



Evolving spatialities of digital life: Troubling the smart city/home divide

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ABSTRACT

While feminist geographers have long aimed to trouble conceptions of the city/home (and, by extension, public/private) divides, the digital city and the digital home are still often theorized as separate phenomena within much digital geography literature. Drawing on previous work on feminist home-city geographies, this paper proposes four analytical frames for reflecting on the relationship between urban and domestic space in digital geographies: governance, domestication, thresholds, and dwelling. The paper explores each lens through a critical review of recent literature in digital geographies and related fields. It weaves this review through a speculative reading of the Eco Delta Smart City, an experimental development building the smart city from the home up in Busan, South Korea. We show how each lens calls attention to distinct sets of questions, actors, agendas, and relations—thus refusing any single reading of the project or of the broader trends around digitalization of which it is a part. In the process, we trace how digitalization does not simply trouble existing spatial categories, but rather makes them manifest in new ways for differently situated subjects.

1. Introduction

Research on emerging digital geographies tends to take ‘the city’ as a primary scale of analysis (Luque-Ayala, 2019), producing insights around the smart city (Kitchin, 2014), platform urbanism (Barns, 2019a; Sadowski, 2020a), urban automation (Cugurullo, 2021; Macrorie et al., 2021), urban algorithmic governance (Leszczynski, 2016; Safransky, 2020) and other manifestations of a broader ‘digital urbanism.’ Related scholarship traces the emergence of smart home technologies (Goulden, 2021; Maalsen, 2020, 2022) and related domestic and intimate encounters with digital systems (Brause & Blank, 2020; Cockayne et al., 2017; Lynch, 2021a). Within this work, some scholars have explicitly troubled scalar logics that might oppose the city to the home such as by focusing on the ‘mundane’ (Leszczynski, 2020; Pink et al., 2017) or ‘everyday life’ (Barns, 2019b; Lynch & Farrokhi, 2022) in human engagements with the digital in ways that cut across neat spatial divides. Despite this, much scholarship in digital geographies continues to focus on the city or the home as largely separate sites of analysis, or have otherwise avoided explicitly theorizing the relation between urban and domestic space in processes of digitalization.

Yet, feminist scholars have long troubled any neat separation of urban and domestic space as they have deconstructed the public-private binary and situated the home as a key site of social and political analysis

and action (Katz & Monk, 1993; Marston, 2000). This is part of a broader project in feminist geography focused on challenging scalar logics (Marston et al., 2005) and related container-models of space (Massey, 2005), instead developing anti-essentialist understandings of spatiality centered on embodiment and the contingent production of spatial relations. In troubling scalar logics that might oppose the nation-state to the home or the scale of the body, for instance, feminist geopolitics has aimed to redefine “what counts as geopolitics and what is appropriately studied through a critical geopolitical lens” by tracing “how geopolitical processes shaped and were shaped by everyday experiences and interactions” (Massaro & Williams, 2013: p. 567, p. 569). Work by Jackman and Brickell (2022), for instance, shifts scholarly debates around drones to the scale of the body and the site(s) of homes in the Global North, tracing the ways drones become domesticated, adapting military logics of securitization and enclosure. In another case, Lynch (2019) employs a feminist geopolitical lens to examine the development of a master-planned smart city project in Honduras, re-scaling focus from geopolitical narratives of development and utopian urbanism to the embodied and lived experiences and political agency of local residents facing potential displacement.

Reflecting this feminist anti-essentialist spatiality, Blunt and Sheringham (2019: p. 829) have called for research on home-city geographies “that encompasses the interconnectedness and porosity of urban

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domesticities and domestic urbanism.” Bringing together home studies and urban studies, this research agenda aims to “address the interplay between lived experiences of urban homes and the contested domestication of urban space” (Ibid., p. 829–830). Yet, as Koch and Miles (2021: p. 1384) point out, “Blunt and Sheringham’s discussion... does not consider the role that digital technology often plays in these processes.” Feminist digital geographies literature highlights how digital systems increasingly mediate intimate encounters in and beyond the home (Koch & Miles, 2021), determine access to (and experiences of) housing in the city (Fields, 2022), extend surveillance and securitization practices into the home (Jackman & Brickell, 2022), and are key to enactments of home by migrants in global cities (Cowen et al., 2020). We acknowledge that many of these processes of digitality (e.g. surveillance, measurement, optimization) are not limited or defined solely through the spatial categories of home or city (“the urban”), but also refer to new relationships between individuals, companies, and regional/national forms of governance. Still, it is clear that these socio-spatial categories remain salient and durable, and that the shifting boundaries and practices that produce them need to be further elucidated.

Working toward this aim, this review paper brings recent smart city/home literature together with insights from feminist/digital geographies in order to explore emerging smart city domesticities and the urban entanglements of the smart home, and question how these categories are troubled by processes of digitalization. Whereas the spatiality of digitalization is often conceived as part of the framing of digital geographies scholarship (defined by a focus on smart *cities* or platform *urbanism*, for instance), we propose approaching the spatialities of everyday digitality as a *question*. As such, we build on work articulating a critical and intersectional *feminist* approach to digital geographies which has aimed to pluralize the sites, actors, and perspectives of interest to digital geographic inquiry and to problematize and interrogate taken-for-granted categories of analysis (Elwood, 2021; Elwood & Leszczynski, 2018). For instance, in a paper on gender in online gaming, Woods (2021) troubles distinctions between online and offline spaces, as well as between gaming and non-gaming spaces. Likewise, Richardson (2018: p. 1) troubles traditional understandings of geographies of work, tracing how “[digital] technologies enact an *extension* of the activities that count as work, together with an *intensification* of working practices, rendering the boundaries of the workplace *emergent*.” More broadly, scholarship across feminist digital geographies question the variety of ways that hegemonic digitally-mediated socio-spatialities are reproduced, as well as the ways they fail, are disrupted, contested, or might be re-imagined and re-built otherwise (Leszczynski & Elwood, 2022; Lynch, 2022; Vadiati, 2022). This review paper builds on this previous work in feminist digital geographies by questioning common, taken-for-granted distinctions between the home and the city and tracing how these categories do not simply disappear but rather come to manifest in new ways for different subjects. It draws together recent digital geographies and related scholarship and reads it through a speculative case study. The paper aims to trace both the ways normative conceptions of home and city are reproduced and re-articulated through digitalization, as well as the ways affective experiences of home and city and the agencies of differently situated subjects always exceed such normativity.

To that end, we explore the smart home/city by reading it through a series of established analytical frames—drawing in part on Blunt and Sheringham (2019)—for reflecting on the relationship between domestic and urban space, namely: *governance*, *domestication*, *thresholds*, and *dwelling*. The first two call attention to the movement of certain activities, relations, or processes across traditionally understood boundaries between domestic and urban spaces. The third lens, thresholds, considers the ways physical and social boundaries between domestic and urban space are not simply transgressed, but are actively produced and re-negotiated through new digital mediations. The fourth lens, dwelling, moves beyond a focus on such boundaries to instead highlight the ambiguity and indeterminacy of everyday life. The four lenses, taken together, comprise a kind of heuristic for exploring and troubling

understandings of digital geographies in a variety of cases.

Rather than highlight one or another frame as the most appropriate or accurate, we consider how each lens opens a distinct set of questions about the evolving spatialities of digital life and the ways they are enacted, negotiated, and potentially contested. To illustrate the potential of this framework as a heuristic tool for case studies, we integrate a speculative reading of the experimental Eco Delta Smart City in Busan, South Korea throughout our discussion. Drawing on publicly available planning documents, journalistic reporting and published scholarship about the development, we use examples from this case to demonstrate the different sets of questions that emerge through each of the four lenses and the diverse sets of actors, interests, and experiences they highlight. In doing so, we demonstrate how these lenses could serve as an important heuristic tool for other researchers interested in expanding theorization of digital spatialities in cases of different kinds.

1.1. The Eco Delta Smart City

Eco Delta is a \$1.8 billion mega-project under construction on the outskirts of Busan. As one of a growing number of experimental greenfield smart city developments, the Eco Delta project is funded primarily by the government of South Korea and developed by the Municipality of Busan and the Korean Water Resource Corporation, K-Water, with a variety of other corporate partners, including Samsung (Carvalho, 2015; He & Tritto, 2022). Most similar greenfield smart city projects, like Songdo in South Korea (Kuecker & Hartley, 2020) or Masdar City in Abu Dhabi (Cugurullo, 2021), center traditionally “urban” concerns like basic infrastructure, transportation networks, or public space management, often with little discussion of domestic space. Indeed, even at late stages of development, such projects have often struggled to attract people to actually *live* in such spaces, even if they may work, shop, or be involved in other activities there (Cugurullo, 2021). In contrast, the first phase of the Eco Delta project has focused on the development of Eco Delta Smart Village, a smaller residential area that will be the foundation for a larger urban development. In other words, this project aims to build the smart city from the home up.

The first phase of the Eco Delta project involved the construction of a 54-unit residential development equipped with cutting-edge smart home technologies, like smart appliances, tele-medicine services, and home robot assistants, as well as high-tech urban services and amenities like robot security guards and smart utility management. The first residents moved into the development in January 2022, agreeing to live rent-free for three years in exchange for constant collection of their personal data throughout their everyday life. The data is then analyzed by “developers, appliance manufacturers, the government, and health care experts” (Belcher, 2022: n.p.) in order to further the development of new smart technologies and systems. The development of the residential village is driven by a years-long experiment that aims to engineer not just a city or a home, but new forms of smart living. Thus, this case offers an interesting example for thinking through evolving digital-home city geographies as Eco Delta troubles any easy delineation between home and city while its complexity offers many footholds for exploring (and troubling) digital spatialities.

We approach Eco Delta as neither an exceptional nor a representative case. It is clear that the EcoDelta experience is defined by a number of unique attributes that distinguish it from more mundane forms of smart domesticity and urbanism pursued in existing cities around the world, including the (geo)political and socio-economic privileges of its residents and its highly experimental nature. At the same time, Eco Delta shares many similarities with other greenfield smart city projects from Dholera Smart City in India (Datta, 2015), Forest City in Malaysia (He & Tritto, 2022), or the failed Sidewalk Labs project in Toronto (Filion et al., 2023) to the above mentioned examples of Songdo and Masdar City. Across these cases, officials aim to integrate the latest technologies throughout the city, building them into the function of urban systems from the inception—though typically with less attention specifically on

the role of domestic space. Several of these developments, including Eco Delta and Masdar City, were explicitly conceived as testing grounds and living labs in which the specific technologies, broader systems of control, and logics that inform their design and implementation are all being developed with the intention for future export and proliferation globally. While it is clear that these technologies will be re-articulated, adapted, and contested in distinct ways in different places, projects like EcoDelta offer a view into the constellation of interests coalescing around the development of emerging smart home/city systems, as well as socio-spatial logics that re-imagine the organization and coordination of urban and domestic spaces. Indeed, Eco Delta may represent a harbinger of future smart city strategies in terms of how it imagines city governments attracting corporate partnerships and fostering global business development focused on integrated algorithmic governance across all aspects of life.

We are not able to do justice to the full breadth and complexity of the Eco Delta project here, and indeed that is not the aim of this paper. Instead, we offer reflections on specific aspects of the Eco Delta project, and the relationships among them, as we trace the kinds of questions, spaces, actors, and agendas that our four lenses illuminate. Rather than advocating for one lens as superior, we want to emphasize that the strength of this framework is in offering different, simultaneous vantage points to garner new insights and questions about digital home/city spatialities. In doing so, we show how thinking through complex digital home-city geographies troubles any single reading of a given case, while also opening space for critique and an attunement to the myriad forms of power that operate through or are mediated by 'smart' assemblages.

1.2. Outline

Below, we develop the four analytical lenses—governance, domestication, thresholds, and dwelling—which, taken together, offer a way to trouble taken-for-granted conceptions of digital-mediated spatiality. We develop each lens through a critical review of recent digital geography and related literature. Our discussion of specific examples in specific sections is not intended to limit the potential readings of those examples—many of which could be read through multiple or all of the lenses. Rather, we reflect on examples to highlight the ways each lens offers a unique vantage point and re-framing of phenomena of digital domesticity and urbanism. In each section, we weave through a speculative reading of the Eco Delta Smart City case, demonstrating throughout the paper how a single case can be read through distinct and sometimes conflicting lenses. We then close with a brief discussion of how working through these four lenses might re-orient future scholarship in (feminist) digital geographies.

2. Governance

While digital geographers have often treated governance as city-level phenomena, the home has historically functioned as a key site of governance that bridges macro and micro levels of societal organization. Feminist scholars have demonstrated how technologies of housekeeping and home management have historically functioned as part and parcel of larger governance projects connected to the re/production of social hierarchies, institutions, and economic arrangements that span private/public life (Cowan, 1985; Wajcman, 1991). Exploring the smart home as a continuation of this history reveals how domesticity remains salient but constantly shifting to accommodate digital logics and modalities of governance. This introduces new questions about the ways that the smart city “moves into” the home via digital infrastructures, both leveraging and disrupting traditional ideas about domesticity in the process.

Advances in domestic technologies in the early 20th century led to “an industrial revolution in the home” that sought to create efficiencies and reorganize house work/ers (Cowan, 1987). Rather than reducing housework, these technologies raised the standards of housekeeping

which served to further entrench the “cult of domesticity” that tied (white, middle-class) women to the home, upholding racialized and gendered divisions of labor (Keister & Southgate, 2022). Smart technologies of today reproduce many of these same dynamics enacting what Woods (2018) describes as “digital domesticity”, or the outsourcing of homemaking to the technologies, which simultaneously rearticulates domesticity and femininity in the process. Digital domesticity draws on hegemonic gender roles to render emerging technologies familiar and acceptable in new contexts. For example, smart systems that manage home environmental controls (dimming lights, setting ambient mood, timers for watering plants, etc) can also be viewed as extensions of the historically feminized labor of homemaking that includes establishing the “feel” or aesthetics of the home (Strengers & Kennedy, 2020). More obviously, female-coded voice assistants take on care-giving roles such as reading children stories, reminding a family member to take medicine, and coordinating home shopping and restocking home goods (Woods, 2018). These technologies leverage gender as a feature of digital domesticity to “smooth” concerns about surveillance and data privacy in the home while creating intimate data gathering opportunities (Sweeney, 2021; Woods, 2018).

While past domestic technologies promised efficiencies through automating household labor (e.g. electric appliances), smart technologies promise efficiencies through the building of a digital household ecosystem. Data is the center of modern household governance and is used to measure, monitor, assess, predict, and influence behaviors and environmental factors of the household and its members. These functions add a new informational layer to household management that transforms domestic activities, objects, and social relations into reserves of behavioral data that are extractable and machine-readable (Dodge & Kitchin, 2009), and have new value as commodities (Zuboff, 1919). In these ways, “mundane (or even intimate) domestic data of the smart home accumulates into the ‘big data’ of the smart city” (McGuirk, 2015: 9). For instance, the Eco Delta project aims to collect an extremely broad variety of data across all spheres of life including information about travel patterns and energy consumption (typical of smart city programs) down to the most intimate of individual behavioral and health data. Describing the daily life of Eco Delta residents, one journalistic report explains:

Once Ms. Lee activates the mirror, it becomes a futuristic-looking touch screen where she can monitor almost every aspect of her health, from her heart rate to how well she slept the night before; pick up suggestions on food and exercise for the day; and check in on the weather and the day's news. And the Samsung tablet — one of two in each home — is her window into every virtual nook and cranny of this smart home: what appliances are running, how much energy the family is consuming, if there is a parcel in her mailbox, even when certain foods in the refrigerator will expire. (Belcher, 2022: n.p.)

These mundane data become key to the functioning of broader smart city systems and other forms of governance. Beyond the specifics of the Eco Delta project, Maalsen and Sadowski (2019:120), for instance, trace how the proliferation of smart devices “enroll” the smart home into “a growing network of infrastructures and institutions” that intersect with private sectors, like finance, insurance, and real estate (FIRE). FIRE use data profiles from smart devices to gain intimate access into use, consumption, and behavior patterns that are used to assess, predict, and manage risk for home-buying, renting, and insurance purposes.

Similarly, governments are invested in knowing about the activities and behaviors of citizens in their homes to inform data-driven social policy that shapes domestic life in terms of public agendas for social, economic, and environmental advancement. Tironi and Valderrama (2021:209) describe this as “sensor governmentality,” or a new way of “knowing” and governing domestic life through digital innovations. Whether employed by governmental agencies or private industries, sensor governmentality reorganizes understandings of public and

private spatialities from fixed, oppositional, and bounded into something more fluid, distributed, and permeable. Digital infrastructure is key to shaping governmental access to domestic space by “tethering” subjects to digital networks through smart applications and through daily living in smart homes. Burdon and Cohen (2021: 155) describe how systems like Google Home utilize a sensor governmentality model through “continuous and unobtrusive observation of mobile individuals in dispersed settings” (Burdon & Cohen, 2021: 155). These systems employ ambient surveillance power to detect “authentic” patterns of behavior from which to build predictive models and “nudge” behavioral modifications.

Behavioral nudges may aim to modify environmental features (e.g. moderating temperature settings), discipline undesirable behavioral (e.g. responding to non-completion of an activity), modify habits (e.g. priming bedtimes with lighting), or modify consumer behavior (e.g. automatically refilling orders). Importantly, nudges can be used to align household management with city-level governance objectives, such as curbing waste consumption or monitoring energy efficiency. Countries like Singapore (Bhati et al., 2017) and Chile (Tironi & Valderrama, 2021), and cities such as Västerås, Sweden (Vassileva & Campillo, 2016) and Shanghai, China (Xu et al., 2015) have experimented with smart meters and in-home displays to track energy consumption patterns, make inhabitants aware of their real-time energy use, and encourage behavioral changes. Bhati et al. (2017) observe that shifting consumer behavior around energy consumption is extremely difficult, even when the consumers understand and appreciate the goals at hand. This is due to the fact that phenomena of energy consumption are embedded in social patterns and cultural values of households—all of which may clash with governmental objectives. Watson (2017) offers a feminist account of how gendered and embodied experiences translate into different resistive strategies for smart water meter interventions in Australia that are articulated across income, education, gender, age, and ethnicity. For instance, some young women in the study indicated a reluctance to curb long or frequent showers due to the importance of upholding cultural standards of feminine beauty and hygiene (p. 1244). In another instance, concerns with appropriate presentation of clean clothes for work and school necessitated mothers doing laundry more frequently than was recommended for water conservation (p. 1245). These examples demonstrate how sensor governmentality may be intimately experienced, resisted, or rejected, as a mundane part of daily life in the home.

Further, in the case of Eco Delta, a focus on individual health and its reliance on broader infrastructures and systems is a key feature of the project, suggesting an evolving form of digital biopolitics in which the health of individuals is directly linked to the health of the smart city. Residents are required to wear a smartwatch at all times that collects and analyzes a series of basic biometric markers. Residents can access these data themselves through the touchscreen controls in their homes. This data is also shared with the community’s tele-medicine “wellness center” through which residents are monitored by doctors at a local hospital (Yoon, 2022). Even further, residents are able to have their DNA analyzed by the US-based genetics analysis company, Genoplan, in order to learn about their body type and risks for certain diseases or conditions (Ibid.). Gabrys (2014) highlights the role of the smart city in enacting an *environmentality*, in which power is exercised through digitally-mediated “spatial-material distributions” in urban space rather than over specific subjects or populations. Yet, a governance perspective on Eco Delta might highlight how the integration of the smart city and home allows this *environmentality* to be combined with more traditional forms of biopolitical management—now enabled by increasingly intimate forms of digital tracking.

In the process, all spaces become an object of digitally-enabled surveillance and governance in essentially the same way. The surveillance apparatus of the smart city moves into the home via home security technologies like home drones (Jackman & Brickell, 2022), ring cameras (Frascella, 2021), neighborhood watch apps like NextDoor (Kurwa, 2019), and police robots (Zaveri, 2021). These technologies connect

federal, state, and local security and law enforcement infrastructures with home security, extending the surveillance of the city while reinforcing the sense of the home as a private space to protect. For instance, police departments have received compensation from Amazon to promote the adoption of Amazon Ring doorbell cameras and Amazon’s Neighbors app, which allows police to request access to individuals’ footage without a warrant (Frascella, 2021:395). The feeds and recordings from these cameras are increasingly used by local police departments in the United States to investigate crimes and surveil neighborhoods (Calacci et al., 2022; Kurwa, 2019; Selinger & Durant, 2022). Amazon also gave police access to a heat map tool so they could see all Ring devices in a given geographic area at street level detail, co-opting the home into a distributed model of police surveillance (Ng, 2019). Such practices destabilize the fixed spatialities of the home by networking city law enforcement infrastructures into the home via personal smart devices.

For Eco Delta, a governance lens calls focus to the role of government and corporate actors in conceiving and executing the project, the goals they set for it, and the socio-technical assemblages formed in order to direct behavior and securitize space in new ways. In this sense, the Eco Delta visions reflect broader utopian imaginaries in which technology (and specifically digital, data-driven technology) is able to optimize all aspects of life—ensuring efficiency, sustainability, health, etc. Within this imaginary, one of the limitations of smart city programs as they have existed thus far is that they lacked a complete picture of urban dynamics by excluding what goes on in individual homes – the individual behaviors driving water and electricity consumption patterns, commuting or shopping behaviors, etc. The Eco Delta project’s focus on the home and on everyday practices of domestic consumption could thus be seen as a clear attempt to move beyond the limitations of earlier smart city experiments, integrating data on individual behaviors into the broader management of urban systems.

3. Domestication

While the previous section considered how city governance moves into the home, this section reverses the flow to consider domestication as a city-level phenomena. A domestication lens calls attention to the ways the coordination of domestic and urban space facilitates new ways of living in and experiencing the city. While public spaces are increasingly managed for personal comfort and preference, a series of previously public activities are potentially relocated to the home through new digital infrastructures. In this sense, domestication highlights the role of urban residents, their desires and daily activity patterns, their sense of belonging in the city, and the ways these are managed in new ways by city planners and technology designers.

Martella and Enia (2021) argue that while the home was traditionally associated with intimacy, the city is increasingly absorbing many of the intimate tasks, rituals, and routines in ways that expand and transform the identities of city/home spatialities. Digital architecture is key for reorganizing these spatialities, enabling new forms of intimacy that are “linked not so much to a physical place but rather to a series of conditions that can occur everywhere, as long as a Wi-Fi connection is available” (p. 415). For instance, new rituals and practices of food preparation and dining are emerging through the availability of food and grocery delivery apps and urban kitchens. These apps blur the rituals and spatialities associated with “eating out” and “eating in.” Whereas dining-out may have previously been treated as a public experience that might warrant “dressing up” or special occasion, food delivery apps reframe dining-out as an extension of dining-in, an activity that you can coordinate from your phone and enjoy from your couch in pajamas. Similarly, cashierless shopping and virtual checkout stores (like Amazon Go) encourage people to treat the supermarket with the familiarity of their home kitchen. The general manager of the checkout-free Albert Heijn supermarket in Amsterdam describes the shopping experience: “As if you were taking something from your own

refrigerator” (AH to go klaar voor uitrol kassaloze winkels, 2018). The digital infrastructure backgrounds the transactional component of these activities, spatially and affectively reorganizing grocery shopping and food delivery as familiar domestic rituals akin to rummaging around one's own pantry.

Similarly, a promotional video for Eco Delta imagines new digitally-enabled home shopping experiences – a smart refrigerator connected to food delivery services or an augmented-reality (AR) fitting room allowing individuals to virtually “try on” and buy clothes without leaving home (Busan Eco Delta Smart City (부산 에코델타 스마트시티), 2020). Such innovations, alongside new e-medicine, e-learning, and remote work infrastructures work to effectively “domesticate” previously public activities. Meanwhile, efficient urban planning, autonomous vehicles, and high-tech last mile transport options (like e-scooters) would further transform individuals' mobility patterns with the purported goal of creating more free time for “shopping and recreation” (K-Water, 2023: p. 36/37) – including through AR home shopping or “check-out free stores” (Ibid: p. 22). These technologies provide new levels of convenience and comfort for residents in the home and beyond that reorganize spatialities of consumption and recreation, blurring traditional notions of the urban and the domestic.

Caregiving and reproductive labor are other traditionally domestic activities that are extended into the flows of the city through digital interventions. Caregiving previously necessitated close physical proximity to loved ones to provide help, safety, and coordinate assistance with daily living activities, particularly for children or aging adults. Now many of these same activities can be coordinated digitally through remote surveillance of loved ones (and their data). Eco Delta's comprehensive plan calls for the integration of robots for elder care and to assist individuals with physical disabilities in navigating urban space (K-Water, 2023). The outsourcing of elder care to robots can entail a range of activities from providing companionship, dispensing medical instructions and reminders for daily tasks, and monitoring behavior and health. Vercelli et al. (2018) note that in these various roles, care robots record a wealth of data about subjects and their environments. Data is central to the concept of caregiving within the digital assemblage of Eco Delta, harnessing a variety of behavioral, environmental, and biometric data to integrate into medical care plans. In this sense, practices of care are extended outward into the city into the broader apparatuses through which it functions. Sweeney (2023) argues that elder care is redefined through intensified surveillance and data tracking carried out remotely by family members on-the-go or at work. In Eco Delta, a full suite of personal tracking devices like smart watches and smart home appliances are controllable through mobile applications or home interfaces (e.g. televisions, smart mirrors) allowing for easy monitoring of home systems and family members at all times, even when not physically present. In these ways, family members out and about in the city can be integrated into home routines, and vice versa, widening the spheres and spatialities of caregiving and reproductive labor.

Location tracking of family and friends can also be used to enhance and coordinate domestic activities, extend parenting or adult caregiving activities, and perform social relationship maintenance. Widmer and Albrechtslund's (2021) research finds that location and family tracking apps add to the broader sense of care as reproductive labor and housework, helping coordinate tasks and estimate times of arrival for family members and friends. Of course, location is often only one mode of surveillance offered through tracking applications. For example, the FamiSafe app allows parents to “track your child's activities and ensure their safety without disturbing them”, and also “remotely listen to a child's surroundings and ensure that no one is bullying or misbehaving with them in your absence” (Greg, 2023). On the other hand, the same family tracking apps that organize or supplement healthy domestic routines can also be used to extend coercive familial control and perpetuate abuse of different forms (Cuomo & Dolci, 2021; Gabriels, 2016). Douglas et al. (2019) argue that location-based tracking, in particular, allows for a “spatial and temporal extension of control” that

removes physical boundaries and the requirement of proximity for abuse, and allows the abuser the ability to extend dynamics of domestic power and control through digital surveillance of bodies and data across space and time.

Personalization is another key feature of smart urbanism that draws on affordances of convenience, familiarity, and intimacy—features often associated with domesticity. Digital technologies allow for seamless movement through the city via mobile applications that personalize route-planning (e.g. maps), transportation (e.g. train-schedules, e-ticketing, bike and car share), and meeting essential needs (e.g. finding food, water stations, restrooms). Movement through the smart city is imagined as a technologically enabled choose-your-own-adventure that merges individual needs and goals with city infrastructures and services, creating optimization across both areas. For instance, some municipal-supported cycling apps in the Netherlands use real-time user data to adjust the timing of stop lights to speed up cyclist movement through the city. While self-tracking is imagined as an ideal way to harness citizen participation in the smart city design, in practice, this is more complex. Tironi & Valderrama (2021) demonstrate that the ideals of citizens as “co-designers” of the city does not pan out, “problematizing some of the promise of Smart Urbanism” (p. 308). For example, their case study on *Rastreador Urbano de Bicicletas* (or Urban Bicycle Tracker), a participatory data-sharing project for cycling mobility in Santiago de Chile, illustrated how the ideals of the purity of self-tracking data fail to account for the unexpected, emergent realities of self-tracking as a socio-technical system.

The Eco Delta comprehensive plan is based around a Learn-Work-Play imaginary in which digital technology and efficient planning (the 15-min city) enable easy access to jobs, education, and leisure activities within the same area. In essence, the master plan envisions a seamless, integrated experience as residents move between home, work, school, and leisure activities, which can be spatially and temporally coordinated in new ways through smart commuting, AR and VR technology, and an integrated “city app.” Just as the smart home can be monitored and managed through a smartphone app or other interface, the city app would be an integrated platform that would enable “access to every facility in the city,” promoted under the slogan: “Less time wasted. More time for happiness” (K-Water, 2023: p. 27). Among the possible leisure sites, the Eco Delta master plan places particular importance on Smart Parks, which would include a variety of smart media displays, air quality monitoring and purification systems, and smart thermometers connected to cool mist systems to moderate temperatures (K-Water, 2023). In this way, the various sites of the city, from offices to leisure areas, become like an extension of the home as spaces to be managed for individual comfort and over which individuals are able to exercise new forms of control.

A domestication lens raises questions about how digital technologies shape what it means to “belong” and exist in the city. While promises of individual comfort, care, leisure, and convenience are shaped through digital infrastructure, they are also shaped through capitalist inclusion and ability to participate in the “rentier relations” inherent in platformed urbanism (Sadowski, 2020a). After all, these qualities (comfort, care, leisure, convenience) are associated with wealth and luxury living, accessible to a privileged few. Personalization requires full integration into data networks which is predicated on the financial ability to afford expensive smartphones, watches, data plans, and other smart home appliances and technologies. For the many people who are struggling to meet basic needs including access to housing, transportation, food, reliable income, or childcare the personalization features of the smart home/city are not only financially out of reach, but may be inattentive to their actual needs and situations. These points raise questions as to how digital domestication of the city via personalization reproduces economic inequalities and may exacerbate social exclusion.

4. Thresholds

While the previous two sections have highlighted movements across traditional boundaries of domestic and urban space, the lens of thresholds draws focus to the myriad ways those boundaries are actively reproduced and/or renegotiated. Blunt and Sheringham (2019) highlight Boccagni and Brighenti's (2017, p. 4) work on migrant experiences of home tracing how thresholds of domesticity are “crafted, enacted, negotiated and, if necessary, struggled upon.” As such, a focus on thresholds “allow[s] us to conceptualize home as dynamic and multi-scalar” (p. 827). Distinctions between domestic and urban spaces do not simply disappear through the extension of governance into the home or the domestication of the city. Rather, thresholds are actively reproduced and negotiated through new surveillance practices, discursive practices, and through forms of human-technology interaction reliant on normative scripts of domesticity or urbanness. This occurs both through exercising control over physical thresholds between homes and city spaces, as well as through the negotiation of social thresholds of belonging in these spaces and the discursive thresholds through which the meanings and expectations tied to those spaces are contingently (re) produced.

The myriad interventions involved in the Eco Delta case allow thresholds of home and city to be reproduced and negotiated in new ways. Indeed, the very conditions of the Eco Delta experiment could be read as a renegotiation of thresholds around privacy expectations. The extensive forms of surveillance and data capture that residents agree to when taking part in the experiment redefine what kinds of government or corporate intrusion into the home is deemed acceptable. While the home has always been constituted through broader systems of governance, the terms of this relationship shift across space and time. For instance, in relation to evolving digital practices during the COVID-19 pandemic, Maalsen and Dowling (2020: p. 4), argue that “technology... is amplifying the porosity of the boundaries of home. To stay at home we need to let other people in – government, authorities, employers, landlords – and digital technologies are the conduit through which this is done.” Likewise, the EcoDelta project can be seen as a key moment in which the very terms of the arrangement between developers and residents shift the boundaries of what might be seen as acceptable. Smart living, like the ability to stay at home during the pandemic, requires letting others in in new ways. The conditions under which this is accepted, negotiated, or resisted is an important question for further exploration and critique, especially as Eco Delta moves beyond initial experimental stages.

Beyond Eco Delta, recent scholarship highlights how the home as a distinct space is reproduced and redefined as it becomes the object of digital surveillance and regulation. Smart home surveillance allows certain individuals (those with access to a private home and the resources to afford the necessary systems) to exercise new forms of control over their domestic space. While this creates possibilities for the surveilled home to become part of broader surveillant assemblages (reflecting the expansion of governance into the home, as discussed above), surveillance practices emerge in new ways within the domestic context that may also reproduce domestic/urban divides. Mäkinen (2016) observes that residents of a home with surveillant technology installed are “not mere objects of surveillance but also participants in the surveillance” (p. 60). Rapoport (2012, p. 331) expands on this point by arguing that surveillant technologies in the home form a “unique assemblage” in the “tripartite conjunction of site, user and technology,” wherein the user assumes “heightened agency” as they “take control over their physical environment and over the projected image of their bodies”. While forms of private home surveillance and home security systems have a longer history, smart technologies have expanded the kinds of surveillance possible, such as 24/7 remote access to home security cameras via a smartphone. As users of smart home technology become interpolated as surveillant subjects, the (constrained) agency they exercise allows them to reinforce certain thresholds between

domestic and urban space as they determine who and what belongs (or not) in the home.

This reproduction of thresholds of domesticity through smart home surveillance is perhaps clearest in the case of AmazonRing and similar doorbell cameras. Such systems monitor and control the physical threshold to the home, alerting the resident of expected or unexpected visitors. Bridges (2021, p. 830) traces how these practices lead to growing “fear and paranoia of the racialized Other” by homeowners in wealthy, predominantly white neighborhoods. Especially when coupled with neighborhood watch apps, such practices reproduce both physical and social thresholds of belonging by which certain individuals are seen as a threat to the imagined security of domestic spaces. Bloch (2022) notes that these apps leverage existent aversive racism to shore up whiteness and informally reinscribe racial hierarchies. For instance, an advertisement for neighborhood watch app, bSafe, depicts a white woman walking alone at night and looking afraid (Kennedy & Coelho, 2022: 132). In these advertisements, white women, like the home, are positioned as a kind of private property that requires the protection of white men (as extensions of the surveillance technology) against the racialized Other. Smart home security systems and neighborhood watch apps shore up the threshold of domestic space by reinforcing the ideals of the middle-class home as white, feminized, privately owned property that is vulnerable to external (racialized) threats.

In a different vein, Koch and Miles (2021) explore how dating and “sharing economy” apps facilitate “stranger intimacy” in which digital platforms help orchestrate social, intimate, and transactional encounters both in the home and in public. Effectively, digital platforms provide new ways of mediating access to the home for a variety of personal and economic purposes. For instance, Airbnb hosts who rent out their own home use the features of the platform (guest profiles, reviews, personal messages, links to social media, etc.) to decide who to accept as a guest, often reproducing racial and other biases through a preference for guests perceived as similar to themselves (Christensen, 2023). Platforms like TaskRabbit or services like Alfred negotiate and manage access to the home for the outsourcing of domestic labor (Atanasoski & Vora, 2015), while apps for dating and/or sex allow users to manage intimate encounters in or outside of the home (Koch & Miles, 2021). As such, these platforms have become important tools for managing thresholds of privacy, making decisions about who to “invite in” to the domestic sphere.

Just as thresholds of domesticity are negotiated and reproduced through digital practices, surveillance practices increasingly aim to reproduce the certain idealized images of urban space, such as through the intensified policing of unsheltered people (Humphry, 2022). While the city may become “domesticated” for some, for others the performance of traditionally domestic activities in urban spaces become criminalized through automated surveillance technologies. Policing practices that began with CCTV cameras in public spaces (Mitchell & Heynen, 2009), have more recently expanded to include aerial drone surveillance of unsheltered populations (Jackman & Brickell, 2022) and the use of security robots to prevent camping on city streets (Lynch, 2021b; Thomasen, 2019). As sensors and other networked technologies saturate urban spaces, the possibilities for individuals without access to traditional domestic spaces to carve out spaces for survival—or, indeed, alternative, non-normative domestic spaces (Speer, 2017)—is continually constrained or curtailed. Likewise, in the case of Eco Delta, as the city becomes like an extension of the home for residents, it is likely to also become a zone of exclusion for those who are deemed not to belong. The presence of security robots and cameras may be used to police and remove non-residents or unknown people in the space. Beyond this, the use of a city app helps determine and regulate access to certain spaces and amenities, including to the emerging digital infrastructures of care. So for some, the surveillant city becomes an extended home curated and managed for their individual desires, needs, and wellbeing. For others, it becomes an inaccessible or perhaps even a hostile environment in which their exclusion manifests across multiple, physically, spatially, and

digitally mediated thresholds of belonging.

Finally, discursive practices around smart city and smart home technologies help to reproduce traditional expectations of these spaces, even as their very deployment may seem to blur such boundaries. Several scholars have highlighted the gendered nature of smart home technologies that reproduce expectations of a feminized domestic sphere (Sadowski, 2020b; Strengers & Kennedy, 2020). Similarly, the growing availability of interactive home robots tend to reproduce common scripts of domesticity through the imitation of babies, pets, butlers, or other familiar household roles (Lynch, 2021a). This might be contrasted with the deployment of robots in urban spaces as police officers, couriers, or service workers in which the aesthetic and functional presentation of the robot enacts scripts that reproduce common expectations of the city. This reflects a broader trend in the design of interactive digital agents which draw on gendered and racialized tropes to produce character (Sweeney, 2016), or otherwise deploy various forms of “banal deception” (Natale, 2021) to maintain user engagement by reproducing familiar scripts. As often quite similar digital systems are rolled out across urban and domestic spaces, the discursive embedding of those systems in familiar narratives help to promote acceptance while also reproducing experiences and expectations of domesticity or urbanness. Such practices can also be seen in the case of Eco Delta, in which discourses of home and city as well as the affects associated with each sphere are reinforced in Eco Delta plans and promotions, even as the systems and infrastructures that shape those spheres are increasingly integrated across any imagined domestic-urban divide.

5. Dwelling

While the previous sections have traced how digital technologies are increasingly transgressing and/or reproducing traditional spatial divisions between home and city, a dwelling lens looks to complicate such divisions through a (post)phenomenological concern with everyday experience and entanglements with digital systems. Phenomenological approaches in geography have a long history, from early humanistic geographies describing individual subjective experiences of place (Tuan, 1975) to more recent post-phenomenological work stressing the ways subjectivities emerge through experience in the material world constituted by relations of alterity (Ash & Simpson, 2016; Harrison, 2007). Within this phenomenological tradition, Zielke (2022: p. 1054) explains how approaches to dwelling as an analytical lens highlight “different aspects of how we are unravelling binary constructions of our environments... by moving through them and interacting with them as a whole.” A dwelling approach takes the body and its movements, connections, and affects as the scale of analysis, thus complicating neat spatial boundaries and categories. The distinction between urban and domestic space, for example, may still be relevant, but only as it is experienced in practice, through situated and contingent encounters.

This focus on movement across divides highlights the active and contingent processes through which homes and cities are not simply experienced, but iteratively produced in practice in messy and partial ways. McFarlane (2011) articulation of the city as an assemblage has been particularly influential in theorizations of the smart city, as scholars have traced the ways networks of sensors, algorithms, screens and dashboards come together within specific social and institutional contexts to redirect urban flows (Cowley et al., 2018; Enlund et al., 2022). An assemblage approach considers these arrangements as contingent achievements open to disruption or the possibility to be otherwise. McFarlane (2011: p. 658) directly links this to the notion of dwelling, writing:

this narrative underplays the ways in which people inhabit the assemblage—ie how they live through the varying forms of porosity and closure of the assemblage, including the possibilities that assemblage opens but which are not part of its current alignment.

For McFarlane, the experiential element of dwelling is key to

understanding the openness and creative possibilities that come from understanding the city as an assemblage. Yet, few engagements with assemblage thinking in the smart city literature have actively engaged the concept of dwelling and this understanding of assemblages as *lived* processes.

One important exception to this lacuna, is Bissell (2020) work on the affective dimensions of digital, on-demand consumption. He argues that “encounters with on-demand food delivery platforms should not be evaluated in a vacuum because they are contingent on the onflow of everyday experience in situated lifeworlds” in which “different subjectivities emerge through geographically situated processes of dwelling in cities” (p. 104). Bissell conducted interviews with users of on-demand food delivery apps to better understand their embodied and affective experiences using these apps. While the majority of work on platform urbanism has placed more emphasis on practices of labor and production than on consumption, Bissell’s research subjects highlight experiences of being at home. Some subjects in the study reflected on returning home from stressful jobs and using the apps to avoid going back out into the city, while others indicated mixed feelings about this, torn between the convenience of the apps (and the ability to rest), while missing the excitement of going out. This research demonstrates the ways that on-demand food delivery is shifting experiences and practices of home in significant ways as app-based services become entangled in key aspects of social reproduction. This focus on the affective dimension of engagements with digital systems is also evident in reporting on Eco Delta, where it is clear that the affective experience is key to winning the consent of residents. An interview with Eco Delta resident, Jeong Mi Sook, nods to the affective experience of participating in the project: “I’ve been here two months and it feels like I’ve been living in a hotel and having a two-month vacation with my family” (Belcher, 2022). Eco Delta is experienced here as a luxury vacation. On a daily basis, the experience of surveillance may fade into the background, overshadowed by the experience of convenience and luxury.

Research on digital self-tracking and wearable technologies have also tended to highlight experiences of dwelling by nature of their focus on the scale of the body and attention to mundane acts like sleep or movement. Pink and Fors (2017: p. 231–232) explain how the “ongoing presence of a data-collecting technology that is therefore felt and also consulted forms part of the way that self-tracking accompanies people and indeed co-constitutes the specific experience of moving through everyday worlds.” As users of self-tracking devices “move through” everyday worlds they are also continually navigating and crossing spatial thresholds, producing data streams that transcend easy spatial categorization though may still reflect experiences of home or the city. Self-tracking through wearables or apps may monitor sleep habits, exercise, food consumption or other metrics that together say a lot about individual behaviors and experiences of space (Lupton, 2016; Klausner and Albrechtslund, 2014). A fitness tracker may remind or encourage a user to exercise and thus leave their home, or a sleep app may remind a user that it is nearing their regular bedtime and encourage them to return home to maintain their sleep schedule. Researchers are also increasingly experimenting with ways of integrating wearable devices into interdisciplinary studies of “urban stress” and other questions around embodied experiences of space (Osborne et al., 2023; Pykett et al., 2020). Location data can show how much time an individual tends to spend at home, where they go when they leave home, how they travel through the city, the kinds of sites or establishments they visit, and other data that presents a detailed picture of individual spatial behaviors (Xu et al., 2018). This data can then be exploited by researchers, advertisers and others, such as to target ads or services for those who work from home, have long commutes, spend a lot of time at home, are physically active, are troubled sleepers, etc. (Erlström et al., 2022). The tracking of these realms of life across space (often through their attachment to the body) and the forms of intervention or mediation that they enable are key to understanding shifting experiences of digital home-city geographies.

Such forms of bodily self-tracking are key to the Eco Delta project as well. As Belcher's (Belcher, 2022: n.p.) reporting highlights:

“Every tenant has a smartwatch that is synced to the mirror and the overall system in the home,” explained Kim Do-Gyun, general manager of K-Water, or the Korea Waters Resource Corporation, an affiliate of the Ministry of Environment that is assisting development of the Eco Delta Smart Village. “It monitors your body and constantly assesses you. It's mandatory that everyone wears a watch for the three years.”

A focus on dwelling—on the everyday embodied movements and activities of individual residents—is fundamental to connecting and integrating data streams between home and city systems. As a project planner explained “to build a successful city for the future, studying the present-day behaviors of the Smart Village residents is essential” (quotes in Belcher, 2022: n.p.). A dwelling perspective calls attention to the ways diverse bodies move through and experience the multiple spaces of the smart home/city. Residents may make use of the optimized smart transportation options to move between home, work, and leisure activities as imagined by planners' 15-min city vision, or they may use urban assistive robots to increase their independent mobility despite advanced age or physical disabilities. A dwelling lens would question how these activities are part of a continuous experience with the navigation and use of individual homes. Alongside new urban mobility possibilities, opportunities for home shopping, e-learning, e-medicine, or remote work could change the ways individuals' and families' calculus in how to organize the spacetimes of everyday life—shifting notions of both home and city in the process.

Yet, a dwelling lens also calls attention to the ways home and city are experienced and negotiated in complex and contingent ways that are increasingly mediated by digital tools. In other words, it would also call attention to how Eco Delta residents experience and navigate their place within such systems. Tracing the experiences of dwelling allows geographers to highlight continuities, tensions, and ruptures as they materialize across home/city divides. For instance, some of the examples in the previous sections could be seen as contradictory readings of emerging digital practices. Different interpretations may paint the user of a smart home security system as an object of governance and surveillance *and* as enacting a new kind of agency as a surveillant subject. A dwelling perspective, however, would not necessarily see these as contradictory perspectives, but rather trace the contingent and shifting conditions in which the user is differentially positioned as subject or object in different spaces and times and how they experience those shifts. Further, a dwelling perspective might help highlight how these experiences differ based on the positionality of the subject. Experiences of governance, domestication, or the negotiation of thresholds likely vary significantly across axes of difference, including race, gender, sexuality, ability, age, socio-economic status, tenancy, and many others. A dwelling lens can help highlight the ways individuals are differentially situated and thus differentially encounter digital systems (Lynch, 2022), defying any reading of the smart home/city as universal.

For Eco Delta, a dwelling perspective would thus highlight the contingencies involved in everyday engagements with the smart environment and the ways individuals experience and navigate these new spaces in ways that may differ from the imaginaries of planners, tech developers, and others. For instance, it might help call attention to moments of tension or rupture in these experiences, such as moments of ‘glitch’ (Leszczynski & Elwood, 2022) in which this carefully designed experience fails to function or appear as expected. This might mean actual moments of technical failure, or moments when things may simply *appear* to be out of order. Such moments open up opportunities for subjects to reimagine their relations to digital systems or work to cultivate alternative relations and dispositions toward them. A dwelling perspective thus might highlight how different subjects experience and respond in such moments, demonstrating the differentiated agencies of digital subjects in the smart home/city (Rose, 2017). In the case of our

reading of the Eco Delta project, these moments are more difficult to identify from the available media and planning archive and highlight the need for continued research into the unique experiences of people living in such high-tech experiments with urban and domestic living.

6. Discussion

We began this paper by questioning how categories of home and city are troubled by processes of digitalization. Through our discussion we have demonstrated the porosity of these categories, revealing how they blur and shift to accommodate many agendas, needs, and emergent contexts. In many ways, the ubiquity and integration of digital devices and systems across home-city divides could be seen to dissolve any meaningful distinction between these spatial categories. In the end, it is all just data. On the other hand, we find that conceptualizations of the home and city remain durable components of digitality that have continued political salience for organizing digital spatialities. Yet, home and city are not static spatial categories. Rather, they are continually produced and experienced in new ways through the shifting relations and everyday practices among governments, corporations, urban planners, and a broad diversity of citizens—all of whom act according to distinct sets of rationalities and agendas.

Our feminist reading of Eco Delta demonstrates how the four lenses might be applied to a specific case to elucidate new lines of questioning, identify contradictions and tensions, and add to understanding of the digital spatialities of home/city geographies. The variety of scales of data capture and sites of active intervention in the Eco Delta project — from basic urban flows down to mundane daily habits of individuals and even their DNA — points to a key ambition of the smart city agenda to engineer an efficient alignment among the needs of individual bodies, the daily patterns of domestic life, and the flows and infrastructures of the city. In line with feminist geography's interest in re-scaling analysis in order to highlight contingent power relations (Massaro & Williams, 2013), the four lenses discussed here demonstrate the complex interconnections across different sites and scales, so that the efficiency of the smart city is inseparable from mundane domestic behaviors and consumption patterns which in turn are inseparable from the unique needs of individual and diverse bodies. It demonstrates emerging attempts by planners, governments, and corporations to coordinate and direct these relationships in new ways as diverse interests and visions of smartness are brought together and negotiated in practice (Han & Kim, 2022).

However, as Han and Kim (2022) point out, due to the diversity of interests and projects integrated into Eco Delta, it would be a mistake to view it as a single, top-down, government driven project. Instead, it might be conceived as “multiple smart cities” converging and diverging under a single banner. The complex spatiality and multiplicity of the Eco Delta project therefore calls for an analysis that does not take the spatiality, actors, or interests as given, but rather poses them as questions. Here, we argue that our proposed four lenses for digital home-city geographies can offer a way forward. For instance, when read together, the scale of the body emerges simultaneously with the scales of the city and the home. This insight may not be as evident without the application of all four lenses. Also, and importantly, by calling attention to tensions, contingencies, and multiplicities we believe this analytical approach opens opportunities for political reflection and action. Smart and platform technologies, and the corporate or government interests they are designed to serve, do exert increasing influence over everyday life, but they do so through sets of differentiated affects, relations, and situated practices that are open to reinscription and renegotiation by a diversity of actors whose agency is often overlooked in scholarship focused more narrowly on institutional and powerful actors.

Following this, a feminist reading of these processes reveals a range of actors, practices, and experiences that occur in, constitute, and push back against places such as Eco Delta. The logics of the smart city are not universally applied or adopted, and they certainly are not accepted

unquestionably into people's lives. Our four lenses offer ways to see tensions, resistance, “glitches”, and failure as evidence of culture, agency, political action, and humanity asserting itself through daily practice. As such, the four lenses encourage us to “stay with the trouble” (Haraway, 2016)—refusing the inclination to resolve tensions and contradictions in our understanding of emerging digitally-mediated life, but rather recognize these tensions as constitutive and potentially generative. In this way, we build on Maalsen's (2023) recognition of the entangled nature of algorithmic harm and care and call to recognize the need to explore and cultivate more *careful* relations with digital systems. Similarly, our multiple readings of the smart city/home relation and the case of Eco Delta allow us to recognize the potential harms and the very real ethical concerns involved in increasingly intrusive forms of digital surveillance while also recognizing the myriad forms of care potentially enabled by integrated home/city digital systems. The systems are both controlling and enabling, as human and machine agencies are necessarily co-constituted (Rose, 2017). Reading across all four lenses, we can perhaps see the Eco Delta case and the broader trend toward urban and domestic digitalization as simultaneously entailing moments of control, surveillance, harm, care, convenience, luxury, inclusion and exclusion, which will all be experienced and negotiated in different ways by differently-situated actors. Embracing this nuance opens possibilities to simultaneously resist or mitigate harms while imagining more careful engagements with digital systems to remake homes, cities, and the relationship between them in new ways—such as demonstrated by activist efforts to harness digital technologies for non-capitalist or community-defined ends (Leontidou, 2015; Lynch, 2020; Vadiati, 2022).

Mitigating harms and exploring alternative relations, however, requires a recognition of the continuation and evolution of entrenched power structures and the ways these shape the diverse subjectivities, agencies, and experiences of different actors. Many of our examples touched on entrenched power structures (e.g. gender, race, class, and capital) and politics that continue to unevenly shape experiences of city and home. By approaching the digital home/city through multiple theoretical lenses, we are able to highlight a broader diversity of potential experiences and recognize the axes of difference that shape and constrain different forms of posthuman agency (Rose, 2017). A wealthy, white, middle-aged, male opting into home surveillance in order to exercise more control over their own domestic space (while potentially also assisting law enforcement) is positioned very differently from a domestic worker working in that same home or a young person of color who might become the object of suspicion when they are picked up on a doorbell camera. Likewise, the meaning and experience of home and city is necessarily caught up in these differences in positionality. This highlights the continued entanglement between the production of spatial and social difference, which has sometimes been lacking in digital geographies scholarship.

Finally, by critically assessing the relationship between home and city in this way, we might also come to question other key spatial concepts. For instance, while beyond the scope of this paper, much digital geographies literature has been shaped by a clear urban bias—this present paper, admittedly, included. While there has been some significant work on rural digital geographies (see Bear & Holloway, 2015; Faxon, 2022), this is still a small minority of work in the field. Indeed, in some scholarship—in particular within work inspired by notions of planetary urbanization (Brenner & Schmid, 2015)—digitalization is automatically equated with the urban as it facilitates the more extensive integration of disparate elements into coordinated systems of accumulation. Yet, a feminist digital geographic perspective such as the one we explore here might help us to challenge inherited assumptions about such spatial divides. Instead, we might ask how traditionally understood boundaries between urban and rural spaces are transgressed in new ways through digitalization, how new thresholds are produced and negotiated, and how these spatial categories emerge in complex ways through different forms of everyday experience. Beyond the specific focus of this paper on

home-city divides, this demonstrates how feminist approaches to digital geographies more broadly can help clarify when, how, and why particular spatial categories remain relevant, even as they may be transformed through processes of digitalization.

7. Conclusion

In this paper we have argued that it is necessary to actively trouble assumptions about the spatiality of digital phenomena by taking spatiality as a *question* rather than as a framing of research. Following theories and approaches from critical feminist geographies, we proposed four analytical lenses (governance, domestication, thresholds, and dwelling) to help highlight the evolving geographies of digitalization in which home and city emerge in newly co-constituted, contingent, and relational ways. We offer that these lenses could serve as important heuristic tools for other researchers interested in expanding theorization of digital spatialities. Each lens offers unique perspectives as to the evolving spatialities of digital home/city geographies including different sets of actors, agendas, forms of power, sites of agency, and questions for digital geographers to consider. Our approach troubles any single reading of emerging digital entanglements, instead calling to attention to the *multiple* tensions, contingencies, and differences through which they play out (unevenly across space, and differentially for subjects). In the process, notions of the domestic and urban become renegotiated, rearticulated, and contested in complex and emergent ways that refocus and center lived human experiences and their entanglement with broader systems of power.

Credit authorship contribution statement

Casey R. Lynch: Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Conceptualization. **Miriam E. Sweeney:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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