |** Timelines of top four most common hashtags in Retweets within corpus of statements. Timelines begin from the first instance that the hashtag is mentioned in the corpus.

in Helsinki. These fourgrams correlate to past studies pointing to the role of urban rankings in pacesetting the conceptualization and construction of smart cities globally (de Almeida, 2019). While cities may rank highly in terms of the development of internet-based technologies, or sustainable development indicators, these rankings may ignore other urban problems, including mobility and social stratification (ibid.). Minimal acknowledgment of Helsinki's past urban issues and the diverse knowledges that contribute to an understanding of its contested spaces continues a trend of path dependency and lock-in (Olsson et al., 2014; Mäkinen et al., 2015).

It is useful to consider this result from the perspective commonly held in Finland that residents are part of a "classless society," and that Helsinki places a great emphasis on the development of the so-called "creative class" (Kantola and Kuusela, 2019; Lilius, 2021). This perception persists despite a wealth of Finnish cultural depictions focused on class struggle, and the downward trajectories of marginalized groups in Helsinki referred to in our desk research (Ameel, 2014; Bacon, 2016). And yet, a Lefebvrian viewpoint would insist that (urban)

spaces do not occur spontaneously, without the context of social practices and histories (Zieleniec, 2018). The development of these imaginations of space throughout Helsinki's history points to a need for greater emphasis on how its past indeed influences its future. In order for residents and urban planners in Helsinki to engage critically with smart urbanism, they must do this while simultaneously interrogating the disconnect between social perceptions of egalitarianism and social stratification.

## Marketable Catchphrases

It is evident that the development of Helsinki's smart city is advertised widely over its Twitter discourses. This marketing leans heavily on certain phrases and projects that are easily memorized, but often not explained or justified as to what urban problems are being solved by these initiatives. Although it is implied that a smart Helsinki is progressive and an inherent improvement upon past urban planning design, it is less clear how or if the City of Helsinki uses Twitter to critically engage with shortcomings in smart urbanism overall.

Analysis through the use of fourgrams and hashtags was helpful for identifying certain catchphrases used to promote

**FIGURE 5** | Timelines of top four most common fourgrams in original Tweets within corpus of statements. Timelines begin from the first instance that the hashtag is mentioned in the corpus.
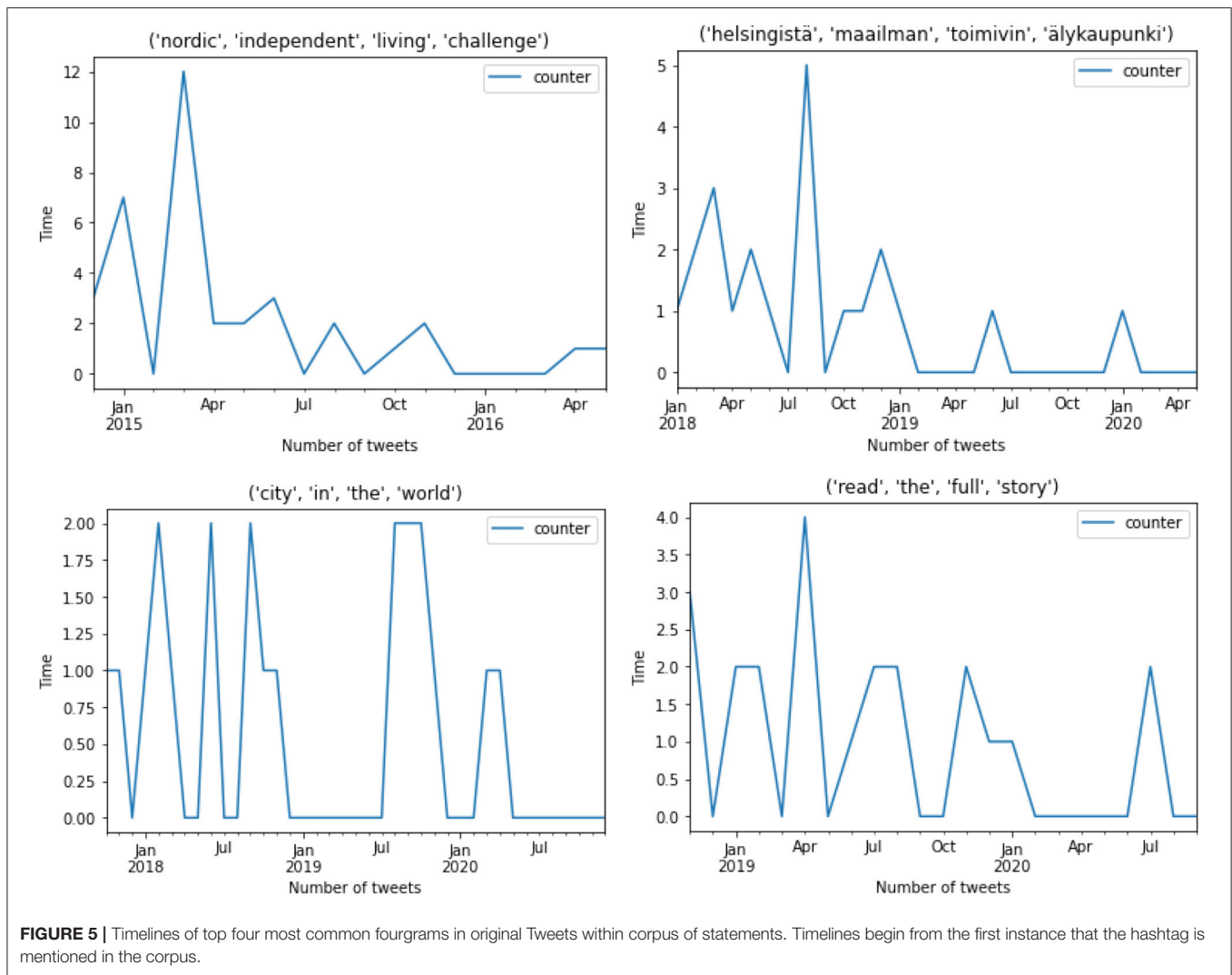
Helsinki's smart city development. These catchphrases were typically parts of highly ranked fourgrams; for example, "Helsinki is the most functional city in the world" (corresponding Finnish phrase "Helsingista maailman toivimin alykaupinki"). Similarly, hashtags were often phrases that advertised Helsinki's role in and action in developing its smart city. Related to urban rankings limiting discussion about urban problems is the trade-off for a focus on branding and the development of a global image (de Almeida, 2019). While there is a high degree of focus on the improved functionality of urban space in Helsinki, there is little indication of a willingness to contextualize artificially intelligent governance to the needs of residents, or need for reflexivity in ongoing smart city development (Jean and Daniel, 2016). Especially acknowledging that smart city development and governance is assembled piecemeal, a marketing focus on becoming the "best city in the world" circumscribes conversations about how smart Helsinki occurs in practice (Shelton et al., 2015).

Understanding the City of Helsinki's role in the ownership, and thus in the conceptualization of Helsinki's urban space, urban planners must also look toward the political values shaping this contested space (Zieleniec, 2018). Helsinki has not been constructed neutrally, and the dominance of this fourgram within a catchphrase marketed to Helsinki residents implies a lack of recognition about the social issues relevant to the city.

## Implications for Smart Helsinki

The future of discourse production from the City of Helsinki must take into consideration the needs of its community. It is telling that there is little to no reference to the potential for a smart city that is built on themes of cooperation and increased feelings of community. Rather, the overriding narrative is based on a need to build not only the competitiveness of tech startups, neighborhoods, and Helsinki overall. A corporate-driven smart city poses limitations for a wider understanding of how "smartness" and "sustainability" work for the benefit of
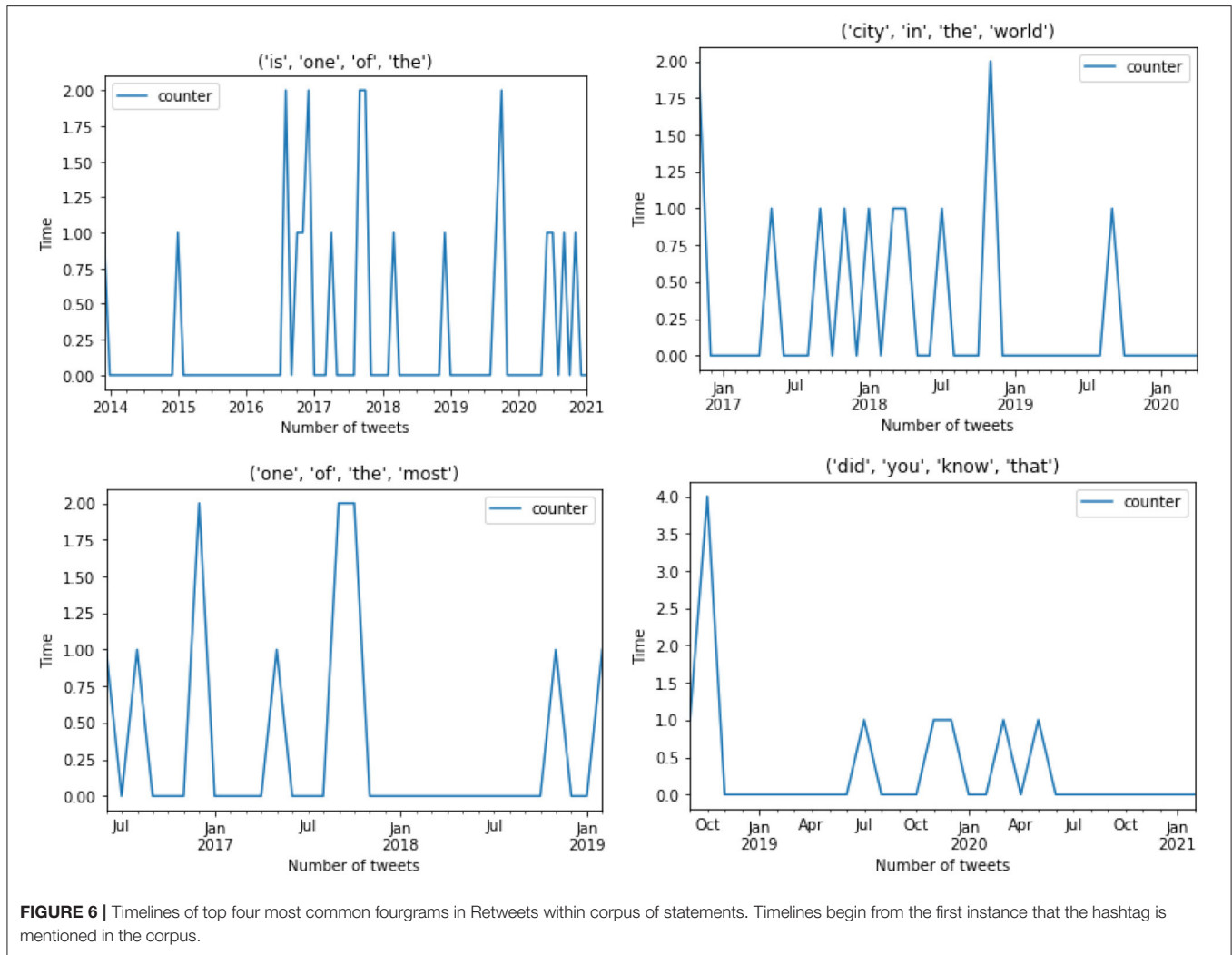
**FIGURE 6 |** Timelines of top four most common fourgrams in Retweets within corpus of statements. Timelines begin from the first instance that the hashtag is mentioned in the corpus.

residents, and restricts the smart urban imaginary to visions promoted by corporate entities and urban planners (Hollands, 2015a; Sadowski and Bendor, 2019). Potential remedies for this top-down approach may indeed rest upon a *community-driven* definition of the smart city, in which residents decide the most urgent agenda that the smart city can resolve, thereby softening the effects of "corporate storytelling" (Söderström et al., 2014). The elevation of these alternative imaginaries of the smart city will allow urban planners to engage more thoughtfully about for whom is the smart city (Luque-Ayala and Marvin, 2019).

The lack of reference to the past of Helsinki's urban history was striking, though not surprising, given the narrative trend of fast-tracking new technologies and the focus on newly-developed neighborhoods in Helsinki. However, increased reference to the sometimes shared, sometimes disparate histories of Helsinki residents can have an empowering effect on the desire to maintain and share urban culture (Sandoval, 2018). Especially when regarded in the face of increasing gentrification (Lilius, 2021), the erasure of culture from space could be slowed, and goals for a more inclusive urban space could be met, by acknowledging the diversity of how Helsinki residents know and remember

their surroundings. This is particularly relevant for the ongoing development of the urban imaginary, in which knowledges of an urban past and present are contested and shaped in a contemporary setting (Bloomfield, 2006).

## Limitations and Future Directions

This study undertook to identify dominant discourses found in a corpus of Tweets collected from the City of Helsinki's accounts on smart urban planning. This study did not examine discourses of Helsinki residents with regard to the smart city, but instead decided to focus on the top-down discourses produced by the City of Helsinki. we also focused on Tweets specifically related to smart urbanism, rather than sustainability in Helsinki as a whole. While this method for examining discourses was able to identify some prominent themes in smart Helsinki's social media presence, we cannot claim that these discourses are "dominant" in discussions about urban planning. Additionally, we do not yet understand how these discourses are perceived by residents (work that has been done in past research (Yigitcanlar et al., 2021). Future research on the ongoing development of the smart urban imaginary should examine discourses produced on other

forums, and by other (possibly interacting) groups. Possible avenues for research also include bottom-up approaches to how community discourses on artificial intelligence and the smart city are created, and further legitimized.

Overall, we assert that, while we did not analyze counter-discourses in this study, those produced by the City of Helsinki on Twitter are underpinned by capitalist understandings of the perceived need for growth, which must be questioned and reworked in order to produce sustainable futures (Asara et al., 2015; Albert, 2020; McPhearson et al., 2021). McPhearson et al. and others in the sustainability transformations literature highlight the urgent need to acknowledge and act upon the dissonance contained in the "pro- growth within environmental limits and societal benefits" ideology (Lang and Rothenberg, 2017; Albert, 2020; McPhearson et al., 2021). AI-managed smart cities have so far managed to fit neatly into this narrative of efficiently managed green growth in cities, allowing urban planners to navigate masses of complex, living data (Nigon et al., 2016; Allam and Dhunny, 2019). Suggestions for challenging this narrative in future research and practice in urban planning include how smart urban imaginaries can engage with theories on degrowth for a more critical dialogue with social justice (March, 2018). Additionally, building collective agendas for provincialization and local goal-setting can help limit influences of consumer behavior and corporate interests (Evans et al., 2019; Irazábal and Jirón, 2021). Previous work has noted that encouraging issue-based citizen participation may have the potential to elevate the lived experiences of urban residents, and promote *substanive* forms of citizenship (Häkli et al., 2020). However, urban planners should consider this goal thoughtfully to manage the risks we have discussed in allowing companies to engender or otherwise define citizenship through smart technology. In sum, we find that a more relational understanding of smart city interactions at a global scale can help illuminate tensions between geopolitical contexts and multi-layered sustainability governance (Burns et al., 2021).

## CONCLUSION

Through discourse analysis methods derived from Foucault, this research was able to identify some of the overriding discourses that are produced by the City of Helsinki on smart urbanism and AI governance. The initial finding of our research was unsurprising, in that the city of Helsinki focuses on technocratic management of urban problems, and keeping Helsinki competitive on a global stage. However, we assert that the discourses frequently observed in our corpus

contribute to an understanding of situated smart urbanism that legitimizes corporate strategies for smart urbanism, while sacrificing resolutions to urban problems that could be defined by Helsinki residents.

With this research, we find that the use of discourse analyses which surface power relations can be useful for the future of urban planning and governance strategies which strive to resolve urban socio-environmental problems, both inside and outside of the smart city context. By uncovering these unseen assumptions about the city of Helsinki's goals for smart city development, community discussions are better able to redirect focus on "smart urban governance" through diverse forms of situated knowledges and developing just solutions to urban problems, with the aid of smart technology.

## DATA AVAILABILITY STATEMENT

The data analyzed in this study is subject to the following licenses/restrictions: this dataset is restricted by the terms of the Twitter Developer Agreement. Requests to access these datasets should be directed to sara.zaman@helsinki.fi.

## AUTHOR CONTRIBUTIONS

SZ was primarily responsible for development of the research question, interpretation of data, and writing the original draft of the submitted manuscript. CH was responsible for data analysis using programming *via* Python. SZ and CH were responsible for data collection and editing the submitted manuscript for critical content revisions. All authors contributed to the article and approved the submitted version.

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The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frsc.2022.796469/full#supplementary-material

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