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Table of Contents

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EDITORIAL

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Bringing the Future to Geomedia Studies: Geomedia as Sociotechnical Regime and Imaginary

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Abstract

Geomedia, representing an epochal shift in spatial mediations and spatialized media, changes daily life. This future-directed thematic issue advocates for contextualized understandings of geomedia that transcend contemporary hegemonic representations of technology. It recognizes the transformative powers of geomediatization processes and asks what "geomedia futures" such processes might bring about. Bridging critical geomedia studies and critical future studies, it challenges dominant narratives about tomorrow's technological society and promotes the exploration of diverse, equitable, and sustainable futures with and under geomedia. Through numerous methodological approaches, the collected articles examine the role of geomedia in contexts such as urban planning, tourism, surveillance, governance, and policy. The thematic issue emphasizes the importance of envisioning alternative futures that resist technological rationalization and unethical exploitation of geospatial data, supporting more inclusive and human-centered mediatized places. This work contributes to ongoing debates in geomedia studies, highlighting the need for critical and interdisciplinary approaches to understand and shape our technological future.

Keywords

critical future studies; critical geomedia studies; geomedia; geomediatization; geomedia futures; sociotechnical imaginaries; spatialization

1. Introduction

Our lives are increasingly molded by a new sociotechnical regime called *geomedia* (see especially McQuire, 2016; Thielmann, 2010), implying an "epochal shift…in the area of spatial (re)mediations and spatialized

media" (Fast et al., 2018, p. 4). The processes leading up to this shift can be grouped under the heading *geomediatization* (Fast et al., 2018; Lindell et al., 2022). In one of the most recent, in-depth examinations of the geomedia regime, André Jansson (2022) underscores the societal impact of geomediatization when suggesting that geomedia affect our entire existence, or, as he phrases it, using Hannah Arendt's terminology, the *human condition*. Above all, Jansson argues that geomedia gain power in and over our lives as logistical media that coordinate and orchestrate even our most mundane activities. The e-scooter is used as an example of a geomedia object that intervenes in daily urban spaces and lives as much as it—like other data-driven objects—nurtures digital surveillance capitalism (Mejias & Couldry, 2024; Zuboff, 2019). The fact that geomedia are integral to today's global economy only underlines their influence (see also, e.g., Brantner et al., 2024; McQuire, 2019).

In geomedia studies, digital mobile, place-based, or locative media (e.g., de Souza e Silva & Sheller, 2015; Frith, 2018; Humphreys & Liao, 2011; Wilken & Goggin, 2014) are typically constructed as key drivers of geomediatization and, thus, as the nucleus of the geomedia regime. However, work in this area of study also advocates for an understanding of geomedia that—similar to A. Jansson's (2022)—moves beyond both technology centrism and presentism. An inclusive and relational geomedia concept decenters the technologies involved and opens up geomedia studies to contextualized inquiries across time. For example, in a recent special issue devoted to "geomedia histories" (Fast & Abend, 2022), geomedia came to include 18th-century air balloons (Thielmann, 2022), 19th-century aerial photography (Bender & Kanderske, 2022), and post-First World War photogrammetry (Wilken & Thomas, 2022). In similar ways, an inclusive geomedia concept can help us think about our technological *future*, which is our focus here. The contributions collected in this thematic issue serve as a prism into the diversity of objects of study that can "count" as geomedia as well as into the multiplicity of sociotechnical imaginaries that geomediatization processes involve—or could involve.

One important source of inspiration for our endeavor is Scott McQuire's (2016) book *Geomedia: Networked Cities and the Future of Public Space*. Throughout the book, and in parallel with a careful historical contextualization of geomediatized urbanism, McQuire encourages us to imagine alternative futures with geomedia and how geomedia can "remake" (p. 12) the city into a more human-friendly arena for social life. Combining critical analyses of data-driven and commodifying enterprises such as Google Street View with hopeful visions of tomorrow's version of the geomedia regime, McQuire ultimately casts the networked city as a "vital laboratory" (p. 16) where the potentials of new geomedia technology should be further explored. McQuire's plea for alternative imaginations of what the geomedia regime could be like, if it were not so dominated by technological rationalization, individual responsibilization, and escalating commodification, matches well with our ambitions here. Let us think of this thematic issue as another "laboratory" for "testing" alternative geomedia futures.

2. The Critical Potency of Geomedia Futures

Our thematic issue recognizes futuristic examinations of geomedia as a crucial component of critical geomedia studies, especially to the extent they can challenge "geomediatization realism" (Hartmann & Jansson, 2024, p. 5). Geomediatization realism encompasses both utopian and dystopian outlooks through which our future with geomedia appears in the singular as if there were no alternatives to the visions that surface in hegemonic representations (see, e.g., Rose, 2018). Hartmann and Jansson (2024) use the term to

refer to "processes of acceptance and resignation not only in relation to media use but also to the wider context of the expansion of geomedia businesses and corporations" (p. 8). As such, the term sits between Fisher's (2009) notion of "capitalist realism," which implies the difficulty of imagining alternative futures beyond today's neoliberal capitalism, and Draper and Turow's (2019) concept of "digital resignation," which refers to feelings of helplessness triggered by digital surveillance that ultimately "causes people to despair about their ability to guide their futures" (p. 1827).

For further cues about the critical potency of alternative imaginations, we may look to another young (at least label-wise) research area, namely critical future studies. This area of study has been most explicitly defined by Michael Godhe and Luke Goode in joint publications (but see also, e.g., Hideg, 2002; Inayatullah, 2007). A special issue devoted to the theme states that critical future studies deal with "the exploration and interrogation of ways in which society thinks, imagines and talks about the future—not the future singular, but possible *futures*" (Godhe & Goode, 2018, p. 152). Although critical future studies are biased toward popular culture representations of our technological future, its raison d'être can certainly be transferred beyond that particular source of technological imagination. As Goode and Godhe (2017) themselves argue, competing technology discourse exists in numerous contexts. We sympathize with critical future studies' attentiveness to matters of social stratification and inequality as well as its reluctance to tilt over into cultural determinism (Godhe & Goode, 2018, pp. 4–7). The latter implies a balanced understanding of the (limited) powers of discourse in the light of material conditions and forces. Such an outlook is well aligned with critical geomedia studies, where material circumstances—especially their spatial manifestations—are always key parameters.

In our exploration of geomedia futures, we also draw on the concept of "sociotechnical imaginaries" as elaborated by Sheila Jasanoff and Sang-Hyun Kim (2015) in their edited volume *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Sociotechnical imaginaries are "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff, 2015, p. 4). The concept is crucial for understanding the diverse futures that geomediatization could generate, as it emphasizes the interplay between technological advancements and societal values, norms, and institutions. In geomedia studies, sociotechnical imaginaries help us frame how different societies envision and implement geomedia technologies, shaping policies, governance, and everyday practices. By interrogating these imaginaries, we can better understand the potential trajectories and implications of geomedia technologies, envisioning plural, inclusive, and equitable futures.

While cautious to avoid the trap of "chronocentrism" (Goode & Godhe, 2017, p. 114)—the idea that our era is always exceptional—we argue that the *urgency* of geomedia futures is already evident at this time. Escalating climate change, ecological collapse, and mass extinction force us to deal with future making, as do ongoing or anticipated wars, conflicts, and humanitarian crises. Geomedia play no small part in these developments: as commodities exhausting natural resources and human labor, as data-driven platforms demanding enormous quantities of electricity, as AI technologies fueling war and state surveillance, and so on. At the same time, critical stances and a sound dismissal of technological solutionism should not blind us to geomedia's capacity to contribute positively to social change. Emergency, after all, can serve as a fruitful ground for imagining another world with digital media, as argued by Elwood (2024a).

To extend our critical exploration of geomedia futures, we have included an insightful commentary by Sarah Elwood (2024b) in this thematic issue titled "Thinking Geomedia Futures: Indigenous Futurisms, Afrofuturisms, and Counter-Mediations of Temporality, Spatiality, and Digitality." Elwood emphasizes the significance of Indigenous futurisms, "Afrofuturisms," and counter-mediations of temporality, spatiality, and digitality as critical frameworks for understanding geomedia futures. She argues that these frameworks hold vital conceptual and analytic insights for imagining geomedia futures that are just and life-sustaining, by challenging the technocapitalist roots and present structures of geomedia. These perspectives are essential for unpacking how linear and singular notions of time enabled the dominance of socio-temporal frames such as "modernity" and "progress," and how these temporalities are bound to technology, justifying the structural arrangements and material practices of racial capitalism and colonialism. Elwood's work exemplifies how everyday digital life can function as a site and mode of futuring, highlighting existing digitally-mediated future making that transcends the confines of technocapitalist structures and imaginations.

A second commentary, "Geomediatization and the Messy Futuring of Geodata Commons" by Boris Michel (2024), further enriches our exploration of possible futures with and under geomedia. Michel's contribution challenges geomediatization realism by exploring the complex interrelation between space and technology, particularly in the context of geodatafication. The commentary highlights the political and economic implications of the increasing translation of the world into machine-readable geodata and emphasizes the importance of digital commons against this backdrop. Using OpenStreetMap as a case study, Michel underscores the resilience and challenges of open and participatory projects, stressing the importance of safeguarding digital commons against enclosure by big tech companies trying to "openwash" their commercial endeavors. Alternative futures, Michel argues, do not come about as revolutionary upheavals but rather flourish in small-scale and local practices that can be found in projects such as OpenStreetMap.

3. The Contributing Articles

André Jansson and Christian Ritter (2024) offer an overview of geomedia studies in their article "Mapping Geomedia Studies: Origins, Trajectories, and Future Directions." Using a bibliographic citation and keyword analysis of articles indexed in the Web of Science, the authors map out the theoretical frameworks and methodological approaches that have shaped this "quasi-field," providing a historical context for understanding current trends and future directions. The article emphasizes the interdisciplinary nature of geomedia studies, integrating insights from media and communication studies, human geography, and adjacent fields. It discusses how geomedia technologies have been studied in relation to their impact on space, place, and society, highlighting the dynamic interplay between media, technology, and the spatial environment. By providing a foundational understanding of the evolution and current state of geomedia studies, the article sets the stage for the thematic issue's exploration of future scenarios. It underscores the importance of a critical and interdisciplinary approach to studying geomedia, aligning with the thematic issue's aim to challenge existing paradigms and imaginaries.

In her article, "'AI Will Be the Beating Heart of the City': Connectivity and/as Care in The Line," Linda Kopitz (2024) delves into The Line, an ambitious, though not yet realized, urban development project in Saudi Arabia, where artificial intelligence is envisioned as the central element of urban life. It analyzes the promotional material of The Line to discuss how AI is depicted as the solution for creating a sustainable, livable city. The study draws on the concept of care, exploring how it is operationalized in the context of AI

and connectivity. The Line is presented as a project that integrates advanced technology with urban planning to create a futuristic city that promises seamless connectivity, sustainability, and improved quality of life. However, the article raises questions about the true implications of such connectivity, suggesting that it prioritizes efficiency over human and environmental care. The article engages directly with the thematic issue's focus on geomedia futures by examining a high-profile example of how geomedia technologies are being used to shape urban spaces. It challenges the optimistic narratives often associated with technological solutions in urban planning, urging a critical examination of the promises and realities of AI-driven urban futures.

"Surveillance Working Groups as Geomedia Governance" by Talia Berniker and Lee Humphreys (2024) investigates the role of community working groups in four US cities in governing the adoption of surveillance technologies. These groups, formed in response to concerns about privacy and civil liberties, are tasked with evaluating municipalities' use of surveillance tools. Through interviews with working group members and an analysis of public documents, the study examines the sociotechnical imaginaries these groups hold and how they influence decision-making regarding geomedia technologies. The article highlights the diversity in goals, composition, and review processes of the working groups, emphasizing their role in shaping the future use and governance of surveillance technologies in their communities. By focusing on the governance and societal implications of surveillance technologies in smart cities, the article addresses a critical aspect of geomedia futures. It contributes to the thematic issue by highlighting the role of community involvement and multi-stakeholder governance in challenging the dominant narratives of technological adoption.

In "Ideologies in Geospatial Futurism: A Computational and Critical Discourse Inquiry Into the ArcGIS and ESRI-Blogs," Helena Atteneder and Joan Ramon Rodriguez-Amat (2024) critically examine the ideological narratives embedded in geomedia technologies and their representations in futuristic urban projects. The study uses a combination of computational methods and critical discourse analysis to explore how these technologies are framed within broader socio-political contexts and the implications for future urban development. The analysis reveals that the representations of the future in ArcGIS and ESRI blogs are deeply embedded in ideological principles, suggesting that complex social, political, and economic issues can be solved primarily through technological means. The article identifies how the studied discourses effectively eliminate alternatives to the corporate visions of the future, shaping societal development and democratic well-being. By deconstructing the ideological underpinnings of geospatial technologies, the article aligns with the thematic issue's goal of challenging hegemonic visions of geomedia futures. It provides a critical lens to examine how these technologies shape and are shaped by socio-political forces, advocating for more nuanced understandings of their impact on future urban landscapes and for narratives that prioritize social justice and equity.

In the article, "Geomedia Perspectives for Multiple Futures in Tourism Development," Lotta Braunerhielm, Laila Gibson, and Linda Ryan Bengtsson (2024) explore how geomedia technologies could transform tourism by creating immersive and personalized experiences. The study uses a participatory action research approach involving five Swedish rural communities and local tourism entrepreneurs to discuss various scenarios where geomedia can enhance destination development. It also addresses ethical challenges posed by geomedia technologies, such as data privacy, environmental impact, and cultural preservation. The article proposes a framework for evaluating the potential benefits and drawbacks of geomedia technologies in tourism, emphasizing the need for a balanced and responsible approach to their implementation. The article

contributes to the thematic issue by illustrating the diverse possibilities and challenges of geomedia in tourism and community development, emphasizing the importance of the critical and empirical exploration of future-directed representations. Highlighting the need for sustainable and ethical practices in the development and use of geomedia technologies, the study aligns with the thematic issue's aim of envisioning responsible and equitable futures.

In "Planners Becoming Visualizers in the Mediatized World: Actor-Network Analysis of Cairo's Street Billboards," Mennatullah Hendawy (2024) focuses on the evolving role of urban planners as they increasingly utilize place-based media, particularly billboards, to visualize and communicate urban projects. Using Actor-Network Theory and a qualitative exploratory methodology, the study examines how billboards along Cairo's 6th October Bridge shape planning practices and professional roles. The findings reveal that billboards in Cairo significantly affect urban landscapes and the visual culture of urbanization, often promoting exclusive real estate projects to a socio-economic elite. By highlighting geomedia-induced transformations in urban planning practices, the article ties into the thematic issue's theme of mediatized places and place-based technologies. The research demonstrates the practical implications of geomedia on professional practices and urban conceptualization, aligning with the thematic issue's aim to investigate future geomedia representations. The article underscores the importance of integrating technological innovations with participatory and inclusive planning processes to create more equitable and sustainable urban futures.

The contributions to this thematic issue collectively underscore the importance of envisioning and critically examining alternative geomedia futures. They push the boundaries of current understandings and offer new insights into the role of technology in shaping our spatial and social environments. They span a range of methodologies—critical discourse analysis, computational methods, participatory action research, interviews, document analysis, and Actor-Network Theory—and diverse geographical contexts, including the US, Saudi Arabia, Egypt, and Sweden. As Sarah Elwood (2024b) also notes in her commentary on this thematic issue, future research could benefit from incorporating additional perspectives and experiences from different parts of the world, particularly underrepresented regions. This would ensure a more inclusive and comprehensive understanding of geomedia futures and challenge the singular narratives often associated with geomediatization realism.

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Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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Mapping Geomedia Studies: Origins, Trajectories, and Future Directions

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Abstract

This article explores the formation of and future avenues for geomedia studies. Drawing on a citation network analysis, we map the development of the interdisciplinary research terrain from its origins and identify central citation clusters. The term "geomedia" has been used in the humanities and social sciences since at least the early 2010s. Subsequently, geomedia studies have been advanced through an interdisciplinary scholarship from human geography, media and communication studies, and other related research areas, assessing the increasingly complex interplay between media technologies and the production of space. To detect the origins and growth of geomedia studies as an emerging field, we conduct a bibliographic citation and keyword analysis of 57 references from the Web of Science core collection. The generated charts and network graphs reveal that research on geomedia has mainly evolved within media and communication studies. A citation cluster analysis shows how two sub-communities and approaches have emerged, tentatively called "visual geomedia studies" and "urban-sociological geomedia studies." A keyword cluster analysis reveals how the approaches are entangled with different theoretical perspectives. Given the societal relevance and the growing vitality of present-day geomedia studies, this article discusses the prospects of both approaches.

Keywords

citation networks; communication geography; geomedia; keyword clusters; locative media; media geography

1. Introduction

In recent years, we have seen the publication of several monographs, edited volumes, and special or thematic issues (including the current one) that address the term "geomedia" in various ways. Obviously, the semantic

joining of the Latin words for "Earth" and "in-between" speaks to the culture of our time and the ongoing fusion of our everyday life environments and means of communication. As a condition, geomedia denotes something similar to what Deuze (2011) calls media life—a *life in media*—where media and environment are inseparable. In a certain sense, this means that the term geomedia is tautological. If we consider the deeper history of media, as Peters (2015) suggests, media were *elemental* from the start, grounded in the natural elements—smoke, fire, water, clay, and so forth—and the meanings they could convey. Today, new technology prompts us to rediscover the *geo*—in media. With innovations such as global positioning systems (GPS) and the Internet of Things, we have come full circle and reached a condition where media are again interlaced with the Earth in increasingly intricate ways. Thus, while geomedia is sometimes used as a shorthand for certain space-contingent technologies or platforms, more or less synonymously with "locative media," the term can also have a wider purchase. This is what McQuire (2016) argues when he draws the contours of geomedia as a digitalized, socio-technologically convergent urban condition (see also McQuire, 2018) and what Jansson (2022) means when describing geomedia as an environmental regime.

Our point of departure is that geomedia represents a significant and promising reorientation in the study of human communication and its conditions. However, this article does not aim to "come to terms" with geomedia. Given the growing academic interest in geomedia *and* the fact that the term itself is relatively open-ended and multi-faceted (at worst, redundant), we find it important to produce an overview of how the term "geomedia" has been used in academic writing and what type of research terrain this terminology represents. Our aim is to bring about the very first systematic mapping of how "geomedia" has made its way into the social sciences, which publications have been significant in defining the research area, and how the term is clustered with other keywords. To fulfill this aim, we conducted a citation network analysis based on a meta-analysis of 463 references from the Web of Science (WoS) core collection. Citation analysis can be a pertinent tool for assessing the status of a field and its subfields (Wei et al., 2023, p. 364). This article provides an unprecedented computational mapping of geomedia research (limited to work that explicitly addresses geomedia), revealing the bibliographic connections between the various research texts, their authors, and schools.

Assessing a data set from the WoS core collection, we raise the following questions: To what extent can the analysis of direct citations provide insights into the differentiation of geomedia studies and the formation of bibliometric communities? In what ways can the keyword analysis reveal the entanglement of research communities with topic areas and theoretical perspectives suggested by geomedia scholars? Furthermore, we ask what conclusions can be drawn from the outcomes of the citation and keyword analysis in terms of future research avenues and new directions for future methodological and theoretical challenges.

Our analysis is structured as follows: First, we illustrate how the usage of the term geomedia has evolved quantitatively over time, both in direct usage and citations. Here, we also provide a comparison with two related concepts: locative media and media geographies. Second, we present citation networks that trace the emergence of bibliometric communities of scholars sharing an explicit interest in geomedia. Third, we visualize semantic clusters to find out which other key concepts are combined with geomedia and thus define the research terrain of geomedia studies thematically and theoretically. The article ends with a discussion about the future of geomedia studies as a prospective research field, focusing on whether we are dealing with a sustainable research community or a more transitory trend.

2. Mapping Geomedia Studies as an Emerging Field

Before turning to the analysis, let us briefly reflect on the meaning of "field"—a geographical term—and what it stands for in our investigation. In 1999, Robert T. Craig argued that communication theory was not yet to be called an academic field. Most communication scholars, he argued, did not recognize one another but referred to other theorists from various disciplines. There was no corpus of canonical texts and a rather disorderly terrain of almost uncountable "theories" (see also Craig, 1991). However, given the practical significance of communication in people's lifeworlds, Craig argued that there could and *should* be a field of communication theory if researchers gathered around shared questions and goals while also recognizing controversies. The potential of communication theory was to become "a coherent field of metadiscursive practice, a field of discourse about discourse with implications for the practice of communication" (Craig, 1999, p. 120). This is a rather concise way of understanding the meaning of an academic field and serves as inspiration for the current analysis.

One thing is clear from the start, however. If communication theory did not qualify as a field in 1999—when Craig could identify seven significant approaches—we must dismiss any idea of calling geomedia studies a field. When we embarked on this analytical endeavor, we did not expect to find a field nor intend to promote geomedia studies as a field (which it is not). A field cannot revolve around one concept alone. Nevertheless, we argue it serves a valid purpose to adopt the idea of (meta)discursive practice to assess if there are key works and shared research topics that keep research on media together *and* if there are signs of debate around media research as such. Only based on such analyses of current discursive conditions can we allow ourselves to speculate about the future. While acknowledging the difficulties of defining a field in media and communication studies and its theoretical connections to other disciplines, Campbell (2013) suggests that demarcating the key contours of a field and its central characteristics allows its scholars to develop a shared identity. As such, what follows is an attempt to chart geomedia studies as a potentially emerging field or a quasi-field (following the ANT notion of the quasi-object as something not actually existing but potentially emerging and an entity that social actors relate to; see Jóhannesson & Bærenholdt, 2020) where different research interests come together, united by a shared concept. We hope this endeavor can serve as inspiration for other researchers. Since geomedia is an inherently interdisciplinary notion, there is potential for new constellations of concepts and mindsets and, in the long run, for new approaches to emerge.

3. Methodological Approach and Data Collection

Our analysis of the development of geomedia studies is primarily based on gathering and reading journal articles and book chapters. These interpretations deriving from a textual analysis of the contributions to geomedia studies are complemented by a computational citation network analysis. The digitalization of libraries and citation indexes has provided extended access to large amounts of bibliographical data, allowing researchers to employ new computational tools that can enhance the interpretation of the textual content. This article is grounded in a bibliographical analysis conducted with the visualization software VOSviewer. This software tool made it possible to assess both citation networks of scientific articles and the co-occurrence of the keywords of these articles.

To map scholarly networks within the research areas of geomedia studies, we retrieved bibliographical data from the WoS core collection. The bibliographical data set was used for both the citation network and

keyword analyses. This database consists of the most relevant bibliographical indexes in the social sciences and humanities, including the Science Citation Index Expanded (1900–present), the Social Sciences Citation Index (1956–present), the Arts & Humanities Citation Index (1975–present), the Book Citation Index for Science (2005–present), Book Citation Index—Social Sciences & Humanities (2005–present), and the Emerging Sources Citation Index (2018–present). The WoS core collection is an adequate data source for identifying research trends and citation clusters in a given scientific field (Tang et al., 2023, p. 2137) since it contains high-level scholarship from around the world. The multidisciplinary database WoS began in 1973 and covers sources going back to 1956. This database indexes about 1,900 journals on a cover-to-cover basis, selectively about 3,000 further journals, and a limited number of conference proceedings and monographs (Norris & Oppenheim, 2007, p. 163). The indexing of research texts on databases such as WoS, Scopus, Google Scholar, and CSA Illumina has played an important role in measuring research outcomes and is often considered by research funding bodies for appraising research quality.

This bibliographical investigation primarily involves WoS as a research tool, committing to the search-as-research approach (e.g., Rogers, 2013). Using a personal WoS account to access the database's search interface, the bibliographic data was assembled with the search query "geomedia" and the parameter "topic," which searches in the titles, abstracts, and author keywords, on January 25th, 2024. We chose this relatively broad search because it allows for tracing discourses revolving around the term "geomedia." Our aim is thus strictly explorative in that we want to map the bibliometric and discursive formations connected to one specific term, "geomedia," rather than trying to reconstruct geomedia studies as a complex research field that incorporates a plethora of other keywords. The latter alternative would have been interesting, of course. However, it would have also required more extensive analyses, for example, tracing the keywords that we identify as closely linked to geomedia or including additional search terms from the start. However, the inescapable downside of such procedures is that the selection of additional terms would have determined the discourses produced. The meaning of geomedia studies would thus have been reliant on our choices, implying, for example, that scholars not identifying with geomedia (studies) would have been subsumed under this label. The terminologies evolving within geomedia studies are semantically related to research labeled, for example, "media geographies" and "locative media," and scholarship within these research areas has been continuously shaped by mutual inspiration.

During the initial search, 197 bibliographic references were found, among which 46 were classified as "environmental sciences," 28 as "communication," and 23 as "engineering environmental" by the WoS database. We went through all of the references manually. We found that many of them did not have any connection to geomedia as an analytical term (such as the GeoMedia GIS software package) or to the type of research implied by geomedia in cultural, societal, or technological contexts (referring instead to minerals and chemical substances). Thus, while ensuring that the selection of articles remained as inclusive as possible, only WoS categories for social science disciplines and the humanities were included in a refined search, and subject areas from science disciplines were excluded (WoS, 2024).

The refined bibliographic data set contains 57 articles from the WoS core collection and 2,257 cited references from the bibliographies of these articles. Amongst the cited references, Scott McQuire's book *Geomedia: Networked Cities and the Future of Public Space* (2016) received the highest number of citations (28), followed by Tristan Thielmann's article *Locative Media and Mediated Localities: An Introduction To Media Geographies* (2010) with 11 citations within the WoS core collection. The data set contains a small number of

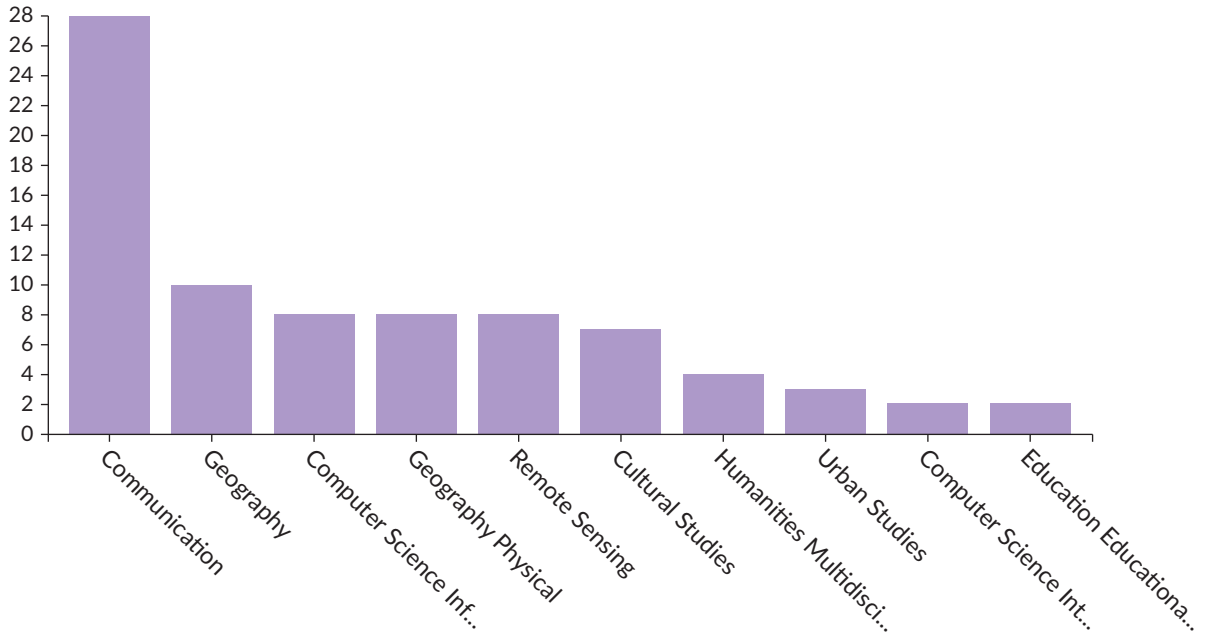

Figure 1. Subject areas related to geomedia studies within the WoS core collection.

book reviews, but these documents do not concern the network clusters discussed below. While 28 documents were classified as "communication," ten were classified as "geography," and eight as "computer science information systems" (see Figure 1). This indicates that geomedia research is predominantly anchored in media and communication studies with strong links to geography, as well as to interdisciplinary research in cultural studies and the social sciences.

To contextualize our analysis, we also examined the terms "locative media" and "media geographies." While "locative media" was cited in 231 articles, "media geographies" appeared in only 31 sources. While the former term predominantly figured in journals classified as "communication," the latter figured above all in sources from "geography." This comparison tells us something about the interdisciplinary position and relatively small volume of geomedia research. Our search also revealed that the use of "locative media" in scientific publications has steadily declined since its peak in 2015, with 35 sources, down to five in 2022 and 2023.

The data set for this investigation was downloaded as a CIW file from the WoS. The text-based tag format for bibliographical references was developed by Research Information Systems and is, for instance, used by the bibliography management software EndNote. The CIW file was loaded in the network visualization software VOSviewer to generate the network graphs displayed in Figures 3 to 5 in the following sections. The purpose of using the VOSviewer visualization is to identify trends and subfields within geomedia studies through citation and keyword clusters.

4. Origins and Expansion of Geomedia Studies

To provide a backdrop to our analysis of citation networks, it is important to reflect on the early years of geomedia studies. In this regard, McQuire (2018, p. 249) has advanced two important points. First, he

contends that the term geomedia started to appear in the social sciences around 2010 when "a certain problematic concerning the way that networked digital media platforms are implicated in reworking the space-time of everyday life became more urgent and insistent." Second, he holds that the term's origins and associated concerns are complex and can be traced to different disciplines and fields. Geomedia studies, McQuire (2018, p. 250) argues, can best be understood as a "space of encounter," even a "creative space" of "unruly conjunctions."

We reach a similar conclusion through our WoS data (Figure 2). While the origins of geomedia as an *explicit* social scientific research topic can be traced back to 2011, even a bit earlier, the period around 2017–19 marks the beginning of a more expansive and still ongoing stage. Figure 2 reveals that while the number of geomedia-related publications has fluctuated significantly over the years, for example, due to the publishing of special issues and book reviews, there is also an overall positive trend. Similarly, the number of citations—probably a better measure of the quasi-field's expansion—has grown steadily and reached 70 citations in 2022. The data for 2023 and 2024 were not completed at the time of the data collection.

The WoS data suggest that one of the first geomedia articles was Lapenta's (2011) "Geomedia: On Location-Based Media, the Changing Status of Collective Image Production and the Emergence of Social Navigation Systems," published in *Visual Studies*. Lapenta, a sociologist specializing in new media innovations, described geomedia as platforms merging existing electronic media and the Internet, locative media, and augmented reality, a view he elaborated in a book chapter in *Mobile Technology and Place* (Lapenta, 2012). Lapenta's technologically oriented approach constitutes an important starting point for geomedia studies. Notably, it was taken up just a few years later by Chess (2014) in an influential article on mobile gaming technologies.

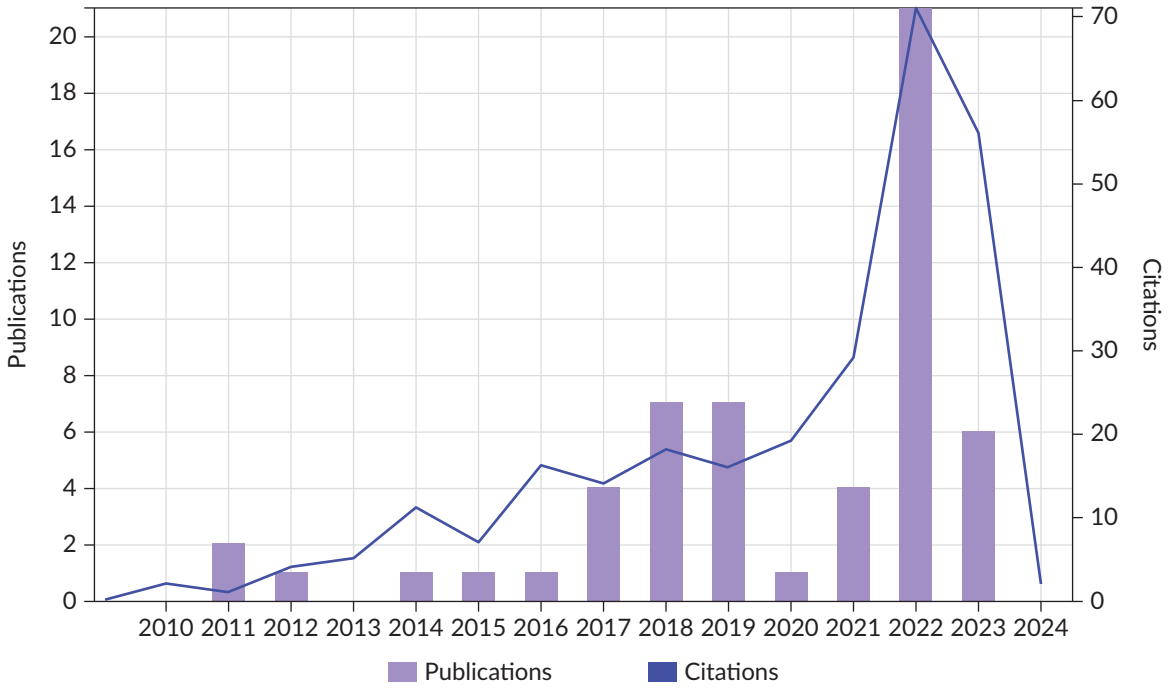

Figure 2. Number of publications and citations referring to "geomedia" in the WoS core collection (2009–2023).

Also in 2011, Richterich published the article "Cartographies of Fiction: Amateurs Mapping a New Literary Realism," which outlines an emerging type of interactive "geomedia fiction." Richterich (2011) does not provide any exact source of the term "geomedia." However, her work draws on Döring and Thielmann's (2009) edited volume *Mediengeographie: Theorie—Analyse—Diskussion*, in which the term geomedia (*Geomedien*) is present (Manovich & Thielmann, 2009). At the time, Richterich was a member of the graduate school Locating Media at the University of Siegen, Germany, where both Döring and Thielmann worked. Neither Döring and Thielmann's edited volume nor Thielmann's earlier articles on geomedia (Thielmann, 2007, 2010) are part of the WoS collection, however. In his article on car navigation systems, Thielmann (2007, p. 63) argues that it "seems appropriate to term media…with converging cartographic and media applications, as the genre of 'geomedia.'" In a subsequent article, which has become very influential, Thielmann (2010) developed his view of geomedia as an expanding technological regime where locative media and mediated localities come together.

There are also (at least) two other "geomedia beginnings," besides Lapenta and the Siegen research group, that are not directly visualized in the WoS material. From 2010 onwards, the term geomedia was repeatedly used in publications on GIS technology in geography education. The first publication that appears in the WoS material is an article by Schulze et al. (2015) entitled "Spatial Citizenship and Digital Geomedia: Composing Competences for Teacher Education and Training." However, the same group of scholars published papers and articles around spatial citizenship several years earlier (e.g., Gryl & Jekel, 2012; Gryl et al., 2010; Schulze et al., 2014), referring to geomedia as a type of interactive web-based applications for geospatial information. In this strand of geomedia studies, while anchored in didactics and geography education, we also find references to Thielmann's media theoretical work as well as to research in social geography (e.g., Felgenhauer & Quade, 2012; Quade & Felgenhauer, 2013). A connecting link to the Siegen research group seems to be conferences and proceedings on spatial citizenship, published in the Austrian journal *GI-Forum*, which is not indexed by WoS (e.g., Abend, 2013; Vogler & Hennig, 2013).

The final starting point can be found in McQuire's ground-breaking work on digitally mediated urbanism. While the WoS collection entails several book reviews of *Geomedia: Networked Cities and the Future of Public Space* (McQuire, 2016), it does not list the book itself nor McQuire's earlier work on geomedia, which was published in 2011 in an edited volume entitled *Urban Interior* (McQuire, 2011). In comparison to other early treatments of geomedia, McQuire introduces a more socially oriented approach to geomedia as a contested (urban) environment. It should also be noted that McQuire had connections to the Siegen researchers and, for instance, contributed a chapter to the above-mentioned book *Mediengeographie* (McQuire, 2009).

Since 2017, we have seen the publishing of several special issues (Fast & Abend, 2022; Fast et al., 2019; Hartmann & Jansson, 2024) and edited volumes (Fast et al., 2018; Felgenhauer & Gäbler, 2018) that have boosted conversations around geomedia. Similarly, if we look at the individual articles and books that engage with geomedia from 2016 and onwards, they typically build explicitly on any of the aforementioned beginnings (e.g., Jansson, 2022; Rodríguez-Amat & Brantner, 2016; Schmuderer et al., 2019). Such patterns—which also testify to the interdisciplinary nature of geomedia studies—stand out even clearer as we turn to the analysis of citation networks.

5. A Citation Network Analysis

In this section, we examine how direct citations of research texts within the WoS core collection can provide insights into the prospective formation of bibliometric sub-communities within geomedia studies. Again, we focus on articles that refer to the term "geomedia." In network science, citation networks are generally understood as networks of relatedness to a given subject matter (Newman, 2010, p. 64). According to Small (1973), citation network analysis is a review methodology that allows researchers to map the structure of a scientific field quantitatively. It makes visible clusters indicating the constellation of nodes and significant sub-components within a given network. Ever since citation network analysis was established in the 1970s, the three main approaches that evolved for investigations into scholarly citation networks have been co-citation analysis, biographical coupling, and direct citation analysis (Boyack & Klavans, 2010, p. 2390).

This investigation into the quasi-field of geomedia studies is based on the tracing of direct citations. Citation networks comprise two fundamental elements: nodes related to scientific research texts and directed edges denoting a citation relationship among the research texts. Suppose a research text A cites research text B. In that case, an edge can be drawn from A to B. Citation network analysis can thus be used to identify research clusters with common themes (Aryadoust, 2020, p. 3), where clusters are described as sub-components or identifiable groups (González-Teruel et al., 2015, p. 692).

The predominant cluster, which we analyze in greater detail, contains 28 articles represented by 28 nodes (Figure 3). The node labels contain the last name of the author or the last name of the first author in multi-author articles. The size of the nodes refers to the frequency of citation for the article within the WoS core collection until the day of the data collection. The 28 articles displayed in Figure 3 form the largest cluster among the 57 articles included in the data set and contain almost all of the most cited articles of the data set: Lapenta (2011) with 58 citations, Chess (2014) with 28 citations, Jansson (2019) with 19 citations, Rodríguez-Amat and Brantner (2016) with 17 citations, and Fast et al. (2019) with 16 citations. The articles reflect crucial moments in the development of geomedia studies as they introduce different topic areas.

Exploring the cluster in-depth, we argue that the distribution of the 28 articles reveals a conceptual tension that has fuelled the emergence of two bibliometric sub-communities within geomedia studies. The first consists of the nodes in the lower-left part of the diagram. This star-shaped subsection of the cluster revolves around Lapenta's (2011) article. This node has 11 edges. All the surrounding nodes that cite Lapenta's work engage with his initial idea of geomedia and are mainly concerned with the visual aspects of such technologies. The analysis of the cluster section forming around this article is particularly insightful as it is an early contribution to geomedia research and serves as a starting point for tracing the evolution of different approaches.

Lapenta's article provided an initial conceptual framework within geomedia studies and outlined the social and perceptual shifts caused by early geomedia technologies. In another early contribution, Lapenta (2012) emphasized the geolocational re-aggregation of the digital image, circumscribing a new socio-economic order for social production and information exchange. Many of the citing authors refined Lapenta's initial conceptualization and introduced the geomedia terminology to new topic areas. Chess (2014, p. 1105) borrows Lapenta's definition of geomedia and expands the concept to the study of the mobile phone game Ingress, assessing how it restructures the relationships between community and space. In their assessment

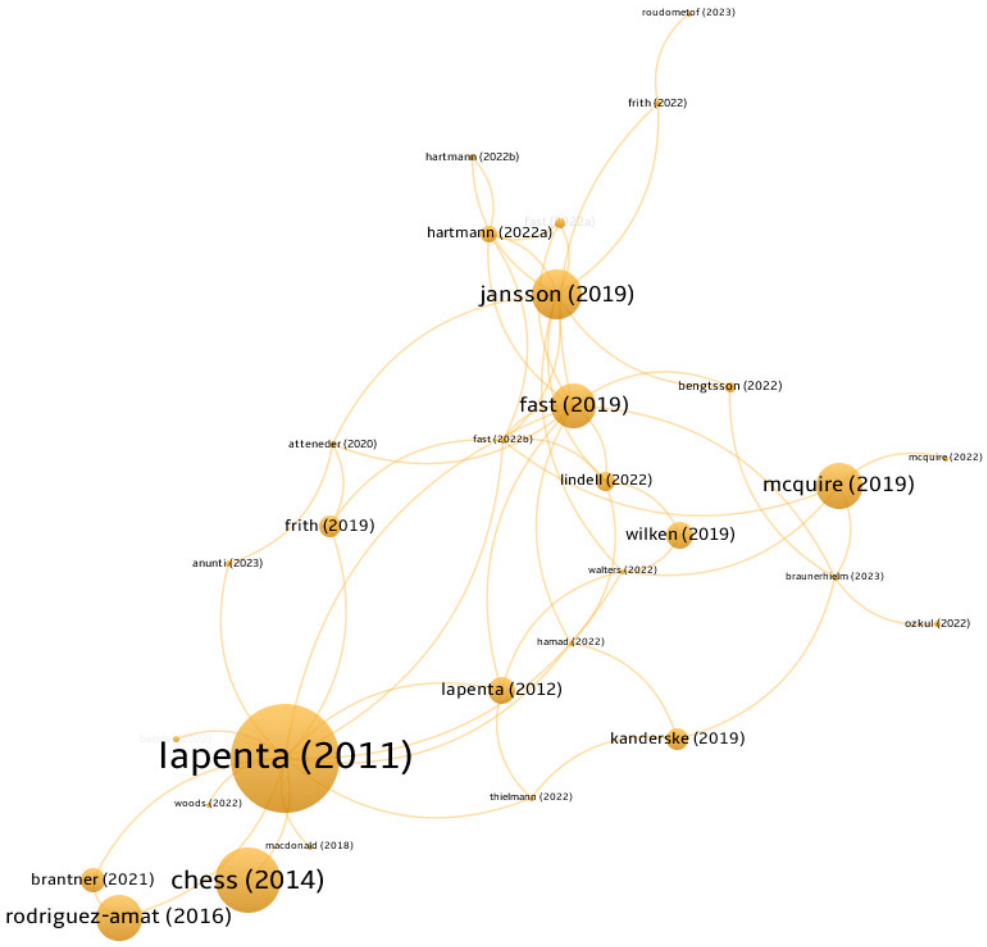

Figure 3. Citation cluster of WoS articles referring to "geomedia."

of Yelp and Foursquare, Frith and Wilken (2019, p. 134) make use of Lapenta's initial concept of geomedia as an umbrella term capturing larger urban, technological, and social transformations facilitated by locative media and other location-based services. Drawing on Lapenta's (2011) concepts of composite imaging and geolocation-based representation, Rodríguez-Amat and Brantner (2016) introduce geomedia perspectives to media research into social movements. This article is another significant contribution to geomedia studies and is cited in the subfield of digital activism. Brantner et al. (2021) refine public sphere theory while mobilizing the socio-organizational principle of self-other and the world (following Lapenta) to analyze social media interaction and political action for occupying urban space. MacDonald (2018, p. 149) draws on Lapenta's analysis of photo collage techniques and puts his claims on the fractured temporality of photographic mapping into question. Woods (2021) applies Lapenta's concept of geomedia to the study of scale and time in the Anthropocene. Thielmann (2022) assesses the infrastructural, environmental, and practical conditions of geomedia, tracing their origins back to the first aerial imagery in the late 18th century. Bender and Kanderske (2022) historicize the idea of geomedia technologies by assessing three consecutive modes of aerial seeing. Finally, Anunti et al. (2023) introduce Lapenta's concept of geomedia to research sustainability education and digital story mapping. Between 2011 and 2024, Lapenta's basic concept of geomedia mainly spread across the thematic areas of gaming, the Anthropocene, aerial imagery, political activism, and visual culture. The different articles contribute to a sub-community that we may tentatively call "visual geomedia studies."

In the upper part of the citation cluster (Figure 3), various articles are also closely connected through citations. This subsection of the cluster is little connected to Lapenta's work. These contributions can be considered a second sub-community within geomedia studies that mainly assesses geomedia in urban contexts. The first sub-cluster evolved around a special issue introduction in *Communication and the Public* by Fast et al. (2019), which has eight connections to other articles within the cluster section. The node around Jansson's (2019) article (appearing in the same special issue) has seven edges. Another special issue introduction, Hartmann and Jansson's (2024, available since 2022) "Gentrification and the Right to the Geomedia City" is also part of this dense polycentric cluster section. The three sub-clusters, which can be institutionally linked mainly to the Centre for Geomedia Studies at Karlstad University, Sweden, demonstrate the formation of "urban-sociological geomedia studies" as a prospective approach through opening up avenues for researching socially-oriented topics such as gentrification and tourism through geomedia lenses.

The urban-sociological approach is constituted by articles that are internally linked through citations and (in several cases) by appearing in the same special issues. In bibliometric terms, however, an even more important common denominator is that all publications in the upper part of the diagram (13 articles) cite McQuire's (2016) book *Geomedia: Networked Cities and the Future of Public Space*. While this legacy is not visualized in the figure, since the book is not covered by the WoS core collection, some illustrating examples can be provided. Hartmann and Jansson (2024) explicitly build their understanding of the "geomedia city" on McQuire's approach and link it to gentrification. In a related vein, Fast (2024, available since 2022) deploys McQuire's framework to study how urban coworking spaces, understood as hyper-connected elite territories, play into gentrification. McQuire (2019) extends his notion of geomedia by analyzing Google Maps as a technical object that radically shapes and embeds urban experience. Hartmann (2024, available since 2022), in turn, analyzes the public battles surrounding the planning of a Google Campus in Kreutzberg, Berlin, as an instance of urban geomediatization. Lindell et al. (2022) incorporate McQuire's view of geomedia as a technological regime in a Bourdieusian study of people's place-exposing activities on social media. Bengtsson et al. (2022) appropriate McQuire's approach in an action-research study of how participatory design interventions may foster socially sensitive place-based mediated experiences in tourism (see also Braunerhielm & Bengtsson, 2023).

The citation network analysis indicates that geomedia studies have evolved as a heterogeneous research terrain accommodating various location-based phenomena, diverse theoretical perspectives, and empirical case studies from various social and material contexts. Whereas many articles still deploy a rather exploratory approach to geomedia and reflect on different ways of understanding the term, our cluster analysis also identifies the formation of two prospective sub-communities and approaches within geomedia studies: visual geomedia studies, largely building on Lapenta's (2011, 2012) definition of geomedia, and urban-sociological geomedia studies, originating from the work of McQuire (2011, 2016).

Given these two ways of approaching geomedia, however, we must again reflect on the limitations of the WoS data. Our textual analysis of articles and book chapters revealed that early geomedia scholarship was developed by members of the Siegen research group (e.g., Thielmann, 2010). Much of this research was not included in the WoS core collection since it was partially published in German. However, this research tradition has been continued in, for example, the journal *Digital Culture & Society*, which is not represented in Figure 3. Thielmann's articles are also much-cited among adherents of the urban-sociological approach, but not to the same extent as McQuire's (2016) work. One might then hypothesize that the recent trajectories of the Siegen

research group, such as the articles by Thielmann (2022) and Bender and Kanderske (2022; see Figure 3), occupy an intermediary position between, or cut across, the two aforementioned approaches.

6. Keyword Clusters

Following the citation network analysis, we explore the same WoS data set regarding the entanglement of bibliometric sub-communities with theoretical perspectives. Raymond Williams established a canonical classification of keywords for social science research. Tracing the meaning of 131 keywords back to their origins and following their development, Williams (1976) provided cultural researchers with a semantic orientation for key categories used in academic conversation. About 50 years later, adding keywords to scientific papers has become compulsory for academic writing to index research outcomes. The digitization of the dissemination of academic knowledge dramatically transformed the meaning of keywords as they leave digital traces stored in gigantic bibliographic databases. Indexing systems, such as the WoS and Scopus, classify research texts and connect them through keywords.

A facet of citation network analysis is the identification of keyword clusters, which is facilitated by the statistics and visualization features of the VOSviewer. Tracing the co-occurrence of keywords in research texts, this technique allows for the allocation of topic areas (Lee & Zhou, 2022, p. 12) or semantic clusters in a given scientific field (López-Fernández et al., 2016, p. 625). Such semantic clusters refer back to discursive practices evolving in the field as many scholars signal their conceptual approaches while adding keywords to their research texts. Following Lee and Zhou (2022, p. 4), a co-occurrence analysis can detect the "conceptual knowledge structure" of a given research area. Similar to a co-hashtag network analysis that can show the semantic interconnectedness between science communication and conspiracy theories on X, formerly Twitter (Tuters et al., 2023), keyword analysis can unveil the semantic entanglements of sub-communities within geomedia studies with different theoretical perspectives.

The 57 references from the WoS core collection contain 272 different keywords, forming 16 clusters. Figures 4 and 5 show subnetworks that are relevant to the above-described approaches and provide visual evidence for how these approaches are connected with research themes and theoretical perspectives within geomedia studies. The *proximity* of keywords signals how topics are interconnected and can point toward emerging trends. The *size* of the nodes relates to the keyword frequency in the data set generated with the search term "geomedia." The keyword "gentrification" was used seven times, the keywords "location" and "tourism" were each used six times, and the keywords "place" and "locative media" five times each by the 57 references. Various major keyword clusters can be identified in the subnetwork forming around the gentrification cluster (Figure 4). This subnetwork, related to the urban-sociological approach to geomedia, is, in turn, flanked by various isolated clusters regrouping keywords with lower frequencies. One of these disconnected clusters contains the keyword "image" and assembles keywords in the second approach, visual geomedia studies (Figure 5).

The clusters displayed in Figure 4 provide insights into trends and conceptual developments in geomedia studies. The distribution of clusters corresponds, to a certain extent, with the formation of an urban-sociological approach in geomedia studies and its main theoretical perspectives. For instance, gentrification (blue color) is connected with Pierre Bourdieu's notion of "distinction" and research into "busyness." Another example of an emerging trend, shown in green color, is the introduction of action

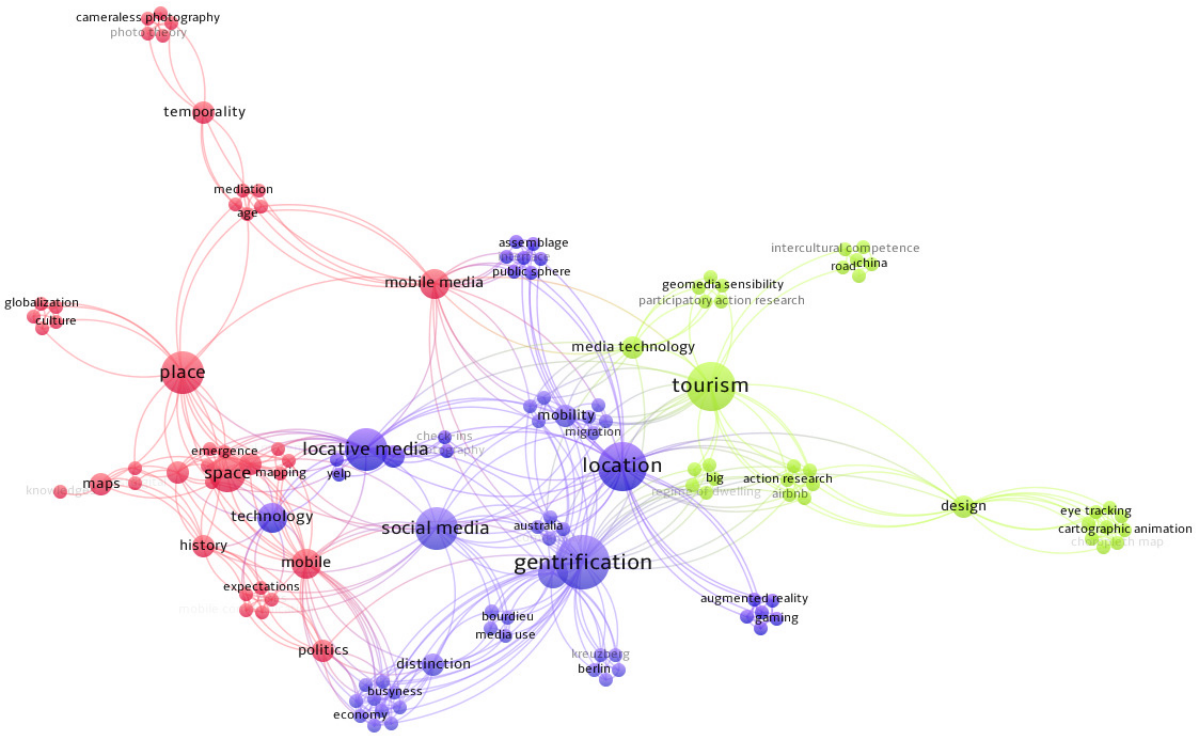

Figure 4. Keyword cluster from WoS articles around gentrification in geomedia studies.

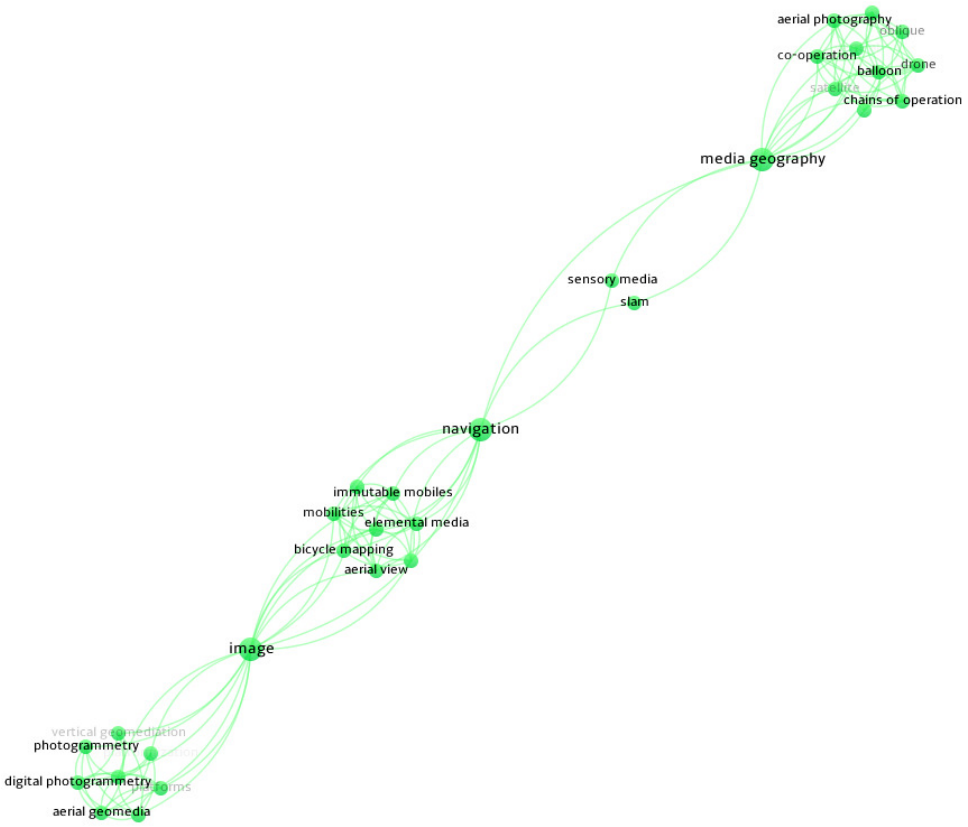

Figure 5. Keyword cluster from WoS articles around visual research in geomedia studies.

research related to geomedia design, which is closely connected with the keyword "tourism." At the same time, semantic proximity can be stated for the keywords "gentrification," "tourism," and "location," indicating that these research topics are closely related. The emphasis on location seems to provide a common ground for both gentrification and tourism research.

In a separate keyword cluster (Figure 5), we can see how geomedia scholars develop new perspectives on the issue of the "image." This cluster is not connected to the gentrification cluster, which again can be interpreted as an indication of a differentiation within geomedia studies. Whereas the gentrification cluster entails mainly sociological perspectives on urban space and social class, recent visual scholarship in geomedia studies draws on theories related to "navigation" and "immutable mobiles" (i.e., actor-network theory). The keyword cluster analysis also demonstrates how the visual approach is entangled with particular research objects, such as "aerial geomedia," "balloons," and "drones." This is an interesting development. As the scholarship in geomedia grows, the research communities draw on various theoretical traditions and contribute to central thematic discourses such as mobilities and navigation (Figure 5) versus location and social media (Figure 4).

7. Concluding Discussion: The Future of Geomedia Studies

As we stated from the outset, it is too early to speak about geomedia studies as a field in the established sense. Geomedia studies can more properly be understood as a creative "space of encounter" (McQuire, 2018). Nevertheless, inspired by Craig's (1999) view of how fields emerge through (meta-)discursive practice, we have deployed two different types of network analysis (charting citation and keyword clusters, respectively) to draw the contours of geomedia studies as a potentially emerging field, or a quasi-field. This type of mapping exercise, we argue, is important not just to understand the evolution of a certain research area but also to assess its future directions.

There are some limitations to our study. Besides the limited amount of research dealing explicitly with geomedia, the citation network analysis is also limited by its choice of material, as the network visualization and citation counts are based on the WoS core collection. The 57 references on which the analysis is based include only English-language research texts, published in "top tier journals" or in books with certain publishers. However, what is considered a top-tier journal or publisher may vary according to the academic culture. Most authors are based in universities in the Western hemisphere, and voices from, for instance, South America or Asia are less heard. Future bibliographic investigation into the field of geomedia studies could address such omissions and include further languages and different citation indexes. Furthermore, the narrow search query implicitly excluded related publications about media geographies, spatial media, and locative media, which constitute a large and expanding research area. This was a deliberate choice, which we discuss in the methodology section.

These limitations aside, we have crystallized interesting patterns that show what keeps geomedia studies together *and* how the quasi-field is differentiated. As to the former, we identified three particularly important origins that still make their mark on geomedia studies. These are related to the early works of Thielmann (2007, 2010), Lapenta (2011, 2012), and McQuire (2011, 2016). While we could also detect a fourth important development related to geomedia technologies in geography education (e.g., Gryl & Jekel, 2012), these publications do not seem to attain the same general significance among geomedia scholars when it comes to navigating or positioning oneself in the potentially emerging field. In our citation network

analysis, we could also identify a tension between scholars building on either Lapenta's work, dealing with visual culture, or McQuire's research on geomedia as part of data-driven urban environments. The fact that we can observe common denominators *and* anticipate the coming of two sub-communities and approaches to geomedia—visual geomedia studies and urban-sociological geomedia studies—shows that geomedia research thus far has evolved in ways that are quite symptomatic of how fields come about. We should also keep in mind that there have been regular conferences, symposia, workshops, and other academic exchanges (including special issues and edited books) that have contributed to building the conceptual platform and sparked conversations around geomedia studies. However, it is beyond the scope of the current article to analyze these dynamics.

This leads us to the future of this quasi-field. Given that geomedia studies is a research area searching for its identity, still gathering a relatively small number of scholars, any attempt to sketch the road ahead may seem premature. Currently, it takes just one or two special issues around a certain theme to make an imprint on the research area at large. It is too early to say something conclusive about the two prospective approaches we identified in the WoS material for 2009–2023. However, if we allow ourselves to extrapolate from the analyses—which provide a systematic overview of tendencies that have not been discussed before—there are three points to make.

First, we predict that geomedia studies will continue to expand regarding how often it is addressed in research publications and how many citations there are to geomedia-related literature. Given the growing vitality of the research community, which we have demonstrated here, and that the problem areas that are at the very core of geomedia studies will stay on the agenda for the foreseeable future, we assume that geomedia studies will continue to attract new researchers. Notably, there is great potential to grow and diversify the community if more scholars from other disciplines than media and communications also "discovered" geomedia.

Second, we believe there are good chances for the two identified geomedia approaches to keep their positions as the main strands within the emerging field. What brings us to this assumption is that the strands are founded upon shared bodies of literature as well as internally coherent approaches to the phenomenon of geomedia. Further, as we have shown, the dominant trends in geomedia studies (also beyond the two sub-communities) are typically anchored in the activities conducted within and between particular institutional contexts. This grants a certain degree of sustainability to ongoing research developments, inducing further theoretical cross-fertilization for the assessment of emerging geomedia technology, such as that shaping volumetric urbanization or the digital geographies of non-fungible tokens.

Finally, it is reasonable to expect and hope that the amount of meta-discursive practices related to geomedia studies will grow. As Craig (1999) argues, this is what one can and should expect from scientific communities—at least in the long run. While it is too early to estimate what types of debates might emerge, we contend that special issues such as this one are a step in the right direction. We also hope our analysis will work as a stepping stone for further discussion around geomedia (studies) and its future.

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Conflict of Interests

The authors declare no conflict of interest.

Data Availability

The data set for the citation network analysis is available on the WoS database and cited in the reference list. WoS users who have a subscription to the database can replicate the research.

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ARTICLE

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"AI Will Be the Beating Heart of the City": Connectivity and/as Care in The Line

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Abstract

Artificial intelligence will be "the beating heart" (Bell, 2022, para. 1) of the linear smart city The Line in Saudi Arabia, one of the most expensive and expansive urban living projects of our times—and crucial in the larger vision of a post-oil future for Saudi Arabia. Exemplary of the complex relationship between past and future in constructing alternative urban imaginaries, the promotional material of The Line highlights technology as the best—and apparently only—solution to "maintain, continue, and repair our 'world' so that we can live in it as well as possible" (Tronto & Fisher, 1990, p. 40), while at the same time imagining artificial intelligence itself as a living and "organic" presence in the urban. Following David Pinder's understanding of cities as always both imagined and real, immaterial and material, this article draws on care as a critical lens to explore the construction of The Line in answer to Nick Dunn's provoking question: "So can imagining the future change it?" (Dunn, 2018, p. 376). Tracing "care in a manufactured landscape" (Mattern, 2021, p. 144) here highlights the entanglement between technology and sustainability, between organic metaphors and artificial environments, between virtual connection and material exhaustion. Critically examining the promise embedded in contemporary architectural projects to deliver "new and imaginative solutions" (NEOM, 2022e) for the physical, psychological, and environmental exhaustion of urban life, this article proposes an understanding of connectivity and care as increasingly entangled—and argues that the urban vision put forward in The Line, ultimately, hinges on care as connectivity rather than caring interconnections, networked logics rather than networks of belonging.

Keywords

artificial intelligence; care; disconnection; NEOM; sustainability; The Line; urban planning; utopianism

1. Introduction

Artificial intelligence will be "the beating heart" (Bell, 2022, para. 1) of the linear smart city The Line in Saudi Arabia—one of the most expensive and expansive urban living projects of our time. The idea to employ "smart" solutions for urban spaces is not necessarily new: Cities that are more connected, and in turn supposedly more adaptable, more liveable, more sustainable, are a staple of urban imaginaries from the mechanical city of the 1910s to more recent examples like The Line. Two hundred meters wide, 170 kilometers long, and 500 meters above sea level, The Line is built to accommodate nine million residents, while at the same time functioning as one of 10 satellite developments that—taken together—form the proposed special economic zone NEOM at "the crossroads of the world" (NEOM, 2022b). As part of what Steffen Wippel calls the "expansive branding policies" (Wippel, 2023, p. 3) adopted by Middle Eastern cities, regions, and nations, highlighting the sustainability of the design and exclusive use of renewable energy in the publicly available material on NEOM can be understood as part of a larger vision of a post-oil future for Saudi Arabia. This, in turn, is exemplary of the complex relationship between past and future (cf. Godhe & Goode, 2018) as well as the entanglement between design, technology, and sustainability in constructing alternative urban imaginaries. Tracing the promise embedded in contemporary architectural projects to deliver "new and imaginative solutions" (NEOM, 2022e) for the physical, psychological, and environmental exhaustion of urban life via artificial intelligence, this article proposes an understanding of connectivity and care as increasingly entangled. Both connectivity and care could easily be understood as part of the "trendy urban concepts and seductive narratives, as well as elaborate city branding strategies and forms of place promotion" (Moser & Côté-Roy, 2021, p. 4) that are part of the global circulation of urban developments. More than representing an almost inevitable convergence of discourses of the "sustainable" city and the "smart" city, however, I propose that the concept of care is strategically operationalized in the discursive framing of large-scale urban developments. Following Liesbeth Schoonheim's call to recast "practices of providing and withholding care as material, economic, and political" (Schoonheim, 2022, p. 1), shifting our attention to care functions as an entry point into both the mediation and realization of urban visions. Expanding on an understanding that care "can also be strategically deployed to frame urban interventions independent of their actual care for the human and more-than-human inhabitants of the city" (Kopitz & Chow, 2023, para. 2), the negotiation of care—what is being cared for, by whom, and how—forms part of the discursive branding of urban images and imaginaries, particularly ones aimed at attracting international investments.

At the intersection between media studies and urban studies, I am approaching The Line—and the further developments part of NEOM—as both a place and a medium, connected through material and immaterial concerns, in the tension between the spatialization of media and the mediatization of place (Jansson & Falkheimer, 2006). The materials discussed here—visual, audiovisual, and written—are all publicly available via the developments' website, and partially also further extended onto other (social) media platforms. As Vanolo (2017) suggests in his extensive overview of the politics of representation in urban branding, it is precisely the production of images that is increasingly operationalized to produce an imaginary of the urban. *Visualizing*, it seems, becomes crucial in *realizing*. Existing research (cf. Boisen, 2015; Vanolo, 2017) draws on the term branding—rather than advertising or marketing—to emphasize that the practices employed in producing urban images and imaginaries are centered around "creating, sustaining and shaping a relevant presence in the mind" (Vanolo, 2017, p. 29). Following David Pinder's suggestion that "cities are imaginary as well as real spaces; they are constituted by dreams and desires, conscious and unconscious longings and fears, along with material developments and practices" (Pinder, 2002, p. 233), the (re)presentation of

The Line functions as an exemplary case study to trace the material and immaterial dimensions of care for human and more-than-human bodies within the city, for communities, and for the environment at large. At the same time, as maybe the most visible and most debated development within the special economic zone NEOM in Saudi Arabia, The Line could be understood as the epitome of a manufactured landscape—which in turn raises questions about urban care as something to be designed, to be manufactured, and to be commercialized as well. Throughout this article, I will attempt to tease out the tensions between care and connectivity in somewhat of a two-step logic. First, reading care as connectivity by highlighting how encountering care in The Line is represented as a virtual and disembodied experience—mediated and made possible only through technology. In the second part, I will reverse the directionality to suggest reading connectivity as care and discuss how technology in turn grounds care by weaving artificial intelligence into the more-than-human fabric of the city. If "urban imaginaries are always becoming, in transition, aiming towards an ideal perfection that is actually impossible" (Vanolo, 2017, p. 5), the emphasis on the operationalization of care opens up to larger questions of virtuality and reality—particularly in relation to producing more sustainable and more caring ways of living.

2. Reading Care as Connectivity: Virtual Urban Encounters

The tagline "virtualizing the real and realizing the virtual" (NEOM, 2022b) of the larger vision of NEOM is my starting point to highlight the urban imaginary as shaped by virtual encounters—with and between urban inhabitants as well as with the urban itself. Strikingly, the video teaser for The Line (NEOM, 2022h), translated into multiple languages and viewed more than 50 million times in the English version alone on YouTube, centers connection—in the multiple meanings of the word. The video teaser begins with a medium close-up of a young woman sitting on concrete steps in the public space of a non-descript city, surrounded but distanced from other urban inhabitants. In the background, sounds of sirens blaring and cars driving past can be heard. The young woman's static posture, bent over and visibly defeated, is disrupted by reflections of light touching her face and catching her attention. As she begins to move toward the (seeming) source of the light, a cover of the song "What a Wonderful World" begins to slowly take over the urban sounds, beginning with the whispered first two lines ("I see trees of green, red roses too") sung in a slightly distorted female voice. The promise of a greener future contrasts with the present of the city, which is marked by high-rise buildings, parked cars, and crowded streets. Shifting from walking to running, the young woman discovers the source of the diffuse light: a metallic installation, abstractly resembling the shape of a rose, standing in the middle of another public square. While other passers-by do not seem to pay notice to the installation—or the light it exudes—the young woman dives into the installation as it becomes a "magical" portal transporting her into a different dimension (see Figure 1). At this precise moment, the lyrics of the cover song pick up again, proclaiming "what a wonderful world" as the gray of the city is replaced with a fantastical landscape of lush greenery. Contrasting the isolated individual in a city full of people but absent of connections, the immersion into the urban vision of The Line functions as an entry point into a more connected way of living and, at the same time, centered on transparency and permeability in the fine balance between private and public life. Yet, the seamless convenience of the smart city (cf. Mattern, 2021, p. 144) in the case of The Line also becomes measured through connections to each other in an interconnected neighborhood, scaled with and through technology:

> Everything will be accessible within a five-minute walk and an efficient public transport network will offer an end-to-end journey in just 20 minutes. Automated services will be powered by artificial

> intelligence. Amenities in close proximity will mean residents see family and friends often through spontaneous encounters. (NEOM, 2022e)

The similarity to visions of caring neighborhoods—scaled to the dimensions of a metropolis without its personal anonymity and spatial distance—should be highlighted here. Notably, the following lines of the original lyrics of the video teaser's song ("I see them bloom, for me and you") are skipped in the cover version, as are all other lyrics—and with them the connotations of a more caring, open, and solidary society often associated with the song. The emphasis, rather, appears to be on the *potential* for connections by choice and on demand—and for the selected few.

Importantly, the city itself is also part of connections—to the outer world. The publicity materials for The Line, as well as those for NEOM's other recent development projects Sindalah, a luxury island (NEOM, 2022d), and Trojena, Saudi Arabia's first outdoor ski resort (NEOM, 2022f), feature visualizations of traffic routes leading to and from the imagined places. At the same time, The Line appears to emphasize the unidirectionality of these connections: While Sindalah and Trojena are predominantly vacation places, and Oxagon an infrastructural hub (NEOM, 2022c), The Line is imagined as a more permanent urban sphere—a place that, once entered, becomes almost impossible to leave. At the 2023 Venice Architecture Biennale, The Line—and NEOM as a whole—were presented as part of a larger conceptual approach named "Zero Gravity Urbanism—Principles for a New Liveability." The emphasis on zero gravity, and the associations this conjures with extraterrestrial settlements, cannot be considered accidental. Even further, the utopian undercurrent of the discursive positioning of The Line as an "unprecedented urban living experience" intersects with the literal meaning of utopia as "no place" here. In the absence of a spatial grounding, the vision of a more connected and more sustainable urban environment thereby turns into a virtual one. Throughout the video teaser, the references to virtual game worlds are noticeable—from access through a "magical" portal via the modular, almost pixelated, design of the built environment, to the specific color palette highlighting shades of purple, green, and blue. Rather than presenting The Line as an alternative city, the video constructs the idea of an alternate reality, accessible through virtual technology. This connects to Sarah Moser and Laurence Côté-Roy's expansive overview of "new cities"—master-planned urban developments across the globe—that highlight customers and consumers rather than citizens, and the city as a space to invest rather than live in for wealthy elites (Moser & Côté-Roy, 2021, p. 7).

The emphasis on playing more than living—in "a multicultural community surrounded by the spectacular nature that makes it such a rare playground" (NEOM, 2022e)—adds to the aesthetic rather than political, virtual rather than spatial dimension of this urban vision. A similar logic applies, somewhat surprisingly, in later videos outlining the development as something *in progress* and *under construction:* In January and October 2023 respectively, NEOM published short films outlining the "rapid development" of the construction sites (NEOM, 2023a, 2023c), with the first one notably opening with the voice-over of a woman affirming that "NEOM is real" (NEOM, 2023a). Still, both films continue to blend aerial photography of the physical reality of the site with virtual renderings of its imagined future, interspersed with what could be termed "stock videography," emphasizing the more abstract promises of the development project (like "business opportunities"), as well as digital maps positioning The Line in the—again very real—global context. In this constant shift between mediations, the emphasis on being *real* becomes suspended between the past and the present, the physical and the virtual.

Figure 1. Contrasting the experience of being in the "urban" with being in the "virtual," the video teaser for The Line proposes the project as an alternative dimension accessible only with and through technology. Source: NEOM (2022h).

The larger framing of the development as a "chance to live in the 'new future' that we are now building" further amplifies connectivity as a utopian impulse. Alberto Vanolo highlights that city branding as a "highly political practice, based on the production and manipulation of representations" (Vanolo, 2017, p. 92) modifies the (in)visibility of spaces and subjects as much as the discourses surrounding them. Reading care as connectivity within this practice plays with the dual meaning of virtual as (a) "almost or nearly as described but not completely" and (b) "not physically existing as such but made by software to appear to do so" (Virtual, n.d.)—a virtual and virtually caring city. If building a caring world, however, means "acting upon the understanding that as living creatures we exist alongside and in connection with all other human and non-human beings, and also remain dependent upon the systems and networks, animate and inanimate, that sustain life across the planet" (Care Collective, 2020, p. 94), the urban vision constructed by NEOM across the prospective developments is notably insular in its emphasis on specific, desirable connections. At the same time, it is precisely through the emphasis on connectivity that The Line somewhat paradoxically becomes disconnected: The geographical, political, and cultural context of the urban development disappears in favor of the virtual vision—resembling what Shannon Mattern refers to as "tabula rasa developments" (Mattern, 2021, p. 142). Drawing on the same metaphor, Sarah Moser and Laurence Côté-Roy frame similar projects of "new cities" as:

> Ideological and discursive constructions…based on the aspirations of their builders: urban mega-developments built from scratch on a tabula rasa that are designed to be both geographically and administratively separate from established cities, while projecting a distinct brand, architectural identity, and vision of the future. (Moser & Côté-Roy, 2021, p. 2)

In this regard, The Line could be understood as both performing digital disconnection and being a prime example of "hyper-connected landscapes" (Fast & Abend, 2022, p. 2391). Pushing this even further, the architectural design itself is turned into a variety of clean slates, layered on top of each other. Rather than

interrogating the "realism" of the proposed construction of the linear city (as, for instance, Batty, 2022, has done from a spatial analysis perspective), I am interested in the discursive positioning of The Line—and similar large-scale development projects—as alternative visions of urban futures. If "contemporary geomedia technologies represent the world in particular ways and thus foster particular world views" (Fast et al., 2019, p. 94), the fractured representation of The Line suspends critique: At the same time real and virtual, the urban vision (re)presented in these different media forms and formats becomes merely *one* possibility. The large-scale models of The Line displayed as part of a larger exhibition at the Venice Biennale simultaneously construct and abstract the vision of alternative urbanity proposed in the video teaser. As reviews of the exhibition highlight, "it was unclear whether the different models represent designs for alternative sections of the proposed 170-kilometer-long building or alternative proposals for the structure" (Ravenscroft, 2023, para. 8)—turning the architectural vision into a variety of theoretical thought experiments rather than a practical blueprint. The meaning of space is never fixed, as Massey (2005) famously insisted—but here, it seems that neither is "space" itself. Following Karin Fast, Emilia Ljungberg, and Lotta Braunerhielm's call to explore the role of geomedia in "wider processes of social and spatial (re)production" (Fast et al., 2019, p. 90) here points to a suspension of material practices and experiences of care in and through space. In the original presentation of NEOM as an emerging project, as Hend Aly points out, "imagination and reality remain starkly divided" (Aly, 2019, p. 104). Through the lens of care as connectivity, this division—it seems—becomes complicated. The imagination is the reality, and the reality the imagination, in an urban vision that is not only framed by but experienced through technological mediation.

Rachel Bergmann and Sonja Solomun urge to discuss artificial intelligence—especially "sustainable AI" and "green AI"—"within their deep relationality and attachment to place" (Bergmann & Solomun, 2021, para. 3). Encountering the city—and each other—virtually, in this regard, becomes paramount to upholding the imaginary of The Line as a radical alternative to existing—but unsustainable—urban ways of living. Following Alberto Vanolo's emphasis on the political dimension of city branding, of the strategic (re)production of "social, cultural and thematic formations" (Vanolo, 2017, p. 98), my analysis understands care as a crucial vehicle in constructing this more connected and more connective imaginary of The Line. In a similar vein, in Hend Aly's discussion of the launch of NEOM, the promotional material not only functions as a representation of the project but also as a reaffirmation of political power at a moment of social, economic, and political instability (Aly, 2019). Turning to care, then, further frames these questions of power as technological and environmental as well. Writing on software as a medical device, Xiaowei Wang proposes "rethinking care and shifting broader, situated circuits of power across different scales and geographies" (Wang, 2021, para. 1). While focusing on a different form of application—and in a different field—a similar critique about the entanglement of artificial intelligence with larger structures of socio-technological power also applies to the urban. In the larger imagination of The Line as a more caring and more sustainable urban future, the emphasis on care as and through virtual connectivity—rather than an affective attunement to the physical space and its human and more-than-human inhabitants—can be understood as a spatial disconnection. Especially considering that the construction has officially already begun, both the abstraction of the linear city through multiple designs and the larger visual discourse of virtual experience function as a counter to public criticism raised against the development itself. As a virtual space rather than an actual place, the less "caring" practices reported as part of the development—ranging from forceful displacement of local residents to the environmental exhaustion of the construction site—shift to the background. The urban vision put forward in The Line, ultimately, hinges on care as connectivity rather than caring interconnections, networked logics rather than networks of belonging.

3. Reading Connectivity as Care: Organic Artificial Intelligence

The publicly available material on the development projects emphasizes that "people's health and wellbeing will be prioritized over transportation and infrastructure" (NEOM, 2022e)—which overlooks the necessity of infrastructures *for* care in turn. Under the headline "more time to spend with loved ones," The Line nonetheless draws a recursive loop to infrastructure: It is precisely because of the technologized design that the vision of a more connected, more social, and—implicitly—more caring community is enabled. The examples drawn on in this article highlight technology as the best—and apparently only—solution "to maintain, continue, and repair our 'world' so that we can live in it as well as possible" (Tronto & Fisher, 1990, p. 40), while at the same time framing artificial intelligence itself as a living and "organic" presence in the urban. Drawing on what Yuk Hui refers to as the "becoming organic of machines" (Hui, 2020, p. 222), here I propose to shift the directionality between care and connectivity: How connectivity becomes the ground for care—and in turn grounds care by weaving artificial intelligence into the more-than-human fabric of the urban. Again, this is not necessarily new: Jennifer Gabrys has discussed a similar logic in her writing on the Smart Forest City in Cancun—another manufactured urban vision of an "urban ecosystem in which nature and the city intertwine and act as a single organism" (Urban Design Lab, 2021, para. 4). While each of the developments part of NEOM articulates connectivity, the infrastructures of technology remain under the surface—and are yet organic and crucial to the functioning of the individual satellite cities, as well as the development as a whole. Writing about the Hudson Yards development in New York City, Shannon Mattern argues that the trees and birds were "placed there to cloak the sterility and artificiality of a landscape whose very topography seems inimical to their ability to plant roots and thrive" (Mattern, 2021, p. 146). While certainly similar logics can be traced in The Line, nature takes on an additional function of not just covering technology, but grounding care in a connected place. Through the lens of care, the idea of *geomediatization*—"the reciprocal shaping of technology, the social, and space/place" (Fast et al., 2019, p. 90)—intersects with that of *infrastructural imaginaries*—"ways of thinking about what infrastructures are, where they are located, who controls them, and what they do" (Parks, 2015, p. 355).

Care and connection are frequently brought into a dialogue—for instance, the manifesto by the Care Collective sketches "caring imaginaries which draw on past examples, present manifestations and future possibilities for forms of interconnected care" (Care Collective, 2020, p. 7). Throughout this article, I am consciously using the term "connectivity" rather than "relationality" to highlight the technological mediation of the literal and figurative connections central in urban visions like The Line. In an automated slide show on The Line's website, virtual renderings highlighting the project as "a model for nature preservation" with a "reduced infrastructure footprint" and exemplary of "alternative ways for humanity to live" flow into the promise of "unmatched business opportunities" (NEOM, 2022e), directly tying sustainability to commercialization—and to the financial potential of urban intelligence run with and through expansive data collection. Beyond the shift in narrative focus, the visuals accompanying these taglines also fundamentally change: Whereas the former depict different views of the proposed design, centered on semi-open architecture and shared green spaces, the latter highlights the technologization of The Line through vertical blue lines, resembling lines of code, running above and through the virtual renderings of the city—adding a further dimension to the simultaneously "multifaceted extensions and superimpositions of geographical space through media and the place-bound nature of media technologies and practices" (Fast & Abend, 2022, p. 2386). Writing on sustainable and green artificial intelligence, Rachel Bergmann and Sonja Solomun highlight the "environmental initiative" (Bergmann & Solomun, 2021, para. 5) central in research and practice

on artificial intelligence, which—in their critique—misses the opportunity to engage with technology across social, political, and environmental dimensions. Following Fast and Abend's call to pay attention to "media's ongoing place-making powers" (2022, p. 2387) in the context of The Line—and the related developments of NEOM—becomes a literal concern as well, as place-making takes on both discursive and physical dimensions. Recently, NEOM expanded the development portfolio to a fifth "region"—the Gulf of Aqaba coast, which in turn consists of seven individual projects that are positioned as "escape," "sanctuary," "destination," or "haven" for (international) visitors rather than urban spaces for both life and work. For instance, the ecotourism destination Zardun is framed as a "carefully restored haven" that is meant to "seamlessly blend contemporary luxury with nature" (NEOM, 2024)—which in turn raises questions about whether luxury, and particularly luxury tourism, are not fundamentally contradictory to visions of sustainable living. In addition, the framing of these more recent developments stands in stark contrast to the proposed permanency of The Line as a sustainable city (rather than a site for tourism or commerce). This emphasis on permanency connects back to questions of infrastructure of and for care.

As a point of comparison: The environmental footprint of the linear design is calculated to be 46 times smaller than that of the city of London, which has a similar population size of just below nine million residents. Key for the framing of The Line's urban planning approach is an animation depicting an "average" city visualized through abstract blocks of high-rises, interspersed with a geometric pattern of roads and small green spaces—which are then stacked into a line to "create out of the desert a city that would be more sustainable, liveable—a city of the future" (NEOM, 2022g, 2023b). This undermines any suggestions to think about alternative ways to live in and with existing both urban and natural environments, the city and the desert respectively, in favor of new developments centered around technology. In doing so, The Line follows the discursive logic of ascribing artificial intelligence in the urban with "significant potential to scale up sustainability" (Dauvergne, 2020, p. 101)—most notably by "enhancing" nature, without being specific about what that entails. Considering the specificities of the proposed locations of the confirmed developments of NEOM, the re-shaping of the existing environments fundamentally changes, constructs, produces "nature." The construction site for The Line roughly stretches from the Red Sea to the city of Tabuk, a region dominated by sand and sandstone formations with interspersed natural springs and date palm trees—a natural environment fundamentally different from the one envisioned within the constructed city (see Figure 2). At the same time, the emphasis on the footprint of the constructed city overlooks the material cost of its construction—and the environmental cost of the immense amounts of glass, steel, and concrete implied in the designs. Caring for the environment, here, becomes synonymous with technologizing the environment in an urban vision that "aims to enable people to live their best possible life, in harmony with nature, technology and each other" (NEOM, 2022e). This logic extends beyond The Line into the other developmental satellites of NEOM as well. For instance, the luxury resort island Sindalah is imagined as "a place where enhanced nature meets responsible design, advanced technology and inspirational architecture" (NEOM, 2022d), centering technology as the connective element between nature–urban–care.

Notably, "legacy infrastructures" are framed as one of the obstacles to "new and imaginative solutions" (NEOM, 2022e) to the environmental crises in other places—positioning the tabula rasa approach of NEOM as the only possible way to construct a more sustainable urban "designed to protect *and enhance* nature" (NEOM, 2022e, my emphasis). Again, the material and immaterial cost of construction on undeveloped (though, importantly, not uninhabited) land and the maintenance of manufactured landscapes are not factored into this logic. Highlighting care as maintenance, here, follows the suggestion by Anna Pendergrast

Figure 2. Contrasting The Line as a virtual experience and a physical construction. Both images are part of the promotional material publicly available on the development project and featured in the "progress" videos. Source: NEOM (2023a).

and Kelly Pendergrast that "to think about AI through the lens of maintenance practices is one way to acknowledge the long life of technological systems and their impacts on people and the environment" (Pendergrast & Pendergrast, 2021, para. 3). At the same time, it should be emphasized that throughout all publicity material available by and on NEOM, the specifics of the artificial intelligence—and the technological urban in general—remain distinctly vague and highly ambiguous. Asked about the project's vision for a "seamless society," Head of Technology and Digital Joseph Bradley describes an "interconnected, intelligent and resilient environment; where everything works together holistically to provide a predictive, personalized and immersive experience—enabled by autonomous, self-healing services that enhance daily life" (NEOM, 2022a). Through specific images like seamless and self-healing, such statements contribute to a reading of technology as living, growing, connecting—caring. At the same time, considering the material costs of not just the construction site but artificial intelligence more broadly, the "organic metaphors" almost become satirical. The "place-bound nature of media technologies and practices" (Fast & Abend, 2022, p. 2386) becomes an environmental concern as well in the context of urban intelligence. As Shannon Mattern argues, "seemingly immaterial digital media are resolutely material…their virtuality and seeming artificiality are dependent upon natural geologic components—copper, coltan, tungsten, silicon" (Mattern, 2019, p. 129)—which is further exacerbated by the environmental exhaustion of building and maintaining artificial intelligence infrastructures, particularly at the scale suggested by the ever-expanding portfolio of NEOM. More critically, the interweaving of artificial intelligence into urban environments could be understood as a strategy to undermine concerns about the careful maintenance of the artificially created—"enhanced"—nature envisioned in The Line.

4. Conclusion

David Pinder asserts that urban imaginaries are "significant politically, being intertwined in how cities may be thought about, conceived and lived" (Pinder, 2002, p. 233). In the context of this article, this becomes

particularly interesting through the further intertwining of the urban vision with technological solutionism. The headline of this article—"AI will be the beating heart of the city"—functions as a critical entry point to tease out the tension between materiality and immateriality, physicality and virtuality, in urban imaginaries highlighting technology as not just an element but rather the starting point of alternative urban futures. Rachel Bergmann and Sonja Solomun criticize that discourses on artificial intelligence are frequently disconnected from their "particular geographic, cultural, and material contexts" (Bergmann & Solomun, 2021, para. 6). In other words, the political dimension of utopian urbanism becomes de-politicized through the apolitical framing of "sustainable" artificial intelligence in development projects like The Line. Tracing the entanglement between care and connectivity in the promotional materials—importantly the only publicly available materials on the urban development—corresponds to an understanding of representations as "both real phenomena and phenomena producing realities and consequences" (Vanolo, 2017, p. 108). What Rajesh Bhattacharya and Kalyan Sanyal refer to as "bypass urbanism" (Bhattacharya & Sanyal, 2011) takes on additional relevance here: Rather than just drawing attention from the crises of existing cities to the promises of new ones, there is an undercurrent in NEOM that appears to move away from thinking about "physical" space altogether. Expanding on Hend Aly's assertion that "in the case of NEOM, as with many other new cities, branding and constructing an image precedes any other construction processes" (Aly, 2019, p. 103), tracing the entanglement between care and connectivity in the (re)presentation of the urban development questions the definition of "construction" as physical altogether.

Already in 2021, the Saudi Arabian state-owned news channel *Al Arabiya* reported on the idea of a "digital twin" for NEOM, introduced by (then) Executive Director of Emerging Technology Mansoor Hanif as allowing future residents "to transport themselves into the NEOM metaverse and experience daily life as they would in the soon-to-be physical city" (Bell, 2021, para. 5). In the following material made available on the different developments within NEOM, as discussed in this article, this temporality becomes further extended: "Soon-to-be-physical" now also contains the option to remain "always-virtual." Building on Hend Aly's emphasis on both the complexity and the vagueness of NEOM "between being a city, a start-up, a country, and the Crown Prince's legacy" (Aly, 2019, p. 99), my discussion adds another dimension: Through a geomedia lens, the question is not only what but rather *where* this vision of an alternative is supposed to be. For instance, as Head of Technology and Digital Joseph Bradley promises: "The metaverse will be a game changer as it will create a new environment for us to experience—whether by creating an immersive experience without friction or streamlining day-to-day activities, it will shape our collective future" (NEOM, 2022a). As in other quotes discussed in this article, the ambiguity between the physical and the virtual space shines through—traversing an increasingly blurring line between representing technology as something to be experienced *within* and something to be experienced *instead* of the physical space. More provocatively, one could read the promotional claim of the development, "NEOM will be like nowhere else on Earth" (NEOM, 2022b), as *being nowhere on Earth*, as an urban (intelligence) vision untethered from the physicality of space—and yet powered by the very geographic, cultural, and material cost of its construction. Here, the material dimension of both care and connectivity takes on a further political note.

Thinking about geomediatization as entangled with the (im)material construction of urbanity further responds to Lisa Parks' urging that:

> We must read media with an infrastructural disposition—that is, when viewing/consuming media we must think not only about what they represent and how they relate to a history of style, genre, or

> meaning but also think more elementally about what they are made of and how they arrived. (Parks, 2015, p. 357)

Creating a "community where humans and machines interact seamlessly," as NEOM suggests, appears to follow Yuk Hui's assessment that the "opposition between the mechanist and the organismic has to be put into question" (Hui, 2020, p. 224). How, then, do we assess dimensions of care in a city imagined to be simultaneously technological and organic, real and virtual, artificial and natural, material and immaterial? In his work on urban imaginaries, Nick Dunn asks provocatively: "So can imagining the future change it? Do the ideas we have for urban futures build up over time and echo throughout history?" (Dunn, 2018, p. 376). The tabula rasa approach of The Line and its fellow development projects part of NEOM consciously disconnects the urban vision of a more sustainable, more liveable, more connected city from (a) the Saudi Arabian context on the one hand, but also (b) from more grounded and gradual approaches to greening the urban in other places. Returning to David Pinder's understanding of cities as always both imagined and real, immaterial and material, urban utopianism becomes a productive lens to critique the (re)presentation of The Line as urban alternative. As this article is being finalized, international news headlines have begun to (again) question the timeline, scale, and feasibility of the larger project, with recent reports (cf. Fattah & Martin, 2024) placing particular emphasis on the exponential costs—financial, human, and material. Rather than focusing on the question of whether The Line—and the other developments as part of NEOM—can and will ever be physically and completely built, I have aimed to shift attention to the environmental politics embedded within urban representation and urban imaginaries. Tracing care and connectivity through the discursive logic of "AI as the beating heart of the city" highlights the entanglement between technology and sustainability, between organic metaphors and artificial environments, between virtual connection and material exhaustion.

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Conflict of Interests

The author declares no conflict of interest.

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Surveillance Working Groups as Geomedia Governance

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Abstract

Municipalities across the US are investing in smart technologies that rely on data collection tools and devices. Though proposals to procure these technologies often describe the benefits of optimization, privacy concerns and asymmetrical data access remain. Some municipalities are working to minimize such concerns by developing community working groups to evaluate the adoption of surveillance technologies. Many of these organizations have an explicit interest in geomedia technologies, yet their goals, composition, and technology review processes differ. We examined working groups from four US cities—Boston, Seattle, Syracuse, and Vallejo—to identify how group members articulate different sociotechnical imaginaries of geomedia. Through interviews with working group members and an analysis of public documents, we examine how working groups imagine the future use, and misuse, of these technologies in their communities. In turn, this project highlights how multi-stakeholder governance can shape decision-making about geomedia futures.

Keywords

geomedia; smart cities; smart technologies; sociotechnical imaginaries; surveillance

1. Introduction

Municipalities are increasingly adopting smart technologies under the premise that data-driven insights can optimize government functions to better support citizens. While smart technologies can benefit municipalities and the public, these tools monitor public space and raise questions about surveillance and privacy. In turn, some municipalities in the US have created community working groups tasked with evaluating the cities' procurement and use of surveillance technologies.

This study compares four working groups in different cities across the US to examine their missions, processes, and practices. These groups first emerged in response to a move towards community control of police surveillance outlined by the American Civil Liberties Union (2016, 2024). In particular, the American Civil Liberties Union encourages municipalities to create community-run, independent advisory committees to raise concerns about civil rights and civil liberties (Southerland, 2023). In many cases, municipal departments must first seek approval from these committees before procuring potentially surveillant technologies (Sheard & Schwartz, 2021). While the initial goal of this movement was to address concerns about police surveillance, smart city technologies have increasingly fallen under the purview of these working groups.

Using the lens of geomedia, we examine how these working groups consider the relationship between technology, people, and space (Fast et al., 2018). Specifically, we consider how working groups construct sociotechnical imaginaries of the smart city. Sociotechnical imaginaries are "collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects" (Jasanoff & Kim, 2009, p. 120). Here, we follow the notion that sociotechnical imaginaries are not merely visions, but are sustained through the creation and maintenance of technological systems (Powell, 2021). Thus, working group members are engaged in a project of imagining and debating potential futures (Goode & Godhe, 2017).

2. Literature Review

2.1. Sociotechnical Imaginaries

Sociotechnical imaginaries build upon Taylor's (2004) notion of a "social imaginary" where large groups of people share a common understanding of a social practice and, in turn, legitimize that practice (p. 23). Though the concept of sociotechnical imaginaries was initially applied to nation-states, Jasanoff and Kim's (2015) work helped to broaden the definition. Specifically, Jasanoff (2015, p. 4) writes that sociotechnical imaginaries account for how "scientific and technological visions enter into the assemblages of materiality, meaning, and morality that constitute robust forms of social life" and hold "visions of desirable futures." Sociotechnical imaginaries intertwine the future of society with technology and are grounded in notions of progress. Through this framing, we consider how people's desires for the future get bound up with material infrastructures, technological systems, legal institutions, and public reason. Sociotechnical imaginaries are useful for examining smart cities since the term smart city is already a sociotechnical imaginary. For example, Sadowski and Bendor (2019, p. 542) argue that "as a sociotechnical imaginary, the smart city is always in the process of becoming—expanding in both scope and reach." Therefore, following Sepehr and Felt's (2023) analysis of how urban policy documents translate and adapt global smart city imaginaries, we use sociotechnical imaginaries as a lens to understand questions of geomedia governance.

2.2. Smart Cities

The concept of the smart city promises that data-driven insights can benefit municipalities. Specifically, smart city initiatives often tether technological solutions to notions of optimization and efficiency (Halegoua, 2019; Houston et al., 2019; Morozov, 2013; Powell, 2021; Velsberg et al., 2020). For example, smart solutions might help governments make decisions about how to optimize labor and other resources. These

technologies are also sold as a means to reduce and mitigate risk. Powell (2021) takes a critical view of optimization arguing that optimization narrows the capacity for citizenship, prioritizing corporate interests over civic decision-making.

Smart cities rely on pervasive data collection and the legitimization of surveillance to create efficiencies (Powell, 2021). While surveillance has long been a feature of societies used to monitor efficiency and productivity (Lyon, 2007), in urban areas, the vast number and density of surveillance technologies can lead to a kind of surveillant assemblage (Haggerty & Ericson, 2000; Leszczynski, 2016). The implementation of these tools contributes to the expansion of surveillance capitalism when commercial intermediaries offer data analytic services to municipalities (Powell, 2021). In these instances, mayors and city officials are positioned as consumers of problem-solving technology (Cardullo & Kitchin, 2019). In turn, smart city initiatives raise questions about how corporate and municipal data are produced and managed.

2.3. Geomedia

Geomedia include a broad assemblage of technologies, services, processes, operations, and practices that shape our encounters with space and place (Fast & Abend, 2022). McQuire (2016) suggests that geomedia embody convergence, ubiquity, location awareness, and real-time feedback. Hartmann and Jansson (2022) use the term "geomedia city" to refer to both digital infrastructures and the coinciding social and cultural norms of the city.

In this article, we examine the relationship between technology, people, and space through the lens of geomedia (Fast et al., 2018). These technologies might include water meters, electricity meters, street and traffic lights, road temperature monitors, air quality monitors, traffic cameras, and other forms of real-time big data that show status updates, location coordinates, tracks, traces, and check-ins (Couldry & Powell, 2014; Kortuem et al., 2010; Leszczynski, 2016; Powell, 2021). Some of these tools might also be described as part of the internet of things (IoT), "a term used to describe objects or sensors capable of transmitting data without a direct internet connection" (Butkowski et al., 2023, p. 1).

Geomedia might perform or enhance urban surveillance capabilities. Geosurveillance reflects the surveillance of geographical activities and spatial location (Crampton, 2007; Swanlund & Schuurman, 2019). Kitchin (2023) notes that the big data often produced by networked digital technologies impacts the breadth and depth (spatially and temporally) of surveillance. Specifically, geospatial technologies perform geosurveillance by enabling "fine-grained, exhaustive monitoring and tracking of places and spatial behaviour for large populations, which was previously impossible to accomplish" (Kitchin, 2023, p. 476). Strategies for resisting geosurveillance might include minimizing opportunities for data collection (Swanlund & Schuurman, 2019). In turn, practices of governance and governmentality must account for a range of questions that coincide with geosurveillance—including questions about privacy, civil liberties, and data management.

2.4. Governance

By centering the practices and experiences of working groups in this article, we explore the complexities of *geomedia governance*. Like geomedia, geomedia governance reflects a convergence, in this case, between

governance approaches including algorithmic governance (Leszczynski, 2016), urban governance (Kitchin, 2014; Sadowski & Pasquale, 2015; Shelton et al., 2015), platform governance (Gillespie, 2017; Powell, 2021; Sadowski & Bendor, 2019), and municipal governance.

Smart governance and increased datafication shape practices and operations of citizenship (Gabrys, 2014; Hartmann & Jansson, 2022). In addition to questions of data management, storage, and retention, approaches to data governance raise questions about for whom technologies are developed and who benefits from the data (Powell, 2021). These questions are increasingly important in geomedia cities where citizens are data subjects as well as potential consumers of data.

2.5. Research Questions

In this article, we consider how working group members construct sociotechnical imaginaries of geomedia. We ask the following research questions: How do working group members account for future uses of geomedia through their evaluation and procurement processes? How do working group members imagine the future use and misuse of these technologies in their communities? How might working groups serve as sites of geomedia management, resistance, or refusal?

3. Methods

We first came across a surveillance working group as part of a larger multi-disciplinary research project focused on building a statewide public IoT sensor network in New York. In our efforts to learn about the creation and governance of sensor network technologies, we decided to conduct a multi-case study of these working groups. Because there were no comparable groups in New York, we opted for a national comparative sample. We identified four cities that have surveillance working groups: two larger municipalities with populations greater than 650,000 and two smaller cities with populations around 130,000 (see Table 1).

As part of our data collection, we collected municipal documents related to the working groups. We reviewed municipal codes, working group websites, and recommendations from the groups. As Jasanoff (2015) notes, policy documents "can be mined for insights into the framing of desirable futures" (p. 27). In addition to document analysis, we conducted seven semi-structured interviews with individuals involved with the working groups in each of the four cities. We asked questions about why the working groups were created, the structures of the groups, and the benefits and challenges the groups face. Additionally, we asked questions about reviewing IoT technologies. Finally, we asked questions about how group members think about surveillance and privacy.

Our method follows a "critical data set studies" approach by foregrounding the human subjects of data sets (Thylstrup, 2022, p. 665). By focusing on working groups, we answer Couldry and Powell's (2014) call to examine data collection in a way that foregrounds the agency and reflexivity of individual actors. Importantly, the working group members were not necessarily IT specialists, but social actors who participate in processes that contribute to the governance of geomedia in their municipalities.

To analyze the data, we drew on Lofland et al. (2006), which involved an iterative and comparative approach. In analyzing the interview data and municipal ordinances and documents, we sought to find themes across

the four cities. In addition, we compared municipal documents to the lived experiences and practices of our interview participants.

The four municipalities we study serve as a useful sample because the boards have similar compositions and number of members, regardless of population size (see Table 1). The outlier in this sample is Boston, which established a Surveillance Oversight Advisory Board as well as a short-term Surveillance, Data and Privacy Working Group (City of Boston, 2024). The working group recommended the creation of a more permanent committee prospectively called the Privacy Advisory Committee (City of Boston, 2024). Additionally, we use pseudonyms for interviewees and the terms "board," "group," and "committee" interchangeably to anonymize participant responses.

4. Findings

We begin our findings by describing some of the key characteristics and attributes of the working groups. Next, we examine how working groups account for the future through their sociotechnical imaginaries of surveillance. Lastly, we examine how groups govern geomedia by helping municipalities navigate ways to optimize, resist, and deoptimize surveillance technologies.

4.1. Attributes of Municipal Surveillance Working Groups

While the working groups in the four cities we study have similar missions, they frame their priorities differently. The primary role of Seattle's group is to provide an impact assessment for each technology, describing potential civil rights and civil liberty infringements as well as potential disparate impacts on communities of color and other marginalized communities (City of Seattle, n.d.-a). In Vallejo, the board was created to "advise the City and City Council on best practices to protect the safety, privacy, and civil rights of Vallejo residents" with a focus on policing technologies (City of Vallejo, 2023, § 2.27.030). The Syracuse working group was created to give recommendations on a variety of areas including equity, efficacy of collection techniques, financial capabilities of implementation, and taxpayer benefits (City of Syracuse, 2020). Finally, the Boston Surveillance Oversight Advisory Board was established to help advise the mayor on surveillance issues and engage the community in further discussion of the topic (City of Boston, 2024). The proposed Privacy Advisory Committee in Boston would serve as an expert body for City employees to consult on their day-to-day work and special projects (Surveillance, Data, and Privacy Working Group, n.d.-b).

The surveillance working groups are intended to represent public opinion in the acquisition of surveillance technologies. Thus, it is important to consider the composition of these groups. In our sample, each group requires stakeholders from across the city (see Table 1). For example, in Syracuse, the board must consist of a member from each of the following types of organizations: social justice, technology, community outreach, and research institution/partnerships (City of Syracuse, 2020). Notably, all four working groups, as well as the proposed Privacy Advisory Committee in Boston, require participation from individuals engaged with social justice or civil liberties efforts in their cities. The multi-stakeholder approach echoes the idea that people in different social positions will have different visions of the same technologies (MacKenzie & Wajcman, 1999).

Table 1. Municipal surveillance working group compositions.

Municipality, committee name, and year enacted	City population estimate (2022)	Mission statement (paraphrased)	Number of members and member appointment	Member composition
Boston: Surveillance Oversight Advisory Board (2021)	650,706 (U.S. Census Bureau, 2022)	To help advise the mayor on surveillance issues and engage the community in further discussion on this topic (City of Boston, 2024).	Five members including two representatives chosen by the mayor and a city councilor chosen by the president of the City Council (City of Boston, 2024).	The other two members must be a representative of the Massachusetts American Civil Liberties Union and a representative of the Boston Police Commissioner. One of the mayor's representatives must be an academic expert (City of Boston, 2024).
Boston: Privacy Advisory Committee (proposed, not enacted)	650,706 (U.S. Census Bureau, 2022)	To serve as an expert body for City employees across departments to consult on privacy aspects of their day-to-day work and special projects. The committee would partner with trusted community-based organizations and residents to cultivate relationships that would steer the City's future engagement around public technology (Surveillance, Data, and Privacy Working Group, n.d.-b).	Five members proposed, not yet determined.	At minimum one representative from each of the following: the Mayor's Office, the Department of Innovation and Technology, the Law Department with technology expertise, an advocacy and civil rights organization such as the American Civil Liberties Union of Massachusetts, and an external expert in privacy and technology, either an academic or a technologist. Additional interested employees with relevant expertise would be encouraged to participate in Committee meetings (Surveillance, Data, and Privacy Working Group, n.d.-a).
Seattle: Community Surveillance Working Group (2018)	749,256 (U.S. Census Bureau, 2022)	To provide a privacy and civil liberties impact assessment for each *Surveillance Impact Report*. These assessments include a description of the potential impact of the surveillance technology on civil rights and liberties, and potential disparate impacts on communities of color and other marginalized communities (City of Seattle, n.d.-a).	Seven members including four members appointed by the mayor and three members appointed by the Council (City of Seattle, 2024, § 14.18.080).	At least five members of the Working Group shall represent equity-focused organizations serving or protecting the rights of communities and groups historically subject to disproportionate surveillance, including Seattle's diverse communities of color, immigrant communities, religious minorities, and groups concerned with privacy and protest (City of Seattle, 2024, § 14.18.080).

Table 1. (Cont.) Municipal surveillance working group compositions.

Municipality, committee name, and year enacted	City population estimate (2022)	Mission statement (paraphrased)	Number of members and member appointment	Member composition
Syracuse: Surveillance Technology Working Group (2020)	144,451 (U.S. Census Bureau, 2022)	To ensure due diligence is done on all technologies fitting the surveillance definition so decision-makers can understand how technologies will impact areas including equity or service, the efficacy of collection techniques, financial capabilities of implementation, and benefit to the taxpayer (City of Syracuse, 2020).	Seven to 10 members: stakeholders to be appointed by the mayor (City of Syracuse, 2020).	Five to seven stakeholders from a variety of community groups including at least one member from each of the following types of organizations: social justice, technology, community outreach, and research institution/partnerships (City of Syracuse, 2020).
Vallejo: Surveillance Advisory Board (2021)	123,564 (U.S. Census Bureau, 2022)	To advise the City and City Council on best practices to protect the safety, privacy, and civil rights of Vallejo residents in connection with the acquisition, borrowing, and/or use by City departments of surveillance technology that collects, analyzes, processes, or stores information about Vallejo residents (City of Vallejo, 2023, § 2.27.030).	Seven members including one resident of Vallejo appointed by each sitting member of the Vallejo City Council and one resident appointed by the mayor. Members appointed by a sitting member of the Vallejo City Council shall be residents of the city of Vallejo and of the appointing Council member's district. At large, council members may appoint a member from any city council district. The member appointed by the mayor may reside anywhere within the city (City of Vallejo, 2023, § 2.27.040).	All members of the advisory board have an interest in privacy and civil rights as demonstrated by work experience, civic participation, and/or political advocacy. No member may be an employee of any city department, immediate family member of a city department employee, or a member of any other city advisory body or local, state, or federal law enforcement agency (City of Vallejo, 2023, § 2.27.040).

Municipal codes reveal differences in how cities define surveillance. The Boston ordinance defines surveillance as the "act of observing or analyzing the movements, behavior or actions of Identifiable Individuals" (City of Boston, 2021). Meanwhile, the Vallejo definition describes surveillance technology as "the systematic observation, for law enforcement purposes, of places, persons or things by visual, aural, electronic, photographic, or other means" (City of Vallejo, 2023, § 2.27.020). Here, the definition of surveillance links the role of the working group to law enforcement technologies. Both Seattle and Syracuse define surveillance technologies as those "that observe or analyze the movements, behavior, or actions of identifiable individuals in a manner that is reasonably likely to raise concerns about civil liberties, freedom of speech or association, racial equity or social justice" (City of Seattle, n.d.-b; City of Syracuse, 2020, p. 1). In most cases, the broad definitions of surveillance used by municipalities expand the scope of the working groups beyond policing technologies to include a variety of geomedia technologies.

4.2. Negotiating Surveillant Futures

How a municipality defines surveillance shapes the scope of the technologies working groups evaluate. Hannah, a working group member, asserted that their city's ordinance was "intentionally written broadly to encompass new technologies that they hadn't thought of yet." Similarly, in Oliver's city, the definition attempts to balance what would be commonly considered a surveillance technology today with "a lot of open space" for new developments. Oscar noted that because there are "a lot of abstractions and subjective interpretations" about surveillance, his city settled on "purposefully vague" terminology. Here, representatives from three municipalities explain how their city's definition of surveillance shapes the scope of technologies they review. Naomi, however, wondered if her group's definition was "overly broad" as it required "every little thing" from software to hardware to be identified and evaluated. While she found it important to be that thorough, at times it seemed "silly" to ask if certain tools were surveillance or not.

While smart technologies promise to mitigate risk and help predict potential disorder in cities (Powell, 2021), surveillance working groups are tasked with predicting and mitigating the risks of implementing these technologies. Working group members imagine the future uses and misuses of these tools in their communities. Interviewees explained the difficulty of anticipating future privacy concerns. Naomi noted that while a sensor alone might not be considered surveillance, if it were integrated with other technologies, it could potentially meet their municipality's definition of surveillance in the future. For example, a sensor technology connected through the IoT could "essentially lead to a pattern analysis where we could track someone's movement or track the behaviors of a person or a group" (Naomi). This concern reflects how technologies, like sensors, might converge, extending into new contexts and absorbing new capacities. While Naomi believes that a lot of IoT applications are "low risk," they still find it important to ask questions and understand how misuse happens. Eve, a participant in another municipality, shared a similar concern regarding video surveillance: "If a young person [is] caught shoplifting at 13, I don't want that video to be a detriment to him getting a job at 19." She summarized: "It just goes back to equity. Equity [in] how things are being stored, maintained, utilized, and sort of shared within a department or across departments." As a result, while "the charge of [the working] group is not to necessarily think about all of the potential future misuses of the application" (Naomi), working group members often find themselves anticipating future civil liberty concerns.

Some working group members accounted for public perception when considering potential privacy concerns. Daniel acknowledged the role of the public in flagging concerns about surveillant technologies. They

mentioned that their working group was created in direct response to public concern over the development of surveillance infrastructure in their community. Naomi reflected: "With surveillance and especially public trust, I think perception is honestly almost as important as the technical reality of these things." They elaborated on this sentiment through the example of optical sensors, which look like cameras but do not capture images. "I don't even know if we should label it surveillance. But because it looks like other cameras, it probably makes sense to err on the side of caution." Thus, working group members often filter their work and surveillance imaginaries through the lens of public perception.

4.3. Optimization, Resistance, and Deoptimization

Working group members balance input from city departments, smart city companies, advocacy groups, and the larger public. In turn, they function as intermediaries between stakeholders who imagine different futures for the city. As a result, working groups negotiate between the dominant imaginary of the smart city focused on optimization, and the alternative imaginary of the smart city focused on resistance, sometimes articulating a third imaginary focused on deoptimization.

Smart city solutions often center efficiency and optimization as benefits (Sadowski & Bendor, 2019). Thus, optimization emerges as a key value within the "dominant social imaginary" (Mansell, 2012) of the smart city shaped by corporate intermediaries. In this purview, surveillance technologies are positioned as solutions for managing costs, time, and resources. Additionally, these technologies can serve the public good and help maintain municipal infrastructure. For example, IoT-connected tools can sense trash can capacity or sense air quality (Butkowski et al., 2022).

Municipal ordinances use the rhetoric of optimization and efficiency to justify the acquisition of surveillance technologies. For instance, the City of Syracuse implies that data can help the city "build efficiencies where needed and ensure projects are delivering productive outcomes for the public" (City of Syracuse, 2020, p. 1). Additionally, the City claims that "building predictive models and automated decision-making tools can create efficiencies in government and can enable more proactive work to happen" (City of Syracuse, 2020, p. 4). The logic of efficiency relies on integrated data sets. For example, Oscar mentioned that in their city they "see a lot of value in combining data from multiple sources to gain better insights"; however, he acknowledges that it also "brings extra risks" when it comes to privacy.

In addition to attaining better insights, optimization promises cost-effectiveness. The Boston ordinance implies that electronic data collection can "manage assets and resources efficiently" (City of Boston, 2021). Additionally, Naomi suggested that in their municipality integrating technologies, like sensors for road temperature readings and cameras for public safety, could help with costs and ease maintenance. Specifically, they believe emerging technologies could help to "effectively and efficiently do things with less human resources because cities are struggling with meeting a lot of demands with fewer and fewer resources." In these examples, larger and smaller municipalities alike use the rhetoric of optimization when considering the value of surveillance technology.

While smart city solutions promise optimization and efficiency, municipalities must also account for privacy concerns. The Syracuse policy notes that oversight over data collection and analysis is necessary to ensure the privacy of community members and to limit the bias of the technologies (City of Syracuse, 2020).

Additionally, in Boston's Privacy Advisory Committee Recommendations, the working group suggests the City "consider funding additional staffing for roles that would lead implementation of improved City privacy practices and community engagement around technology and data collection" (Surveillance, Data, and Privacy Working Group, n.d.-b). Ironically, cities need to invest resources into the management of technologies that promise optimization. Oscar reflected on this tension noting that they encountered "a lot of wasted money on the city side" when cities "pursued a particular set of technologies without proper oversight." Later Oscar stated: "This smart city moment has a lot of smoke and mirrors" since "smart city people" are "really good" at marketing. Oscar also noted that at times smart city projects have failed because municipalities have not thought through who will look at the data and how those insights will benefit the city. In turn, working group members can disrupt the inclination to optimize by raising questions about data management and governance.

Resistance to surveillance emerges as a key value within the "alternative social imaginary" (Mansell, 2012) of the smart city shaped by activists, advocacy groups, and some scholars. Here, resistance operates as a counter-hegemonic vision of a geomedia future. Southerland's (2023) work on police surveillance working groups found that working groups can operate as important sites of resistance. In our study, working groups resisted geosurveillance by minimizing opportunities for data collection. They also operate as sites of surveillance resistance by refusing to condone certain technologies. While participants in our study acknowledged the importance of elevating concerns about privacy and civil liberties, none of them took a position of absolute refusal towards all surveillance technologies. Working group member Nate summarized:

> I feel that no one in the group is coming in just trying to completely reject every proposal. I feel like everyone takes a good look at it and really tries to see the benefit of it. We can see some of the potential harms. How do we get as many of the benefits while allaying as many of the harms?

Thus, the multi-stakeholder approach enables working groups to have constructive conversations about these technologies. Rather than come from a point of absolute refusal, working group members try to evaluate each technology in situ by weighing risks and benefits.

The existence and structure of the working groups facilitate resistance. For example, Hannah noted that their working group was required to retroactively review implemented technologies before reviewing new ones. In her words, this process "prohibited and prevented new technologies from being acquired by the City." Here, Hannah implies that companies, and municipal departments, lost interest in new technologies while waiting for the implemented technologies to be reviewed. Thus, the semantics of municipal ordinances can inadvertently lead to surveillance resistance, by slowing down and limiting the adoption of new technology.

Sometimes, the activities of the working groups lead tech companies to refuse municipalities their services. Nate explained how the working group functions as an intermediary between tech companies and cities:

> We have potential vendors come and kind of pitch, our group will ask them difficult questions….One time they decided, after they met with us, that they didn't want to sell our city their technology, which seems weird, we're just asking questions.

In this case, refusal came from the tech company and not from the surveillance working group. The tech company refused service because the working group asked questions about data governance, revealing the importance of working groups in challenging techno-solutionism.

Other times, the working group and tech company are able to move forward after the working group questions corporate practices. Naomi described this form of resistance when their working group asked third-party vendors (like cloud-based solutions) who would own and retain the rights to the collected data. They elaborated: "We [might] think [a] technology is a surveillance technology, but we're okay with the city moving forward with using it. As long as the City negotiates a strict disposition policy with the vendor or puts privacy protections in place." In turn, working group members can balance different stakeholders' visions for the smart city by refusing parts of a vendor's solution while still adopting the technology.

The slow pace of the working group structure might also lead to resistance. As Hannah shared: "Because bureaucracy is slow, technology development is always going to outpace the law and our standards and practices that we have, it's always going to be responsive to technology." Rather than frame the slow pace of these groups as a negative, slowing down the impetus to optimize can lead to a more thorough review process. Through resistance, but not necessarily complete refusal, the slow pace of the working group counters the fast pace of technology development. Here, working groups serve as a kind of speed bump, slowing down the inclination to optimize. Ideally, this process would give City departments more time and input to question the value of the technology they are hoping to procure. As a result, resistance processes can lead to a more sustainable approach to technology adoption.

Our research finds that municipal surveillance working groups are useful for exploring an additional "alternative social imaginary" (Mansell, 2012) of the smart city focused on deoptimization. Deoptimization encourages technology use in contexts outside of the corporatized smart city. Here, deoptimization reflects larger social values where technological practices engage and benefit the public. Nate suggested community members want "access to information about their city, whether it's how their government spends tax dollars, how much crime is in their neighborhood, [or] how long code violations take to get addressed by landlords." In turn, Nate exemplifies how data can help citizens communicate with regulators and make cases for improved services. Additionally, smart technologies can engage the community in the process of envisioning the city's future. The proposed Privacy Advisory Committee in Boston might reflect this approach as the recommendations for the group include the establishment of community-led data governance practices informed by residents and community-based organizations (Surveillance, Data, and Privacy Working Group, n.d.-a). Naomi also expressed a desire to center community members, sharing that they want to make data collection tools and data accessible to middle school and high school students so that the community can better understand the kinds of data that are collected and imagine other ways data could be used to measure or monitor their environment. Efforts to use local municipal data in STEM education leverage the benefits of geomedia to privilege public good over efficiencies. As a result, a deoptimized imaginary might lead to constructive and creative uses of technology that inclinations towards optimization or resistance would discard. This approach might center on a variety of collective values such as education, public health, or art. Deoptimization then reflects less of a middle ground between calls for optimization and resistance and instead invites an alternative imaginary of geomedia futures.

4.4. Ongoing Challenges

While municipal surveillance working groups operate as a useful governance strategy, working group members reflected on several challenges they face. First, some city departments seeking new technologies give "stock answers about what they do with the data or who has access to the data" (Hannah) when providing information to the working groups. If there are no accountability systems for evaluating what departments do with the data they collect, the labor of working groups could be merely symbolic. Second, municipal departments are not always required to go back to the working group if they want to integrate existing technologies. This can complicate how working group members negotiate surveillant futures. Furthermore, Oliver explained that there is an onus on working group members to learn about these technologies themselves. While the composition of these groups includes members with different expertise and social backgrounds, those without technical knowledge sometimes need to engage in additional work to learn about the technical aspects of geosurveillance technologies. Learning about these tools is important so working group members do not rely on information from vendors. However, this work was not always equally distributed among working group participants. Finally, Eve noted that group members struggle to solicit equitable feedback from the public when governments are still building community trust. This concern about equitable feedback is not, likely, unique to these working groups, but an ongoing challenge for municipalities more broadly. In summary, the ability to carry out the mission of the working group can be impacted by a variety of factors outside of the working groups' control.

5. Discussion

Municipal surveillance working groups operate as a form of geomedia governance. Geomedia governance encompasses the adoption and datafication of surveillant technologies, people, and space. Working group members must consider questions of future data collection and retention as well as questions of surveillance imaginaries through their governance efforts. Additionally, working group members are imbued with the agency to delay, or halt, technology procurement. By evaluating technologies, working group members imagine and construct the uncertain futures that characterize emerging technologies (Rotolo et al., 2015). Their involvement complicates the notion of citizen sensors where citizenship is informed through the monitoring and collecting of data (Gabrys, 2014; Houston et al., 2019). Although imperfect, surveillance working groups provide opportunities for civic engagement and citizen agency to counter geosurveillance and geomediatization, the process by which the adoption and logics of geomedia are seen as inevitable (Hartmann & Jansson, 2022).

Through their evaluation processes, working groups develop geomedia futures in their communities. Group members voiced a sense of responsibility to consider the claims of different stakeholders in order to make decisions that benefit the public. In turn, they are engaged in a process of negotiating the dominant and alternative social imaginaries of the smart city. They navigate ways to optimize, resist, and deoptimize technologies through their work examining, managing, and imagining geomedia. Interestingly, there were no significant differences by population size in how the working groups across our case studies functioned. Instead, there were many similarities including their general compositions and the centering of citizen perspectives in the procurement process. If "data-based cities are imagined as places where citizens can gain access to information, hold governments accountable, and use information as an open resource that allows everyone to participate" (Powell, 2021, p. 80), then it is imperative to involve citizens in decisions about

technology adoption and governance. The working group structure seems like a useful tool for smaller and larger cities and serves as a reminder of the importance of studying how smart city logics and applications are being adopted by communities of all sizes. While sincere and thoughtful engagement with citizens can be challenging and time-consuming, community members bring pertinent experiences and viewpoints to discussions about geosurveillance. Surveillance working groups bring together stakeholders who can help represent citizen perspectives, particularly those from marginalized groups who have disproportionately been affected by historical surveillance and discriminatory practices (Enns, 2016; Loury, 2008).

6. Conclusion

While municipal surveillance working groups initially emerged out of concerns about police surveillance, their ongoing work demonstrates the breadth of surveillance technology in cities today. The municipal codes which established the groups, their scopes of work, and membership, as well as members' efforts to optimize, resist, and deoptimize the use of technology, are all elements of geomedia governance. This work slows down and creates space for public engagement, review, and exploration of potential uses and misuses of geomedia. The working groups consider not just the adoption of geomedia, but the complications that come from ongoing data management, data sharing, and data integration. Through their work, working group members engage in the imperfect governance of geomedia futures.

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Conflict of Interests

The authors declare no conflict of interests.

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Ideologies in Geospatial Futurism: A Computational and Critical Discourse Inquiry Into the ArcGIS and ESRI-Blogs

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Abstract

Geographic information systems (GIS) are ubiquitous building blocks of geosurveillance environments embedded in everyday social practices. This article builds on the literature on geomedia, the criticisms of GIS, and communicative spaces, to delve into the realm of GIS software and spatial analytics. The data corpus consists of ArcGIS and ESRI blogs on the Environmental Systems Research Institute (ESRI) site, which defines itself as the global market leader in GIS software, location intelligence, and mapping. This project assesses the impact of their discursive representations of the future and the societal implications of these views through an iterative process of computational and critical interpretive analyses—extending from LDA topic modelling to critical discourse analysis—to unveil the ideological underpinnings of a corporate-prescribed understanding of (GIS) future. The analysis reveals that representations of the future in the main blogs of the geospatial industry are deeply embedded in ideological principles that emphasise perceived indispensability and technosolutionism as the inherent belief that complex social, political, and economic issues can be solved primarily or exclusively through technological means. The article identifies the rhetorical and structural operations in a discourse that ultimately kidnaps any alternative futures. The geospatial industry's representations of the future serve as ideological tools that shape perceptions about societal development and democratic conditions. The critical engagement with these representations contributes to understanding the role of GIS technology in the shaping of fair futures built on democratic public spheres in the digital age.

Keywords

computational methods; discourse analysis; ESRI; future tropes; GIS; geomedia; ideology; spatial analytics; public spheres; topic modelling

1. Introduction

Geographic information systems (GIS) software-driven spatial analytics are today part of "geomedia" (Fast et al., 2018; Jansson, 2022; McQuire, 2016). First, because GIS combines analysis, mapping, and visualisation of layers of (geographic) data into digital/networked/sensor-ed devices; and second because it involves (geolocalised) user data, which flows back to software producers. Beyond this relationship between user and data economy, discourses on GIS enter the field of geomedia, integrated into the broader societal technology discourse. In this sense, and because contemporary technology discourse legitimises capitalism (E. Fisher, 2010), and because technology discourses reinforce the ideological assumption that ICTs are the master metaphor for progress and developed societies (Lievrouw, 1998), this article adopts a discursive approach to examining technology's impact on societal structures. Indeed, the trope of media indispensability highlights how major stakeholders like IBM, Huawei, and Ericsson, foreground their economic interests in the ICT discourse (Fast, 2018) or on locational privacy (de Souza e Silva & Frith, 2010). These discourses on technology also project into the future, enforcing and legitimising hegemonies and social orders beyond semantic conflicts, and through "ideological loading of particular ways of using language and the relations of power which underlie them" (Fairclough & Wodak, 1997). Discourse theory and practice identify the corporate visions/narratives around GIS in relation to the imagined futures and their ideological connotations. This article brings the theoretical building blocks into an abductive, iterative, close-meshed connection with computational methods of data collection and analysis (Lindgren, 2020). GIS software specifically, and similar geotechnologies, have been historically criticised as vehicles that shape certain agendas and support specific interests of privately owned companies (Goodchild, 1995; Goss, 1995; Gryl & Jekel, 2012; Pickles, 1995; Roberts & Schein, 1995; Schuurman, 2000; Wilson, 2017), and as ideologically loaded corporate framings (Belina, 2010; Rosen & Alvarez León, 2022). Such questioning is now even more relevant when GIS applications have expanded their impact—once reserved to a privileged professional and corporate niche—to many people's day-to-day mediatized lives, and even more so as the entire industry of geospatial data has moved from a small customer-oriented market to a flourishing demand-driven mass market (Fischer, 2010), with its own media and communication channels and its own increasingly strategically positioned software products that support their corporate strategies. The analysis of discourses on GIS futures will allow the examination of power structures, ideologies, and the impact of dominant economic systems on shaping alternative futures, visions, and utopias (Goode & Godhe, 2017). Indeed, the "occupation" of the possibilities of future that these corporate imaginations shape leads to a sense of resignation and acceptance of capitalisms inherent flaws (M. Fisher, 2009), rather than opening spaces for innovative critique and development. This line of work adopts a broader framework that links a critical political economy of GIS (Alvarez León, 2024; Leszczynski, 2012), with a critical political economy of communication (Mosco, 2010). Integrating these approaches will facilitate the analysis of how ideologies serve the interests of dominant classes while shaping their societal norms and values.

Corporations such as the Environmental Systems Research Institute (ESRI), founded in 1969 by Jack and Laura Dangermond, claim to have adapted to the times by developing mass-friendly software and building blocks. The self-attributed "global market leader in geographic information system (GIS) software, location intelligence, and mapping" (Esri, n.d.), complements the software toolkit with a purposeful public communication strategy to present geospatial analytics to the world. The company supports GIS professionals through training, education, and its annual User Conference, to use ArcGIS—the flagship mapping tool—and the other APIs and SDK kits that enable seamless access to GIS resources to build apps and analysis. The extensive ESRI repertoire includes

conferences and industry exhibitions, offering "story maps" and describing all these endeavours in detailed blog posts. ESRI's blogs, central in the sector, cover a range of topics related to GIS technology and its applications, and work as an arena where experts, researchers, relevant personalities, and politicians, contribute to discuss geospatial technology and its future developments.

The future is political. Representing the future is an activity that imprints intention on a negotiation between the present and its plausible unfolding. "Describing the future" is thus an ideologically loaded practice and product of ongoing negotiations between power structures within the fabric of society. This article explores the case of the ESRI blog that presents itself as a space for discussion, while at the same time, prescribes particular futures stained by ESRI's own condition as a commercial corporation. The central question of this article is, therefore, related to what shapes these representations of the future in the geospatial industry take, and what ideological principles they entail. For the analysis, we have collected posts on the ESRI blog related to the future, using a combination of computational methods and discourse analysis. The contribution of this article is double: unravelling the ideologically informed content of those future representations and combining critical discourse analysis with computational textual analysis methods.

2. From Geomedia to a Political Economy of Media Geographies

This article explores three overlapping conceptual areas: (a) geomedia to critically approach fundamental space-place-media-communications-entanglements, and thus to embed geospatial analytics within everyday social media and communication practices vis-a-vis data collection and monetisation strategies; (b) the transformation of the geospatial industry, especially in the field of GIS/spatial analytics; and (c) the public sphere perspective that resonates with approaches on political economy, to explain how ideologies within the case of the ESRI blog shape public political debates. Before entering the methodological section of this article, the text excurses to refresh some epistemological features of the possibilities of a dialogue between traditional sociological theoretical approaches and computational methods (Lindgren, 2020) and to refresh the features of critical discourse analysis in dialogue with computational tools.

Geomedia as a conceptual frame has evolved from data and technology-centred positions (Lapenta, 2011; Thielmann, 2007) to broadened theoretical approaches that consider societal implications. The geomedia field explores the fundamental mutual relationship between media, communication practices, space, and place (Fast et al., 2018; Jansson, 2022; McQuire, 2016), and is conceptualised from a broader socio-economic scale as media's twenty-first-century condition (McQuire, 2016), created by location-aware and related technologies. This framework helps to understand the flows of geolocative data from the user to the industry and back. In this context of practices informed by the (re)production of geolocative data, devices and the media are perceived as indispensable (Jansson, 2014,) because they shape premediated spatial experiences and embed them into the socially (re)constructed space (Lefebvre, 1993). Geomediatization, thus, implies the reorganisation of social life, while geomedia technologies become essential across multiple spheres, prompting individuals to adapt their actions accordingly (Fast et al., 2018, 2019). This leads to an "environmental regime…where technologies are…more entwined with other materials and human bodies," inhabiting a volatile environment (Jansson, 2022, pp. 47–48). This view highlights how social practices have embedded geospatial analytics (as part of geomedia) in the domain of the every day, generating patterns of behaviour of a "perceived indispensability" of geomedia technologies that emphasize the spheres of influence (and of benefit) of the geospatial industry.

It is therefore key to understand the major commercialisation shift within the geospatial industry, especially in the field of GIS/spatial analytics which describes the entire area of (geo)data processing among others. Indeed, GIS plays a crucial role by providing spatial data analysis and visualisation capabilities which are instrumental in the digital rendering and management of urban spaces. But in the last few years, the commercialisation shift involved turning profits from solely collecting and trading raw geodata, into profits derived from the development of advanced geoinformation products and services (Fischer, 2010), and implementing them into smartphones. App services utilise location data in predictive models and real-time geosurveillance, selling this data to brokers for enrichment with contextual information to enhance profit margins (Christl & Spiekermann, 2016; Forbrukerrådet, 2020; Kitchin, 2015). "Ubiquitous geodata capture" has thus become "a necessary part of the technological developments and the corporate arrangements that underpin them (business deals, monetization strategies, platform-specific data extraction methods, algorithmic sorting, etc." (Wilken, 2018, p. 21), while the "fundamental dis-locations of (geo)data" (Rodriguez-Amat, 2021, p. 404) remain invisible. The pervasive but usually hidden use of geospatial technologies has given rise to the post-GIS era (Harvey, 2013) as the merging of geospatial technologies with ubiquitous, mobile, computing, and network technologies; "or as Ed Parsons [geospatial technologist of Google] recently expressed, GIS is going from being a technology for applications to becoming part of ubiquitous computing with *a bit of geospatial in everything*" (Harvey, 2013, p. 275, emphasis added).

To understand the implications of the ubiquity of geodata-based models, we must unfold the "ground truth" of GIS (Pickles, 1995). The use of GIS to advance solutions to social problems has been extensively criticised in three waves that capture the underlying assumption of an "absolute" Euclidean space and the positivist ontology upon which it is grounded (Goodchild, 1995; Pickles, 1995; Schuurman, 2000). This positivist ontology references a form of place-determinism, according to which a set of possible relations between objects have been defined in advance (Schuurman, 2004) and simplify the social by naturalising any human action concerning physical, material, cognitive, and social aspects (Jekel, 2008). Other critiques have called for further ethical and epistemological considerations, particularly those overshadowed by the momentum and financial investment of GIS (Lake, 1993), and others appeal to the societal consequences and ramifications of the global visual representations of GIS (Roberts & Schein, 1995). These representations empower influential entities, like nation-states and corporations, to symbolically *occupy* the world through imagery, thereby consolidating political and economic influence. This happens in the present, or even with projective implications—for instance perpetuating past demographic differences (Goss, 1995) and ultimately simplifying society's representation and commodifying social identity through market control. Critical GIS scholars (i.e., Elwood, 2008; Wilson, 2017) argued that the technology can embed and perpetuate existing social inequalities and power structures by reflecting and reinforcing biases inherent in the data and the algorithms used to analyse and visualise spatial information. These criticisms have led to discussions about citizen control (i.e., tracking technology; see Gryl & Jekel, 2012), shifting power relations (Atteneder, 2018), and reproducing ideology with crime mapping (Belina, 2010).

The "geo-Web 2.0" (Elwood, 2010), "VGI," and "neogeography" (Haklay, 2013) have enabled more people to use GIS tools to analyse and map data in simple applications, but the promise of a "democratised" and "more just" GIS turned out to be a delusion (Haklay, 2013): Inequalities in participatory processes (Elwood, 2008) often disguise a lack of basic skills to use geographic information (GI) tools maturely (Atteneder et al., 2022; Gryl & Jekel, 2012). Instead, corporations shape neogeography to market spatial technologies with a neoliberal focus on individual consumption, rather than to enable collective action, reinforcing power

dynamics and inequalities in the process (Leszczynski, 2012). This anticipates and perpetuates socio-spatial inequalities through the interplay between urban governance, data, and algorithmic securitisation, projecting them into the future through the lens of algorithmic surveillance and control (Leszczynski, 2016), or reshaping urban governance, spatial realities, and economic landscapes (Rosen & Alvarez León, 2022). Ideologically, the "digital growth machine" reflects a neoliberal worldview that prioritises market-driven solutions and the commodification of urban spaces and data. Therefore, the general invitation is to adopt a critical political economy approach to discuss the "geo-Web 2.0" and the digital technology sector-led urban growth and dominance, as a new perspective from which to analyse and engage with the prevailing techno-economic paradigm under digital capitalism (Alvarez León, 2024).

In this study, we analyse discourses about GIS. This helps identify power configurations reproduced via language in media and communication practices. These configurations are built as ideologies that play a legitimation role for the whole technological ecosystem. For this case, we consider "ideology" as systems of beliefs embedded in speech as "idealized, universalized and detached expressions of actual social relations" (J. L. Martin, 2014, p. 18). These considerations of the ESRI/ArcGIS blogs as spaces for discussion where the discourses about GIS are enacted, circle back to questions about the (re-)configuration of the public sphere. By examining the ArcGIS and ESRI blogs of the ESRI corporation, we have a relevant object of investigation from an ideology-critical perspective on the level of media content, but also, a direct insight into aspects of media organisations, ownership structures, and the media's interdependence with politics and business (Sevignani, 2020), particularly understanding media and communication practices as cultural and social expressions of the contested structuring of social hegemony (Mosco, 2010). Therefore, shifting the focus towards the structures of the public sphere (Brantner et al., 2021) or keeping an eye on the "critical-structural conception of ideology" (Sevignani, 2022, p. 93) that incorporates both ideological structures of the public sphere as well as communicative content, helps to secure the specific case of ESRI's corporate blogs as an epitomic example of public debate in a privately owned outlet.

Blogs have emerged in their role of creating a public sphere as part of the web, allowing more dialogue than pre-digitally written texts and, above all, enabling much cheaper and more extensive distribution channels, and creating what, already two decades ago, was called the "blogosphere" (Keren, 2006). Indeed, blogs form communicative spaces that facilitate the exchange of views as well as the convergence, in this case, of GIS industry stakeholders contributing to a broader community around GIS technology. In contrast to personal blogs, corporate blogs help by engaging directly with customers, and actively participating in discussions surrounding their brand, enabling some control over the corporation's public image and narrative. Additionally, companies can ensure adherence to company values and control the published content, thereby maintaining consistency and trustworthiness in their online presence (Rettberg, 2014). ESRI's corporate ownership of the blogging space implies some influence in shaping GIS-related stories.

Envisioning futures from hegemonic GIS corporation positions indicates more than technological determinism, as these are strategically positioned "corporate visions" (Rose, 2018) and as such, normative prescriptions for societal development. They are fostered by technological discourses that advocate the ideology of a transformative potential of technology for a "better" future. This article approaches the ESRI and ArcGIS blogs as corporate "flows of discourses" (Wodak & Meyer, 2016), that centre on the topic of a geospatial future and therefore as part of larger societal discourses. We ask: How are the representations of the future negotiated in the geospatial industry, using the example of the ESRI and ArcGIS blogs, and what

ideological wirings do they entail? We examine flows of discourse that circulate around the topic of geospatial futurism to uncover discourse strands that comprise sub-topics and groups of sub-topics. We do so from two, differently scaled viewpoints: one from emerging topics arising through collected articles (broad scope with articles as smallest unit of analysis that were collected with the keyword(s) future(s)), and one from uncovering meaning around the keyword future/s (in-depth viewpoint from inductively emerging categories).

This question can be operationalised with three sub-questions:

1. Around what topics are the contents of the ESRI blog organised?
2. What discursive strands of understanding of geospatial future/s can be identified?
3. What shapes and implications do these strands have as ideological models?

3. Methodology

Evolving online media landscapes complicate systematic material selection and analysis. Broader methodological toolkits are required to examine interconnected transmedial discourse strands and to claim contextualisation. This project advocates for "an iterative, alternating model for switching between machine and human, and between data and theory, in a structured approach for how data (science) and (social) theory can be incorporated in empirical research" (Lindgren, 2020, p. 144). We encompass interpretive and critical methods (Wiedemann & Lohmeier, 2019; Wodak & Meyer, 2016) with computational tools (van Atteveldt et al., 2022) and digital methods (Rogers, 2015).

Similarly to Aranda et al. (2021), the methodology has five phases: a first phase of data collection; a second phase of exploratory data analysis; a third phase of combined unsupervised machine learning for topic modelling of the blogposts, and their interpretive challenge; a fourth phase explores the multiple understandings of future; and phase five represents the "return to theory" where ideological patterns are identified.

3.1. Phase 1: Data Collection

A Python script led to the ESRI search engine (https://www.esri.com/en-us/search) and captured all posts containing "future" and "futures" in two steps: first, the headlines and links; second, using the links to capture the body of text. The search on the ESRI blog engine produced 6219 links. After cleaning, a global sample of 5119 active articles was identified with 107 different tags; 10 tags labelled more than 60 articles. A tag is a label set by the blog site to classify the articles: The main ones were "products" and "videos"; "ArcGIS blog" and "ESRI blog" were next. These tags set the first criteria for a specific sample of blog posts.

3.2. Phase 2: Exploratory Data Analysis

The 577 posts identified as "ESRI blog" (76 items) or as "ArcGIS blog" (501 items) that talk about the "future" are the sample for the analysis of this project.

3.3. Phase 3: Topic Modelling

This sample was analysed using (latent Dirichlet allocation) LDA topic modelling (Blei, 2012), enriched with the hierarchical Dirichlet process (HDP; Teh et al., 2005) to establish a distribution of 20 topics. This unsupervised machine learning model classified the sampled blog posts according to their dominant topic (see Figure 1). In response to the divergent distribution of articles and topics, a further interpretive process relabelled the blogposts, enriching the computational, statistically word-vectorised, topics with their actual social and cultural semantic significance. This mixed methods approach to sorting the posts allows the identification of "streams" as a broad scope of meaning to/around the future (this is how we responded to RQ1).

3.4. Phase 4: Identifying Futures

In parallel to the topic modelling process, we identified the text passages that included the word "future" and categorised them using MAXQDA, until theoretical saturation. This narrow focus was independent of the blog posts and aimed to identify meaning in the direct context of the search term "future." The iterative process of initial coding (category identification), intermediate coding (selecting core categories until data saturation), to advanced coding (theoretical coding to develop a storyline; see Chun Tie et al., 2019), enhanced a category framework that adds to the critical discourse analysis procedures, as a critical stance leading to the formulation of critical goals (van Dijk, 2013). The categories emerging from the MAXQDA analysis combined with the LDA emerging topics and streams let us identify discourse strands and patterns that conform to what we call ideological wirings. This process drives its critical potential for "understanding and explaining necessarily complex social phenomena that require a multidisciplinary approach" (Wodak & Meyer, 2016, p. 2), harnessing vast data resources, and media specificity (Sell & Linke, 2019), while maintaining a reflexive stance, ensuring critical examination of language, power dynamics, and socio-political contexts. Central to this analysis is understanding the discourses of actors and the mechanisms through which power shapes social realities and legitimises discourse (this is how we responded to RQ2).

3.5. Phase 5: Ideological Wirings (Reconnecting to Theory)

These understandings of future and the advanced LDA streams provide insights that excite the formulation of new theoretical ideas. This operation is mostly abductive and connective and reconnects the findings via "theoretical sensitivity" (Glaser & Strauss, 1967, after Lindgren, 2019) back to the theoretical frame. This article describes findings in two directions: one in the conceptual direction (about the public sphere and ideology) and the other on the possibilities of methodologically combining computational methods and discourse analysis, where "theoretical interpretation" and a "qualitative" approach to data is integrated with "quantitative analysis and data science techniques" (Lindgren, 2019, p. 6; this is how we responded to RQ3).

4. Three Layers of Results: Phases 3, 4, and 5

The findings are organised along the three research questions answered in Phases 3, 4, and 5. The first section (Phase 3, RQ1) is split in two: It starts with a description of the LDA topics and continues with the interpretive labelling that refines those topics to streams. The second section (Phase 4, RQ2) explores the notions of "future" emerging from the discourse analysis and describes the nuances of meaning of each one of those

notions. The third section (Phase 5, RQ3) opens a discussion about the ideological patterns and implications behind the representations of futures on the blog.

4.1. Phase 3: Topic Modelling and Interpretive Discussion (RQ1)

The LDA algorithm identifies pairs of words (vectors) appearing together in the corpus and clusters them (the topics). Topics are thus statistically defined through word frequency and word proximity. LDA modelling requires setting the number of topics as a condition before the model operates. We applied HDP to run the algorithm hundreds of times against multiple variations. The calculation suggested 20 topics (coherence score 0.4 and perplexity of −8.6). These two indicators set the LDA topic modelling to produce the results shown in Figure 1.

This visualisation identifies the LDA topics along a double-axis system that marks the relative distance between them (Figure 1). The size of each cluster (circle) indicates its relevance: This distribution shows

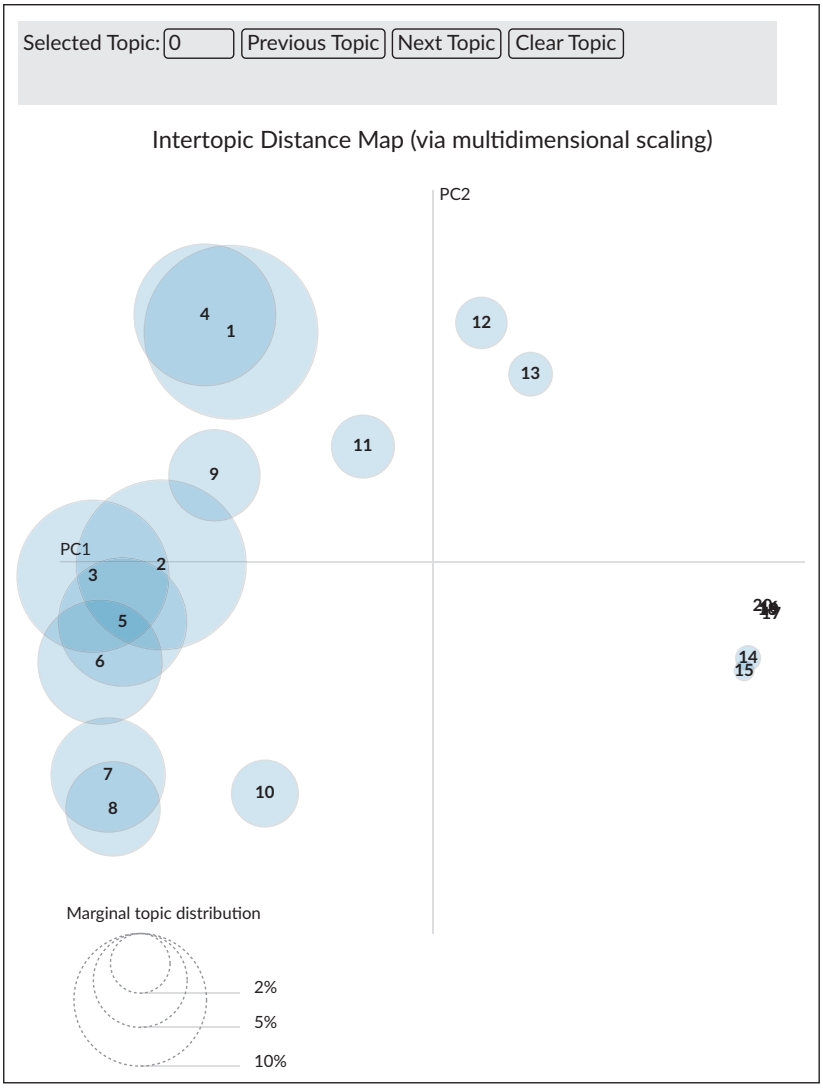

Figure 1. LDA topic modelling: Result visualisation.

the relative distance between the main topics (left) opposite the five bunched clusters on the right. The overlapping likely suggests the presence of outliers in the words, or in the blogposts that displace the centrality of the cluster differentiation. This initial computational organisation of blogposts offers an initial insight into the contents, but it still requires an interpretive approach that allows us to identify nuances. The interpretive process reshaped the 20 LDA topics to the following seven main streams:

1. Building the GI-community
2. ESRI-software and products
3. Story-smart-mapping
4. Widgets, Apps, and APIs
5. Adapting with GIS
6. Time series forecasting
7. Social justice for future communities

Table 1 roughly shows how the LDA topics—number next to them—provide the basis for the newly identified streams.

4.2. Phase 4: Identifying Futures

The word "future(s)" itself also offers tropes. This section analyses the contexts in which the word "future(s)" appears and within what cross-sectional themes, that traverse the streams identified in the previous section. The analysis has identified five themes or core categories (exemplified in Table 2):

A. The future of GIS software
B. GIS and future urban environments
C. Predictions (of the future) with/by GIS software
D. Future of available data
E. Visions of future work environments
F. Smaller future discourses

These six themes (five core categories and a few smaller ones) emerged from the iteration of a manual analysis. This operation allowed us to identify that these types of future are consistent across the corpus with obvious variations. Together they shape a form of synthetic future captured by a technological drive and the promising conditions set by the availability of ring-fenced, privately owned, data.

4.3. Phase 5: Discussion—Locating Ideologies Through Drawings of the Future

The following discussion section emerges from the systematic analysis of the ESRI and ArcGIS blogs against the discursive formations that wire the ideological underpinnings. The discussion builds around three layers of analysis: (a) structural, identifying fundamental aspects of the structure of the blogs; (b) rhetorical, which identifies turns and discursive operations; and (c) the more general layer that points towards the implications of the discursive construction of the future itself. These three layers merge in a fourth point where they adopt an all-encompassing ideological shape.

Table 1. Streams emerging from the combination of LDA topic modelling and the interpretive process.

	Stream	Description	Examples
1	Building the GI-community	Texts identify the community around spatial analytics. Words include exhibitions and conferences such as the ESRI User Conference (Decker, 2021; Newell, 2022), with high-profile figures like, i.e., Jack Dangermond (A. Martin, 2022), president of ESRI, and the formation of a start-up community/culture building around spatial analytics.	Collective building, networking, location-intelligence. GIS as a solution to complexity "explore how GIS can be applied to better understand our world and design solutions for our collective future" (Newell, 2022).
2	ESRI software and products	This stream discusses new software and tool development. The posts discuss tools to address city-related issues, urban planning, or indoor navigation through specific software applications.	"The future of what people can do with GIS is going to be about how people can think creatively rather than about limitations in computing power or data storage" (Iannone, 2018).
3	Story-smart mapping	This stream loosely connects to stream 4, including storytelling maps. "Story maps" is an ESRI software application for non-cartographers to create thematic maps by embedding spatially located stories.	"The canvas for GIS data to be shaped and displayed," Storymaps become a way of "mapping the future of GIS" (Szukalski & Ball, 2018).
4	Widgets, Apps, and APIs	This stream links to the previous: Posts share the idea of software development to save the future, focusing on app-based user environments, and app developer interfaces. Posts involve ArcGIS APIs for JavaScript, Python, and SDKs (software development kits).	"ArcGIS API for Python: Visualize regional growth with building permits" (Cappelli Breier, 2019).
5	Adapting with GIS	Posts refer to extreme climate conditions including rising sea levels, or high heat in cities, and their impact on global food security or biodiversity, or to smart city prototyping (Brooks, 2023).	"Geospatial tech" (Budden, 2021), sensors for data capture and visualisation (Gadsden, 2023; Wright, 2022) as solutions for further growth and sustainability.
6	Time series forecasting	This stream is narrowly focused on the description of forecasting tools.	"Visualization, exploration, and forecasting…for daily new confirmed cases of Covid-19" (Liu, 2020).
7	Social justice for future communities	This stream approaches community building, placing the ESRI software in the solution-building side, including protection against disease outbreaks (vaccination rates dashboards, health ranking maps, live epidemic maps (Geraghty, 2020), and mapping economic vulnerability.	Geography brings "equity and social justice into focus" (Bordne & Johnson, 2020) and the ArcGIS Hub gives communities a voice (C & Thompson, 2019), "racial implications of place" (Johnson, 2020), promotion of participatory processes to address problems threatening communities (including GIS reconnecting isolated communities; Sullivan, 2023).

Table 2. Future themes: Examples in the reference list.

	Theme	Description	Examples
A	The future of GI software and tools	Vague future scenarios contrast with the technical specificities of the future. Scenarios charged with social relevance using "sustainability" or "accessibility." Compatibility and systems integration as "future-proof" factor to "work together for a more sustainable future" (Andrews, 2019). Overtly techno-deterministic connotations of this discourse appeals to exponential growth, combined with promises of accessibility.	"We're living at a point in history where our technological and computing abilities are exploding at an exponential rate, and the field of GIS is no exception….At this juncture, ESRI is working to make GIS more accessible to more people…not just an elite group of experts" (Iannone, 2018).
B	GIS and future urban environments	Urban environment problems, amplified with threatening scenarios (climate change or pandemics); future technology-enabled solutions. Politically relevant social problems in urban areas: lack of affordable housing or inadequate infrastructure, are "depoliticised" by promoting technology solutions. The future of urban living happens in highly digitalised, smart cities in which GIS analysis and digital twin technologies, for example, shape sustainable and resilient cities of the future.	"ArcGIS Urban enables the digital transformation of city and regional planning to encourage collaboration…toward a more sustainable future" (Szukalski, 2020). "The crux of it all though, is that projects like this can (and will!) make a huge impact…to sustainability and resiliency in cities…to help prepare us for what's to come" (Fabricius, 2020).
C	Predictions with/by GIS-Software	Software-based predictions centralise the future: predictability and forecast are key for risk management, public safety, social responsibility, and environmental disaster management.	The objective is to extrapolate "historic and future climate scenarios" (Scopel, 2013), build "high resolution gridded representations" (Frye, 2022) of future population in "world population imagery layers in living atlas" (Guerra, 2022). Spatial analytics "to better shape an uncertain future" (Massey, 2019).
D	Future of available data	The data discourse emerges. Data will make projections possible. The future availability of datasets will complete and enhance future analyses and predictions. Sets are often exclusively available to premium ESRI user groups. Developing future ESRI-integrated data ecosystems with advanced exchangeability. Data would not be open access but reserved as an extractive good.	Data in the future from "third parties" through "successful collaborations" (Donihue, 2019) with corporations partnering with the ESRI data ecosystem.

Table 2. (Cont.) Future themes: Examples in the reference list.

	Theme	Description	Examples
E	Visions of future work environments	Access, software, and data change the working environments. A version of the future in the blogs places GIS as key in them.	The vision includes "sharing data between teammates or command entities" (Henderson, 2021), or the "work order management [could] provide…real-time awareness and help plan and create the future" (Szukalski & Ball, 2018).
F	Smaller discourses of future	Smaller themes worth further analysis: the word "future" as teaser for forthcoming posts, future as represented in ESRI story maps, or paleo-futures.	

At a fundamental level of analysis, considering just the typology of blogs and the diversity of authorship, there are some points to consider: First, with the initial typology of blog posts as used for the first sampling, the site labels most of the blog posts with the labels "video"—referring to video-blog posts—and "products." This shows that the highest number of posts including the search term "future" are commercial. The core business of the blog is thus the promotion of its own product. This is an early warning that the appearance of an open discussion blog is subordinate to commercial purposes. This prominence of the link between the word "future" and the posts labelled "products" reinforces the rhetorical feature of advertising discourses that promise a better world in the future where the product thrives, transferring some of the wealth and good of that future to the presence of that product. Second, at this same level, the analysis shows a clear pre-eminence of certain authors in the posts: Indeed, the repetition of authors is indicative either of a high level of celebrity work or of in-house authors on the blog payroll. The presence of employed writers, as would happen in any news outlet, leads to questions about transparency and payment, and even about guidelines and the presence of a style book. It is also unclear whether their authorship is free, or aligned with predefined editorial guidelines. Paid or not, the recurrence of authors talking about the future, factors as a reduction of the plurality of voices, and immediately raises questions about representativity, privilege, and marginalisation of alternative voices, with the immediate implications around whose future they are talking about.

At the rhetorical level, the analysis allows for more complexity. The analysis has detected multiple, and recurrent, discursive operations, including critical discourse analysis features such as "nominalisation," as described by Fairclough (2003) and later nuanced by Billig (2008), or "intertextuality" as coined by Kristeva (1980), imported from Bakhtin (1968), and later incorporated by Fairclough (1992), among others, into the operations of discourse analysis. In the former case, the texts show a clear tendency to refer to software solutions in terms of reified agents that *do the work*: "Our products and services support critical decision-making by business leaders, providing them an operational advantage over their competition, while allowing them to lower operational risk and increase efficiencies" (Decker, 2019). This is an example of nominalisation that deletes agency (and with it, responsibility) for managers; a good example, at the height of the principles of "the market dictates" and "the economy needs." On the other hand, patterns of building on the polyphony of texts are also present, paradigmatically in the post where Jane Goodall—the zoologist—is interviewed (Gadsden, 2019). Her sole presence builds a majestic constellation of voices: the chimpanzees, and with them nature and endangered species at planetary scale, local indigenous human

communities, and the long shot of the value-transfer connection of her work as a past-present conservationist, with the Geospatial Cloud used by the Jane Goodall Institute that represents her future. By activating this particular form of intertextuality, the blog inscribes its purpose within that of the conservation of the planet and greenwashes the brand and its resource-consuming technologies. This kind of intertextual operation is also visible in the ways the blog imagines a community (of users of ESRI products). The corporate structure of ESRI transfers directly onto the hierarchy of the user community: "Our community and ESRI president Jack Dangermond" (Decker, 2019). The article is a powerfully carved model that alternates between presenters ("they"), the professional ("you" and "visitor"), and the ESRI community-corporation ("us"). The article finishes with an invitation to "join us."

Above these rhetorical strategies that appear throughout the corpus, some general assumptions seem to prevail. For instance, the emphasis of blogs in offering personalised geotechnology for individual consumption that deactivates any collective or collaborative action. Furthermore, the blogs imply that ICTs are the primary drivers of progress and development and that cities adopting these technologies will be more prosperous and innovative. This centrality of spatial technologies in the growth, progress, and development drives, (mis)leads towards the understanding that there is a continuity between the possible future and the tools to achieve it, while dismissing any collateral problems, including the limitations of data/software or contextual unpreventable factors. Even further, the blog content emphasises the indispensability of digital technologies and data for contemporary urban governance, building on the above-mentioned trope of media indispensability. Urban issues are a particularly frequent topic of discussion, often explained regarding increasing global urbanisation. The problems described are presented as inevitable but approached from a techno-solutionist perspective, as if urban governance was solely based on technological solutions as objective and technical processes. Similarly, cases such as climate change and global population inequalities, which are often caused by political and economic failure, but in the blog are de-politicised and solvable with ESRI products. Such a positivist ontology has a crucial ideological depth that de-politicises, dis-locates, and expropriates the issues from their contexts, offering a mapping tool that could make the problems vanish. This chain of thought ensures the linkage between problems and solutions, by securing and protecting a monopolistic position within a data-driven ecosystem and proprietary software.

These rhetorical and structural operations within the discourse, throughout the corpus of analysis, seem to overlap in the building of a common and generally homogeneous vision of the future, that is built on neoliberal principles of individualism and commercial drive. This builds a clientele form of community with a strong hierarchical structure, with the ESRI president at the top, and an articulation of layers defined by access to data, and to APIs, with rights to store (save) the outputs and the algorithms in a proprietary cloud system. Indeed, the blogs often extol ESRI's geotechnologies as improving urban life, demonstrating the ideological loading of the corporate frame; furthermore, the posts reinforce the legitimacy of the capitalist system by portraying technology and innovation as key drivers of economic growth and progress. All around that structure, a strong branding, a messianic and imposing narrative, that greenwashes the resource-costly infrastructure through interviews with celebrity conservationists, cancels any imagination of the future outside capitalism (M. Fisher, 2009).

The analysis shows that ESRI's corporate blogs are, in the end, the articulation of a repertoire of communicative practices that inform an ideological model. The four layers of analysis identified a clear pattern that overlaps throughout, wiring an ideological landscape driven by profit and commercial interest rather than by a public

discussion of shared and collectively available futures; and here, the idea of the blogosphere as a form of public sphere is kidnapped and enslaved to precariously serve a corporate designed future.

5. Conclusion

This article uncovers the ideological principles of representations of the future thematically bound to GIS and spatial analytics, using the example of the ESRI blogs. The awareness that *geo* has entered the media ecosystems has activated multiple scholarly discussions that explore the technological shift, social practices, and the environment usually framed within the notion of geomedia. From a critical perspective, the proliferation of GIS in handheld mobile devices highlights their perceived indispensability in modern life which is anchored in a discourse that sees technology as the primary depoliticised catalyst for development and solving social problems.

Starting with computational methods to scrape 6000 future-related blog posts, to clean and structure them in topics, and further incorporating interpretive analysis, we challenged the computer-made topic arrangement to uncover layers of meaning in the corpus. The open-ended iterative approach that connects theory with a rich methodology composed of critical interpretive and computational methods is only a start. It has however proved fruitful, to address the complexity and messiness of the material, particularly if having Lindgren's (2020) statement in mind that computational tools from data science, even if rooted in ideals of positivist exactitude, predictions, and measurements, can be sociologically effective if they are integrated into a broader interpretive framework.

The analysis of the material reveals ideological and rhetorical modes as interest-specific organisational strategies for promoting GIS-based products and extrapolating software indispensability into the future. It is a way of legitimising the artificial sustenance of the entire data life cycle, and therefore of ESRI's corporate role as a major player in future scenarios. By critically examining these blogs, we gain insight into how ideological beliefs are embedded in media discourse and urban governance practices. The ownership structures of the ESRI blogs are a highly commercialised platform for GI scientists and experts, where ESRI controls access and sets the stage for communication which, stripped of its "magic," remains not much more than a dedicated form of advocating for, and imposition of, techno-solutionism.

There is still room for more critical discussion. For instance, the determination of the geographies where these futures are staged, and as much as it is demonstrated that this is not a future thought for everyone, there are reasons to believe that this is not a future for everywhere either.

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Geomedia Perspectives for Multiple Futures in Tourism Development

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Abstract

This article draws on five participatory action research studies to address how geomedia theory can induce multiple imaginations of the future. Critical future research advocates that societies need to collectively create visions of multiple futures, transcending the single rational (neoliberal) future path. The studies were conducted in collaboration with rural communities and local tourism entrepreneurs who were exploring geomedia technologies to develop destinations. The tourism sector uses geomedia technologies but often depends on commercial platforms that seek upscaling and generalisation, becoming detached from local practices and place-specific settings. By applying critical geomedia studies, we problematised the relationship between people, place, and technology in the present, the past, and the future. Geomedia studies provided a critical lens that provoked future visions beyond preformatted technological infrastructures and media practices. The participants were asked to engage with complex issues such as access, restrictions, equality, authority, and legitimacy in relation to the specific place, bringing forth a multitude of local assets and narratives envisioning alternative geomedia technologies. As a result of this process, participants paid greater attention to local assets, gained a more critical approach towards technology, and dared to use digital solutions in a more visionary manner. We, therefore, argue that researchers need to engage with society to bypass hegemonic geomedia representations. By illustrating how geomedia theory can be utilised within community development, we provide a framework for how collaborative research can more explicitly engage with local actors' thoughts and imaginings of possible futures.

Keywords

collaborative research; destination development; geomedia; multiple futures; participatory action research; representations

1. Introduction

This article draws on five participatory action research studies conducted in rural Sweden to address how geomedia theory can induce multiple imaginations of the future. Critical future research advocates that societies need to collectively create visions of multiple futures beyond the single rational (neoliberal) future path (Goode & Godhe, 2018). The intention is to defamiliarise unquestioned, sedimented, or "common sense" discourses of the future and shake them up to broaden the field of possibility. Enabling multiple alternative futures is considered key for societies to handle the urgent transition towards a more sustainable planet and society (Fitzgerald & Davies, 2022). In this thematic issue, the authors are asked to bring insights into our geomedia futures to open up multiple imaginative possibilities. With our contribution, we illustrate how critical geomedia studies applied in design processes can enable people to collectively (re-)imagine geomedia futures. The aim is to capture the opportunities of future-oriented design processes of geomedia technologies more effectively, together with five communities, by highlighting the potential of research-based interventions. The design process utilises critical design to reformulate the future (Jakobsone, 2017). This critical design stance critiques how designers work within an ideological (capitalist) context of singularity, efficiency, and economic gain, thus contributing to negative effects on social and environmental issues (Dunne & Raby, 2013). Through critical design, researchers and designers engage with the social, cultural, and ethical implications of design, thereby enhancing the potential to reshape the future (Malpass, 2015).

Our study emerges out of a critique of the design, use, and implementation of geomedia technologies, especially within the tourism sector, which often lacks consideration for the effect on place (Munar et al., 2013). Within the tourism sector, the use of geomedia technologies has grown in the last decade, with the aim of creating new and enhanced experiences for visitors (Pai et al., 2020). However, investments in technological development within tourism have gravitated toward an urban-centric and technology-driven paradigm (Cowie et al., 2020). The tourism sector is becoming dependent on commercial platforms that seek upscaling and generalisation, where the solutions are detached from local practices and place-specific agendas (Dwyer, 2017). Investment and technological development seldom harmonise with the values and aims of rural small tourism actors as lifestyle businesses with few employees and a high interest in sustainability (Cunha et al., 2020). Being situated within a rural setting makes tourist entrepreneurs dependent on local assets and highly entangled with the local community, where there is no clear-cut division between tourism, culture, recreation, and community-building (Rosalina et al., 2021). Therefore, there is an urgent need to detach from the preformatted discourses of geomedia technologies and be open toward more collectively created possibilities where local settings, values, and culture come to the forefront. Geomedia theory provides crucial perspectives into the design process to allow a community to go beyond unquestioned discourses and envision a variety of future media solutions, giving the place an "extended agency" (Adams, 2017).

This article is based on five studies in the county of Värmland, Sweden, conducted from 2016 to 2021. Through participatory action research, together with local communities, we explored methodological interventions in the *design processes* of geomedia technologies, not geomedia technologies as such. Each community was represented through tourism businesses, actors within the culture sector, organisations, interest groups, residents, and stakeholders. Participatory action research forms the methodological framework and is commonly used in futures research (Floyd, 2012) and future-oriented design processes (Ollenburg, 2019; Ramos, 2017).

The first section of this article presents our theoretical foundation. Subsequently, we demonstrate our participatory action research method and how critical geomedia studies guided in-depth studies of each place (also referred to as our five cases in this article). In the results section, we draw on examples from the studies to illustrate the process and present the outcomes. In the final section, we then address how geomedia theory studies give places an "extended agency" (Adams, 2017), contributing with additional perspectives, nuanced understandings of representations, and even uncomfortable insights to the design process—as asked for by critical future studies (Fitzgerald & Davies, 2022). We thereby offer insights and guidance on how researchers within geomedia studies can more explicitly engage with local actors' thoughts and imaginings of possible geomedia futures.

2. Theory

Media technologies are intricately woven into the fabric of places, deeply embedded in the social construction of space (Fast et al., 2018; Jansson, 2020; Kanderske & Thielmann, 2019; Wilken & Humphreys, 2021). An illustration of this integration is the commonplace use of positioning applications on smartphones, facilitating not only location-based services but also co-created experiences (Fast et al., 2019). Therefore, geomedia technologies in tourism have rapidly developed, with technology-mediated tourism experiences and place-based digital services for visitors (Braunerhielm & Ryan Bengtsson, 2023). Our five participatory action research studies originate from the core thinking of geomedia studies: that place holds a role in organising and giving meaning to mediated processes and activities, and thus the other way around—media's role in organising and giving meaning to processes and activities in space (Fast et al., 2018). Space is understood to be produced in constant negotiation between politics and everyday practices, entangled with its past, present, and future (Lefebvre, 1991). Each locale possesses a unique socio-cultural identity crafted by human interactions (Massey, 2005). In the context of the five studies drawn upon in this article, considering the way a place is represented (including its digital representation) through a critical geomedia theory context that emphasises the complex interweaving of place and media technologies has the potential to inform collaborative technological development (Fast et al., 2018). The geographical context becomes a pivotal consideration, expanding the perspective to encompass social, cultural, and geographic dimensions (Adams, 2017; Cowie et al., 2020).

Digital technologies facilitate reshaping place identities through idealised images (Ash et al., 2018). For example, Wilken and Humphreys (2021) highlight how place is re-negotiated through the social media platform Snapchat, recognising how the platform contributes to the commodification of place. Brantner et al. (2024) identify how Google's image search prioritises images with marketable properties over local assets and diversity by studying the Google image ranking of images of the British coastal town, Great Yarmouth. These studies are examples of how media platforms play into place-making and, therefore, pinpoint the risk of the tourism sector becoming dependent on commercial platforms seeking upscaling and generalisation. This also suggests that local actors lose control over the development path and information cycle (Morozova et al., 2021).

In recent years, critical research has heightened awareness of the diverse impact of digital media. Studies have, for example, delved into how platforms such as Airbnb contribute to gentrification, over-tourism, and tensions between tourists and residents (Gössling & Michael Hall, 2019; Ioannides et al., 2019; Krotz, 2017; Mermet, 2017). Despite the geographical positioning inherent in geomedia technologies, local conditions

and unique local assets are rarely highlighted as a resource in developing technologies or for inclusion in content. While technological advancements influence travel and tourism at large, they also shape local contexts. Notably, scholars advocate for reshaping digital tourism development by emphasising historical context, reflexivity, equity, transparency, plurality, and creativity (e.g., Alvarado-Sizzo, 2021; Gretzel et al., 2020; Sigala, 2018). The emerging development, therefore, shows how media technology is shaping and reshaping spaces (McQuire, 2016). This implies a need to reflect on the shaping and how it can be turned into possibilities (Murray, 2012). Our perspective aligns with this, emphasising that a deeper understanding of media technologies can broaden narratives, introduce novel experiences, and foster inclusivity and sustainability. We, therefore, need more knowledge of how media technologies are "taking place" at tourism destinations, and as defined by Adams (2017), therefore, are shaped by space. In order to understand the possibilities geomedia technologies entail, the focus is set on the geographical place and its actors and how they are integrated into multiple futures.

Including geographical contexts in the development of geomedia technologies allows us to address each place's social, cultural, and geographic dimensions. We give the place agency, acknowledging how action, knowledge, and identity are formed in relation to and with place (Adams, 2017). Adams (2017) argues that places have agency manifested in, for example, the role they play in how we act, think, learn, and identify ourselves. Critical design scholars think along the same lines, arguing for the engagement with perspectives that are "more-than-human" (see, for example, Akama et al., 2020; Jönsson et al., 2021) to deal with pressing social and environmental issues (also see Haraway, 2016). Design inevitably works with the future and, therefore, plays a role in shaping our future; thus, with design, we also have the ability to reconfigure the future (Malpass, 2015). Critical design has emerged with the need to expand design thinking beyond affirmative design within a neoliberal context of efficiency and economic growth (Dunne & Raby, 2013). Critical design promotes the use of critical concepts within development processes to question and (at least try to) challenge preconceptions and current hegemonic understandings.

Critical design thinking can thereby contribute to more radical visions of possible futures (Jakobsone, 2017), which aligns with critical future studies' emphasis on the urgent need to consider multiple futures (Goode & Godhe, 2018). Critical future studies seek to go beyond "common sense" discourses of the future, question predefined future paths, and allow people and societies to broaden the field of future possibilities (Inayatullah, 2007). Applying critical design, we argue that a critical geomedia perspective gives provocative insights that provoke multiple visions of geomedia futures. We, therefore, argue that we need to problematise representations of a place to reconnect local practices and place-specific settings (Dwyer, 2017; Jansson, 2020).

Central to and in line with critical design (Goode & Godhe, 2018; Jakobsone, 2017) is the need for societies to collectively create multiple visions of the future, which demands a collective process. As Young (2005) argues, the aim is to allow humans to understand that they collectively have the capacity to steer history and their own future by engaging with questions of the future. A common way to engage with society in order to induce empowerment and capacity for change is to conduct participatory action research. We apply geomedia theory in this context, which is used as a theoretical lens and approach in our method. Geomedia enables us to take a holistic approach to understanding a place and actors within the place, its history, its resources, different forms of representation, and the use of media technologies. This approach and the use of geomedia is what we refer to as "geomedia sensibility" (Braunerhielm & Ryan Bengtsson, 2023). By including

local conditions such as physical and social elements, as well as actors as stakeholders and users, we are adding an inclusive and sensible aspect using critical questions. By engaging with critical questions on representation, we are furthering the participants' comprehension of how media technologies participate in the co-creation or reproduction of places. We also conceptualise geomedia sensibility (Braunerhielm & Ryan Bengtsson, 2023) to initiate these critical and reflexive questions early in the design process, as well as questions that could make aspects of collaboration visible in the process. The critical questions raised with a focus on representation were: How are these places historically and presently represented? What part of the history is represented? What is included or what is excluded in the digital representation? These questions enable a more reflective, nuanced, and spatially sensible understanding of the design processes of geomedia technologies.

3. Method

In our research, we apply a participatory action approach (Ingold, 2018). It implies conducting research in close collaboration with businesses, politics, and organisations—actors outside academia—enabling researchers to go into depth with a problem (see, for example, Haraway, 2016; Ren et al., 2017). Ultimately, this collaborative approach aims to empower participants to be actively involved in community development (Brydon-Miller et al., 2003). Action research can involve both quantitative and qualitative data collection where the investigation is centred around change rather than generalisable conclusions (Coghlan & Brydon-Miller, 2014). Participatory action research provides an established methodological framework to conduct collaborative studies and development. However, it does not specifically address working with multiple options, perspectives, and future visions. Critical design, therefore, guided us on actively including critical geomedia perspectives in the design process (Malpass, 2015). The contribution of critical design is twofold. It first generated place-specific knowledge in the collaborative process, ensuring it became anchored in the local context. Secondly, we were able to identify local examples that induced discussions on issues such as access, restrictions, equality, authority, and legitimacy.

Participatory action research guides the researcher to work in cycles, where a cycle includes inquiry, action, and reflection. Knowledge and perspectives produced within each cycle form input to the next cycle (Brydon-Miller et al., 2003). Each of the five studies consisted of seven cycles. The first cycle mapped the various actors within the place and conducted in-depth studies of each place. The in-depth studies provide research-based knowledge and additional perspectives to the following cycles, in accordance with critical design (Ollenburg, 2019). Thereafter followed four cycles of collaborative workshops (Cycles 2–5) with the local community. In the first workshops (Cycle 2), local and regional public organisations participated to build joint knowledge about the place. This gave input to the following workshops (Cycle 3), where local entrepreneurs and associations participated, adding further knowledge. In the next cycle (Cycle 4), users (potential visitors and locals) explored user perspectives and experiences utilising the knowledge production from previous cycles. The final workshops (Cycle 5) gathered a smaller group of key actors, creating concepts for future prototypes and testing. In the final cycles, we developed concepts and evaluated the full process (Cycles 6–7). When all the studies were conducted, we performed a final and eighth cycle, drawing conclusions from the individual studies. Table 1 presents an overview of the collected data within each cycle.

Table 1. Data source and collected data.

Method	Data collected	Sampling and material
Document study (Cycle 1)	Local history, culture, the conditioning landscape, and natural resources.	Written local material, such as books and reports. Archives at local heritage organisations. Visual material, such as old photographs. Websites describing the local history.
Qualitative study of media presence (Cycle 1)	Digital representation of the place.	Social media, such as Facebook, Instagram, YouTube, Google Maps, and Twitter. Hashtag search related to each place.
Qualitative interviews (Cycle 1)	On-site, face-to-face interviews with visitors, entrepreneurs, stakeholders, and locals at each place.	There were 66 interviews, 40 of which were with Swedish citizens and 26 with visitors from other European countries. The interviews were 20–60 minutes long.
Visitor survey (Cycle 1)	Qualitative visitor survey on-site.	Survey distributed by the destinations. 54 answers.
Workshops (Cycle 2–5)	Creative, collaborative work with different groups.	Observations, written notes, photographs, and video documentation. Each workshop lasted around four hours and was conducted locally on-site. Fifteen workshops with 161 participants were recruited using a snowball method among entrepreneurs and the research team.
Evaluation questionnaires (Cycle 6)	Qualitative evaluation questionnaires to participants in workshops.	Evaluation questionnaires distributed after each workshop. 67 answers.
Focus group discussion (Cycle 7)	Qualitative evaluation with entrepreneurs and stakeholders.	Six focus group discussions (20 participants) after the process.

3.1. The Five Cases

The studies were conducted at five different sites in the county of Värmland, Sweden. The first two were the mining village Långban and the Klarälven River Valley. Långban is an old coal mining area that has been converted into an open-air museum. It is one of the places in the world where you can find many different minerals and a rich flora and fauna. The Klarälven River Valley is located in the northern part of the county, where the river was previously used for timber transportation. Nowadays, the tourism business Vildmark i Värmland attracts international visitors who learn how to build timber rafts and float down the river. The other three studies were conducted in a nature reserve, Glaskogen, an area with a long history of forestry and manufacturing that today attracts nature-based tourism; the waterfront of Kristinehamn by Lake Vänern, a resource for tourism with a long maritime tradition; and the last case is the cultural scene around the municipality of Sunne, with a long tradition of storytelling hosting, for example, the home of Nobel prize laureate in literature, Selma Lagerlöf.

3.2. Fieldwork and Analysis

Each study began with in-depth investigations of the place itself, both past and present. The investigation of the past consisted of historical documents such as photographs, texts, films, and maps, as well as more recent material such as reports, plans, and marketing materials. The material was provided by local actors and found

by searching archives and recently published material. The historical investigation mapped the places' history, culture, and natural landscape. Engaging with the past through a critical and reflective mindset allowed us to identify untold stories and perspectives, adding to the already-told local history. The material was mainly analysed in terms of representation of place, asking questions such as: Who represents the local past? In what way are different social classes presented? Is the history of both men, women, and children portrayed? In what way have the landscape and natural resources formed the place? Are there groups that have been excluded from the historical descriptions? These questions were crucial to avoid re-producing history, which would have been the case if the historical material had been used without a critical gaze upon it.

The present and the interconnection between the present and the past were investigated through qualitative interviews, surveys, and contemporary digital representations (see Table 1). Interviews were conducted with residents, public actors, and tourism businesses. Residents connected to the predominant local industries, such as mining and forestry, and local cultural and natural heritage, were asked about the local history. Other respondents were public actors from municipalities, representatives from non-profit organisations, the county administrative board, and tourism businesses (including guides and seasonal employees). They were asked about their views on the present situation for these destinations, their businesses, and their perceptions of future development. In addition, visitors were asked to participate in a web-based survey and qualitative face-to-face interviews on-site. The survey was distributed to visitors by email from the entrepreneurs over a few weeks. The qualitative interviews with visitors were performed on-site (with one exception). Through the visitor study, an understanding of these places as tourist destinations made a valuable contribution to the research results. The interviews were transcribed and, together with the open-ended questions from the questionnaires, analysed using thematic analysis.

Digital representation was investigated by collecting social media data (Facebook, Instagram, and YouTube) and digital maps (Google and local map apps). Here, we asked questions such as what is represented and what is not. What is the relation between the digital representation and the place? The digital representation inquiry gave insights into the role of media representations in our understanding of a place and brought attention to inequalities and misrepresentations. These studies also gave insights into the implications of the implementation of geomedia technologies.

The thematic analysis aimed to find nuances within the main themes of representation of place and digital representation. Through a critical geomedia perspective, we identified gaps in the representations and additional themes and perspectives with the capacity to shake up preconceptions in order to broaden the field of possibility in accordance with critical future research (Goode & Godhe, 2018). Including the results from the in-depth inquiries into the future design process also contributed to perspectives to understand the implications of a design (Malpass, 2015).

Analysing the stories of different groups of actors resulted in a theme of, for example, invisible boundaries between locals and visitors. Analysing the different representations gave us insights into the relation to time, with some places lacking a connection between the present and history, while other places struggled to connect historical resources to the present. Another theme that emerged concerned marginalised perspectives on gender and representation of place, both historically and in the present time. Central was a continuous discussion and reflection on the preconceptions and interpretations of the research group (Forsythe, 1999) in collaboration with various actors involved. This aimed to empower participants and build

collective knowledge, including during the analysis process. The analysis from our fieldwork constituted new perspectives for further development, and the critical geomedia lens provided central aspects of representation when conducting the workshops. So, the results from the initial in-depth studies of each case gave us multiple perspectives (Murray, 2012) to include in the design processes, where theoretical perspectives, research results, and participants' knowledge were mobilised (see further in Ryan Bengtsson et al., 2022). This shows how our focus on representation exemplifies and captures part of the process and part of all the results that the process has produced. The main empirical findings from the in-depth studies of the five places are discussed below.

4. Empirical Findings

We found that a common trait of our cases is their disconnectedness from parts of their own local history. The norms of the past of what was a "respectable surface" are still lingering on in the stories of today. What has been perceived as too sensitive, shameful, or perhaps not interesting enough is not shown. There is an emergent pattern of a lack of representation of women, children, and the working class. Moreover, stories of social life and these places as communities are overseen, as the storytelling predominantly focuses on economic and industrial history. The findings from these cases are all examples of the argument put forward of the importance of problematising representations of a place and its specific settings (Dwyer, 2017; Jansson, 2020).

Furthermore, a clear pattern emerged where representation at these places in the past was mirrored in geomedia technologies used by local actors today. The narratives in historical documents and interviews showed the same type of representation (or lack thereof) on websites, social media activities, guided tours, and so on. These findings align with other geomedia researchers, stressing the embeddedness of media technologies in socially constructed spaces (Fast et al., 2019; Jansson, 2020; Kanderske & Thielmann, 2019; Wilken & Humphreys, 2021). Making these insights visible to the participants was part of a collective learning process, where they jointly "re-discovered" these patterns of representation and used this knowledge in the following workshops.

Our fieldwork was inspired by the idea of places as unique socio-cultural communities (Massey, 2005) and the fact that more knowledge is needed about rural areas and their challenges for future development (Cowie et al., 2020). Using the geomedia perspective lens, we found a common lack of representation in each of the five cases, i.e., selective storytelling of certain parts of the local history and visitors being treated as mere observers. However, the place-based method (inspired by, for example, Massey, 2005; see also Adams, 2017) also revealed unique local assets and stories untold. Therefore, in order to understand the complexity of applying a critical design to design processes (Jakobsone, 2017; Malpass, 2015) suitable for different communities, the sections below summarise examples of these discoveries in each case. Thereafter, we show how this knowledge was transferred to the local actors and how these insights contributed to practical outcomes.

4.1. Långban

Findings that became specifically relevant in this case were that the Långban museum lacked representations of the lives of women and children in the village despite their presence in historical documents. Women

and children were "invisible" in the story of Långban. It also became evident that individual male inventors, engineers, entrepreneurs, and business owners were well-represented in the museum. In contrast, people from the working class were represented to a lesser degree and then in a more generalised way. Except for the odd photographs of groups of workers, the exhibitions at the museum showed the mining from a male, upper-class, and technical perspective. The observation of the lack of representation was also mirrored in the digital representation, and the story was repeated on websites and social media.

4.2. Klarälven River Valley

We found that the history of the forestry industry and timber logging on the Klarälven River was excluded from the storytelling to visitors (despite being the main reason for the timber rafting business), both physically and digitally. In this case, the connection to history and the context of the river as a means of transporting logs was missing. The destination excluded the relation between past and present as a ground for putting today's experience in a wider context. The story of timber logging was sometimes told to visitors—if the guide had the local knowledge and there was spare time before the visitors' task to build their own raft and travel downstream. Then, they would focus on the male job of handling the logging and not the wider effects on the local area, fostering generations of independent women, as the men were absent for long periods, working in the forests.

4.3. Kristinehamn

Visitors at the Kristinehamn waterfront often felt a sense of disconnection and exclusion from local information, coupled with a feeling of marginalisation by the locals. The historical depictions primarily centred around the maritime industry, its connection to iron mining, and Kristinehamn's historical role in shipping. This was mostly shown at exhibitions on-site and, to some extent, told in guided tours. However, in our comparative studies, we found very little trace of this historical legacy on the social media platforms used by the local actors. Similar to our other cases, the history depicted focused on men, neglecting the representation of women and children and giving little attention to the wider maritime environment. Our surveys found a fascinating past with a place formed by women entrepreneurs, business and manor owners, lighthouse families, a mental hospital, and many more stories.

4.4. Glaskogen

In the case of Glaskogen, we found unspoken barriers segregating areas for visitors and locals, with visitors expressing a desire to disconnect and seek authentic, nature-immersed experiences. This desire, from both visitors and tourist officials, to portray Glaskogen as this "untouched" natural site has led to the complete lack of any historical ties shown in social media and marketing. Entrepreneurs and cultural sites were non-existent on digital maps such as Google Maps. This contributed to forming the image of an "empty" local community, void of all local services, residents, and past and present activities. Our studies pointed towards the possibilities of using the different historical eras of this border region to add to the visitor experience and strengthen the local identity. This could include the culture of the Finnish settlers in the 17th century or the effects of industrialisation or the Second World War on these rural communities.

4.5. Sunne

Sunne officially labels itself as "part of the Saga," citing a long tradition of renowned authors residing in the region and priding itself on being creative. However, visitors perceive Sunne more as a museum where places are meant to be observed rather than experienced, leading to a sense of exclusion from "the Saga." The focus leans heavily towards history, particularly emphasising local author and Nobel Prize laureate Selma Lagerlöf (1858–1940), at the expense of the present cultural activities. The desire to be recognised as a cultural place worth visiting, with a long history of established authors and other prominent figures, was obvious in our studies. This was the focal story in digital media as well as on-site. So much so that the more obscure and mysterious literature, often based on local myths and legends, has recently been acknowledged. However, the representation of popular and contemporary culture is still lacking or less visible here.

4.6. Turning Knowledge Into Ideas

As described in the fieldwork sections above, the research team analysed the findings using a critical geomedia perspective (Fast et al., 2019). Summaries of these findings were then delivered as input to the next cycles in the process. For all five cases, this process consisted of a series of creative workshops (see Section 3). The research team was aware of the challenges of applying a critical perspective in a process based on participatory action research. We, therefore, had a transformative approach, where our role as researchers and the importance of using a critical perspective was stated at the start of each process and at each workshop.

The practical aim of each workshop series was to create ideas on digital place-based solutions that could enhance visitor experiences and strengthen local communities. Therefore, our next role as researchers was to guide the participants in a selection process and to funnel the ideas into practical solutions that could be implemented. In the final cycles of the process, we used a tool to categorise the ideas into groups with different degrees of realisation so that the local actors could start with at least one of the ideas.

Co-creating new digital solutions based on critical views of the past helped the participants to jointly discuss and envisage multiple paths for the future rather than just continue with "business as usual." The in-depth studies and analyses contributed to giving the local actors new perspectives on their past and present. It also helped the participants to envisage new, multiple futures, including the sometimes-neglected parts of their past. Through the workshops, the local actors created many ideas of what this future could look like. We argue that this process was a part of local empowerment—to increase local knowledge and insights, leading to creative ideas of different futures, having new tools to sort these ideas, and then turning them into action. The empirical findings from the in-depth studies (Cycle 1) served as a vital input into the process for the local participants, who turned the new knowledge into resources in the process of collectively creating visions of multiple futures for future community development.

4.7. Practical Outcomes

Following the process, participating entrepreneurs and public organisations have paid attention to local assets, multiple uses, and sensible alternative developments. By engaging with various forms of actors, the process has enabled and strengthened the capacity of local actors to steer their own future. The strong will to act upon

new knowledge and realisations resulted in parallel processes with several side effects during the development process. For example, local actors implemented tangible solutions which emerged as a result of the social meetings facilitated by the research team. Through our evaluation of the processes, we have noted practical outcomes, so-called "side effects." Examples are described in the following paragraphs.

As an effect of the exclusion of women's history, Långban Museum introduced new thematic guided tours focusing on the women of Långban's story, adding this perspective to their new digital guiding app. This was also promoted through social media and added to their website.

As part of the tourism business in the Klarälven River Valley, a new reception house was constructed at the visitor centre of the timber rafting business. This house featured a multimedia presentation to introduce visitors to timber logging's history. This also enabled the seasonal staff to be educated on the local history and its connection to the business.

Today, we can see that geomedia technologies are used in some places as a concrete result of our studies. For example, in the case of Kristinehamn, the municipality has taken ownership of the process and benefited from the experience and lessons learned. They now run digital "quests" for residents and visitors to connect the city centre with the archipelago and integrate their local maritime history.

The creative concepts for future prototypes as end results of the processes resulted in digital solutions, all with very clear connections to the initial findings from the in-depth studies presented in this section. The digital solutions aimed to complement and enhance the place-based experience grounded in geomedia perspectives. The prototypes were low-tech solutions to ensure that entrepreneurs would be interested in developing them further. The purpose was to deliver digital solutions that were based on challenges, needs, content, and experienced, and not what was technological possible. These practical outcomes are good examples of how the participants implemented their new knowledge and created a new product using geomedia technology. Thus, also challenging the hegemonic geomedia technologies often used by the tourism sector (Munar et al., 2013), which is in line with other scholars in the field (Goode & Godhe, 2018; Inayatullah, 2007; Jakobsone, 2017).

5. Conclusions

This article reveals how, by applying critical geomedia studies (Fast et al., 2019), we have studied the intricate connection between people, place, and technology across different time frames—past, present, and future. Geomedia studies, in this context, has offered a critical lens into our methodological approach that inspired visions of the future beyond preformatted technological infrastructures and media practices, giving place an "extended agency" (Adams, 2017).

This process involved collecting a large amount of data. Likewise, a large number of results were produced, both during the process and in the final phase. This means that the in-depth studies were not intended to stand alone but to gain knowledge and examples useful within the participatory action study (Ingold, 2018; Ryan Bengtsson et al., 2022). The in-depth studies have the role of identifying various representations (see Section 3). In this way, we ensured that the voices and stories of the actors followed the process as a common thread. They also serve as an example of how research plays a role in this type of process.

The geomedia perspective, integrated into the methodology in analytical questions, gave rise to identified gaps in the representations, different themes, and new perspectives at each place (Forsythe, 1999). This, in combination with identifying challenges through in-depth studies, helped local actors to re-discover their communities and offer opportunities to reinvent themselves and, in the next step, envisage multiple futures. This illustrates how critical perspectives added by researchers can support local actors in their collectively created visions for local community development (Jakobsone, 2017) and how geomedia theory can induce multiple imaginations of the future. In this way, the in-depth studies resulted in several different paths for multiple futures (Goode & Godhe, 2018). They demonstrated a more democratic way of working beyond the single rational future path (Goode & Godhe, 2018). The method shows how local resources and human assets can give rise to new solutions. These solutions are not necessarily focussed on economic growth but rather on social interaction, preserving cultural or socio-cultural values, and ensuring the retention of skills. In doing so, we can reach beyond sedimented or "common sense" discourses of the future and broaden the field of possibilities. This is important for a sustainable future, as Fitzgerald and Davies (2022) argue.

The process itself contributed to individuals feeling more empowered. As one of the participants summarised: "Being creative together makes innovation" (local entrepreneur, March 8, 2019). The assessment indicates that the process allowed actors to expand their digital knowledge, explore geomedia technologies, and consequently enhance their control over local development. Participants expressed reduced reliance on existing platforms and tools for mediated experiences. They also acquired novel approaches for business development, supporting digital progress, and a heightened awareness of conflicts between local interests and those of the tourism sector (Ren et al., 2017). Other local contributors expressed satisfaction that they were able to share their specific local knowledge, appreciating the opportunity to shed light on and expand their perspectives by highlighting the different representations. As highlighted by several participants, this represented a unique chance to be part of a local development initiative.

Through a participatory approach with a place-based and collaborative method, our aim has not only been to empower individuals and locals in rural tourism settings but also to create an awareness of the uniqueness of local places, their assets, and representations in order to give the place agency (Adams, 2017). As a consequence of the digital age, a common understanding of how media influence the representation of place is necessary. The researchers' engagement in working together with communities promotes multiple perspectives when imagining futures and their own roles within a specific place. In the discussions, participants jointly explored and expressed reflections on complex issues such as access, restrictions, equality, authority, and legitimacy (Ryan Bengtsson et al., 2022).

The collective process allowed us to intimately familiarise ourselves with the places in terms of needs, challenges, and resources, bringing forth a multitude of local assets and narratives and allowing the participants to envision multiple alternative geomedia technologies. The development of a so-called "geomedia sensibility" is achieved by guaranteeing that ideas and concepts produced are firmly grounded in the specific conditions of each place, along with the actors' associations with them (Braunerhielm & Ryan Bengtsson, 2023). This opens up an understanding of the role of media and how they can be part of an increased representation and diversity (Dwyer, 2017; Jansson, 2020). An awareness of the relationship between place, people, and technology/media reveals how actors can take command of their own development and see their own role in harmony with places and people.

This article serves as an example of how research can contribute to the intersection of knowledge, critical thinking, and advancement and how it enables participants to cultivate fresh viewpoints. An important contribution of this article is thus the methodological approach. By applying critical design and a geomedia perspective to the design process, we, as researchers, adopt a critical approach and create opportunities for participants to envision multiple futures. By bringing researchers into the process, we allow more options about what the future could be. We believe the image that actors have of the future also influences how the future is developed. Therefore, by adding critical design to the process, we have increased the number of alternative futures. This expands the potential narratives related to each destination, fostering experimentation among local entrepreneurs and municipalities. Consequently, we argue that researchers should actively engage with society to bypass hegemonic geomedia representations. By providing tools and methodologies to address obstacles, challenges, opportunities, and benefits, we provide a framework enabling people to collectively (re-)imagine geomedia futures. With this article, we call for further studies on how to bypass hegemonic geomedia representations in media technology in both tourism development and in a wider context of place development, as well as how this critical perspective could be applied in other international contexts.

Through the co-creation of both research and practice, we have contributed to creating concrete solutions, especially creating multiple futures together with local actors. Together with local actors, we learned how to refine the work in a place-based and collaborative manner, focusing on people and places instead of technology-led development. The undertaking provoked future visions beyond preformatted technological infrastructures and media practices in rural settings, thereby enhancing the empowerment of local actors by engaging their thoughts and imaginings of possible futures.

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Conflict of Interests

The authors declare no conflict of interest.

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Planners Becoming Visualizers in the Mediatized World: Actor-Network Analysis of Cairo's Street Billboards

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Abstract

While visual communication is crucial in urban planning, there is a gap in understanding how dominant narratives and visuals affect professional planning practice and planners' roles, particularly in mediatized urban environments. This study addresses this gap by examining street billboards in Cairo to understand how planning visualizations contribute to the restructuring of the planning profession. It explores how these visual tools shape the practice and roles of urban planners, who are increasingly becoming visualizers. Employing actor-network theory, the study traces the relationships between billboards, planners, and other network actors. The primary research question is: How and why does the use of planning visualizations (billboards) restructure the profession of planning, including planning practice and the roles of planners? Utilizing a qualitative exploratory methodology, the study focuses on billboards along Cairo's 6th of October Bridge. Data were analyzed through visual and content analysis of 209 billboards to understand their language, content, patterns, and geo-positioning. The analysis revealed that billboards in Cairo significantly impact urban landscapes and the visual culture of urbanization, often promoting exclusive real estate projects to a socio-economic elite. The research highlights the dilemmas in the changing professional roles of planners within a mediatized world and underscores the need for more inclusive planning practices. By employing actor-network theory, the study provides a nuanced understanding of the complex relationships that shape and are shaped by the visual culture of urban planning, offering insights into how planners can navigate and influence these dynamics for more equitable urban development.

Keywords

actor-network theory; billboards; Cairo; mediatized world; urban planning; visual culture

1. Introduction

Cairo's streets and national TV channels prominently feature real estate billboards and ads, promoting new apartments or villas with standardized visual symbols (e.g., 3D models, green areas, swimming pools). Media plays a large role in constructing our daily images, framed stereotypes, city perceptions, and defined standards of beautiful design (Regan et al., 2006). The term "mediatized world" emerged as a contemporary concept referring to the interrelating role media plays with society (see, among others, Hepp, 2010; Hjarvard, 2008).

The above observations expose the significant role visualizations play in planning and designing cities. Scholars emphasize the crucial role of visualization in urban planning and its impact on practice and planners (see, for example, Kitchin & Dodge, 2014). Visual communication in urban planning and design is the primary method for creating and exchanging ideas about the urban environment among planners, architects, and the public (Al-Kodmany, 2002; Langendorf, 1992; Rose et al., 2014). Many urban scholars in Egypt have also addressed the role of visualizations and graphics in planning and communication (e.g., Abotera & Ashoub, 2017; Selim, 2015). However, the extent to which these dominant narratives and visuals impact/construct professional planning practice and the planner's role is still under-researched.

I argue that the different media assemblages are employed to visualize cities and one can use them to reflect on planning practice and the kind of city planners envision/plan. This article investigates the ways in which the utilization of planning visualizations, specifically billboards, contributes to the (re)structuring of the planning profession, encompassing both planning practice and the roles of planners. This study's contribution to the field lies in highlighting certain dilemmas in the changing professional roles within the mediatized world.

To achieve this objective, street billboards are chosen as the case study to understand how planning visualization structures the planning profession. As seen in Cairo and elsewhere, street billboards significantly impact urban landscapes and the visual culture of urbanization (Hendawy & Saeed, 2019). Street billboards are becoming an increasingly prominent part of the urban landscape in Cairo, reshaping the visual understanding of the city (ElRouby, 2015). Billboards, in this sense, are not only perceived as a final product but are embedded in a network that employs agency in creating the presented visuality, both in the physical and imaginary space. Hence, the research question guiding this study is: How and why does the use of planning visualizations (billboards) restructure the profession of planning, including planning practice and planners?

This inquiry is developed by adapting an assemblage ontology and using actor-network theory (ANT). Starting from the street billboards as a representation of the urban-visual experience and tracing backward to the planning offices that create part of the billboard content (the promoted 3D rendered images), and following Latour's recommendation to "follow the actor" (Latour, 2007, p. 68; see also Kärrholm, 2016), this article adopts a reverse/backward process to unravel the layers behind the construction of street billboards as a spatial phenomenon (product) and the embedded actions that produce them (Figure 1). The motivation for adopting a reverse process in this article is to delve deeper into the complexities of street billboards as a spatial phenomenon. This approach uncovers the underlying layers involved in their creation, providing a comprehensive understanding of their multifaceted nature, spatial significance, and the factors contributing to their construction and placement within urban environments.

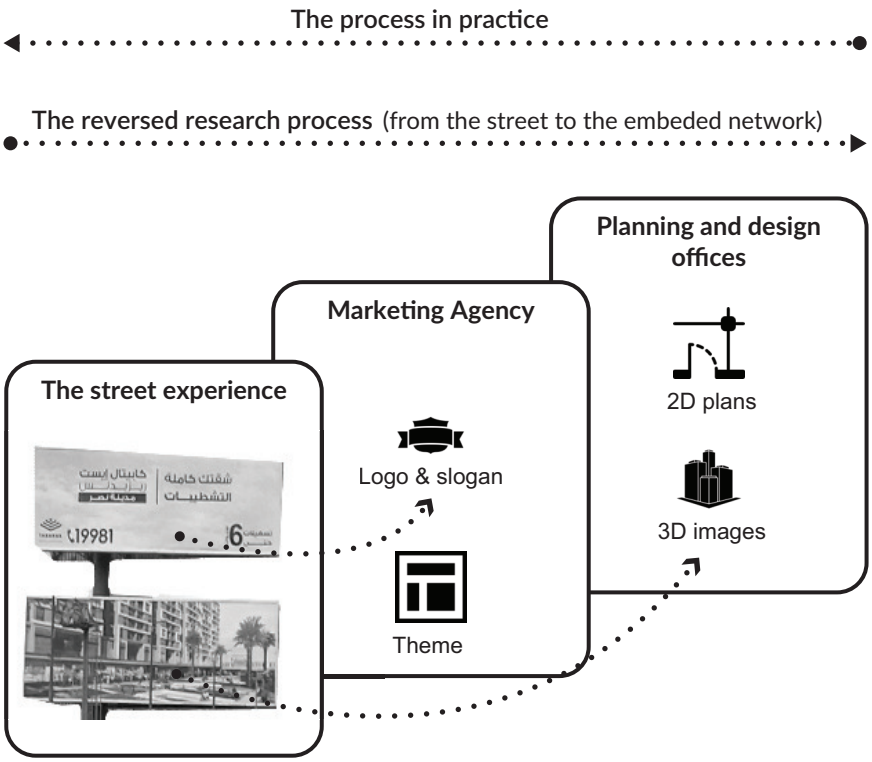

Figure 1. The research process (following the billboard).

Billboards could be depicted within the described actor-network as geomedia, which function as communication devices in urban space and at the same time take part in its transformation. The concept of the geomedia city includes not only the digital infrastructures within urban spaces that circulate and embed data but, more importantly, the social and cultural dynamics that legitimize or marginalize certain norms, skills, forms of capital, and individuals in the urban context (Hartmann & Jansson, 2024). This is evident in billboards, which impact urban landscapes by promoting exclusive real estate projects to the socio-economic elite (see Abotera & Ashoub, 2017), thereby reinforcing territorial inequalities.

2. Cairo's Street Billboards

This study focuses on Cairo, which serves as an exemplary megacity for examining the billboard trend. There are two reasons for selecting Cairo. First, the sheer scale of the impact of "billboardism" in Cairo. In general, billboards are thought to convey "meaning and provide order to the landscape" (Venturi et al., 1977). In Cairo, billboards play a significant role as an outdoor advertising tool, communicating news, ads, and campaigns in Egypt, revealing what and who is made (in)visible (see Abotera & Ashoub, 2017). Second, the vast majority of the content of real estate billboards appeals to a social, economic, or cultural elite who form a small proportion of the population, drawing heavily on scarce resources in desert cities (Abotera & Ashoub, 2017; ElRouby, 2015). This context allows for an exploration of how urban planners are enrolled in this context.

Billboards are a defining feature of Cairo's urban landscape, reflecting urbanization, commercialization, socio-economic trends, and impacting the visual environment and daily lives of residents. The pervasive use of billboards in Cairo symbolizes the complex interplay of economic interests, cultural dynamics, and urban

challenges. On one hand, these billboards serve as vital tools for advertising and economic activity, providing a platform for businesses to reach a broad audience (Bhargava & Donthu, 1999; Taylor & Franke, 2003; Wilson & Till, 2011). On the other hand, they contribute to visual pollution, altering the aesthetic quality of the urban environment and sometimes overshadowing the city's historical and architectural heritage (Saghir, 2019). This transformation has both positive and negative implications for urban quality of life. The dense clustering of billboards, particularly in high-traffic areas, can overwhelm the visual environment, making the cityscape appear cluttered and less aesthetically pleasing (see Talaat & Osman, 2023).

3. Methodology

The billboards on the sides of 6th of October Bridge are used to understand the position of visual communication in Cairo. The bridge was selected because it is the longest bridge in Egypt, constructed in 1990, spanning 18.705 kilometers and ranging from 14 to 34 meters wide (Arab Contractors, 2019). It is located in the center of Cairo, links key areas of the city, and is accessible only to cars. It physically connects the old and new areas of the city, creating a communicative situation for the targeted public who use it. The 6th of October Bridge in Cairo is a major thoroughfare with several start and end points, as well as multiple intermediate access points, spanning various key areas of the city and making it a crucial artery for vehicular traffic. In 2017, the bridge was crossed by more than 500,000 people daily (Osama, 2017). The map and images in Figure 2 provide an aerial view and the atmosphere of the bridge, including a subset of the billboards on its sides.

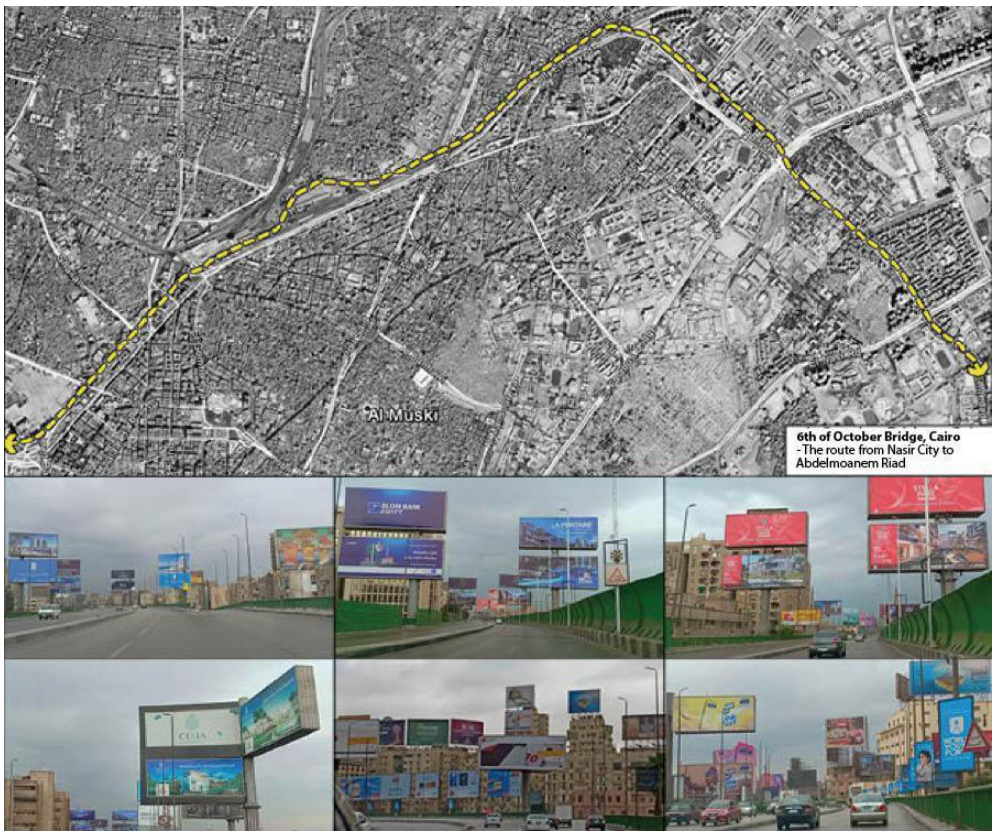

Figure 2. Aerial view and images of the billboards on the sides of the selected route on 6th of October Bridge in Cairo.

With the help of an assistant, photographs of the billboards along the bridge were taken during an uncrowded day, constructing a series of photos for the entire bridge from the entry point at Nasr City to Abdel Moneim Riad and back (Figure 2). These photos were taken in November 2018 by simply moving along the bridge and taking photos.

The study uses a qualitative exploratory methodology, including visual and content analysis of 209 Cairo billboards. Photographs of the billboards were taken and analyzed to understand publicly mediated city images and messages.

In total, 160 photos were taken: 88 photos from Heliopolis to Mohandeseen and 72 photos in the other direction. After all the photos were collected, another assistant helped transfer the photos to a sample of 209 billboards by focusing only on large billboards and excluding smaller or repeated ones. Afterward, the sample of 209 billboards was sorted based on the needed information for the study. Identifying the needed information took place in parallel with the sorting process by reviewing the sample back and forth. It was a flexible, cyclic process which I chose to extract and analyze the billboards as there are no statistics for the number of real estate projects that use billboard advertising in Egypt. In addition, the empirical evidence provided by this study is significant.

Additionally, a content analysis was conducted on the billboards sample from four angles: the language used on billboards, the content of the billboards, the patterns of real estate billboards, and the geo-positioning of the billboards in reference to the advertising communicated through them. The content analysis focused on understanding the linguistic strategies used to target different demographics. This included examining the prevalence of Arabic versus English text, and the presence of multilingual content. It was assumed that the choice of language often reflects the intended audience's socio-economic status and educational background, with English typically targeting higher-income and more cosmopolitan segments of the population. Moreover, the content analysis investigated the themes and types of products or services advertised. For instance, it became clear that billboards advertising luxury real estate goods were prevalent. Furthermore, the patterns used in the real estate billboards were examined specifically to understand the marketing tactics used in promoting property developments. This included analyzing the visual and textual elements, the frequency of real estate ads compared to other types, and the messaging strategies used to attract potential buyers. Finally, a geo-positioning analysis explored the strategic placement of billboards in relation to the surrounding environment and traffic flow. This involved mapping the locations of the billboards and assessing their visibility and impact based on their placement. The geographic positioning also considered the socio-economic characteristics of the neighborhoods where billboards were placed, which could influence the types of advertisements displayed.

The collected data was interpreted and presented using the ANT approach. ANT was developed by Latour and Callon in the 1990s as a methodological approach that draws on assemblage philosophy to analyze the interaction of human, social elements and non-human, material, or technological elements in a network. According to Latour (2007), "a good ANT account is a narrative or a description or a proposition where all the actors do something and don't just sit there" (p. 128). In this sense, the actor is defined as "any element which bends space around itself, makes other elements dependent upon itself and translates their will into the language of its own" (Callon & Latour, 1981, p. 286). This allows the consideration of agency in all elements, or, in other words, the elements' power or ability to impact the process (see, among others, Healy, 2013; Ratnayake et al., 2016).

The first use of ANT in spatial research can be dated back to 1995 in the work of Murdoch and Marsden (1995), who attempted to link politics and geography, which at that time were still not sufficiently incorporated. By adopting a micro-sociology perspective, they discussed how space and politics restructure one another. They showed that actors at local levels are entwined into broader networks of national relations, and, in so doing, "the local and the national become 'mixed up' as actors build associations in pursuit of their goals" (Murdoch & Marsden, 1995, p. 368). Subsequently, Murdoch (1998) continued to relate his work more straightforwardly to ANT, particularly its concept of acting at a distance, to understand what and who acts at a distance and the spatial networks that appear accordingly. A more direct attempt to use ANT in planning literature came with Beauregard (2012) who advocates for a "place" for non-human objects in planning practice and theory. Building on the work of Latour (1992) and Murdoch (1998), Beauregard discussed how things used by planning professionals, such as apartment buildings and site plans, influence the practice of planning, reflecting the "micropolitics of planning" where planners use objects to "convey authority and commitment and to establish mutual understandings" (p. 1). Beauregard claims that understanding these objects helps us grasp the consequences of planning. Another attempt to integrate ANT in urban design came from Kärrholm (2016), who follows a statue as a non-human object with design-political significance in public space, assembling other actors. In this study, I build on these endeavors and extend them to observe not only the influence of non-human actants on planning practice and theory but also the ways in which planners and the planning profession are entangled and restructured in this network.

In this article, the sample of billboards is analyzed through content analysis and is understood to be both an artifact of the planning profession and an influencer of the planning profession. The article proceeds to describe and present an analysis of the billboards in Cairo as actors in an actor-network analysis. Using ANT, street billboards as examples of urban visualizations and media are perceived as both a method for research and a means for understanding planning practice and the role of planners. As such, the billboards were treated as actors in the planning process. As a planner who studied architecture, visualizing the network was a challenging task in this article, as designers generally share a known common language of communication to convey their ideas. Nonetheless, how things and networks are defined is still an open field. Not having a preconceived idea of what the network looked like was useful, as I attempted to develop more than one trial to reflect what emerged the more I looked at the network and tried to visualize it from an ANT lens. Rydin (2012) presented a visualization for studying the network regulating low-carbon commercial development with and without material actants. Figures 6 and 7 in this article are inspired by this before-and-after approach. Yet still, I think the presented figure (Figure 7) could be considered a success to the extent that it provokes discussion and criticism.

4. The Physiognomy of Real Estate Billboards on Cairo's Bridge

This section provides an analysis of a sample of 209 billboards from four angles: the language used on the billboards, the content of the billboards, the patterns of real estate billboards, and the geo-positioning of the billboards in reference to the advertising communicated.

4.1. Content and Language of Cairo's Bridge Billboards

The analysis of the 6th of October Bridge showed that around 39% of the 209 analyzed billboards were real estate ads, making the final sample on which this article works about 82 real estate billboards. Of these, a

striking 85% were in English, 10% were bilingual, and only 5% were in Arabic. Figure 3 shows photographs of the billboards on the bridge and an overview of these statistics.

Simultaneously, the study of the bridge revealed the names of 23 real estate projects or developers, 21 of which had Western names (English and French), with only two developer names in Arabic (Amer and Emaar). Nevertheless, Emaar, as a developer company with an Arabic name, offered two real estate projects with non-Arabic names (Mivida and Uptown Cairo) and one project with an Arabic name (Marassi). Similarly, Amer, another developer company with an Arabic name, promoted a series of real estate projects under the non-Arabic name "Porto" (Porto Cairo, Porto Marina, Porto Sokhna, etc.). In a country with an almost 25% illiteracy rate ("More than 25%," 2014), billboards in English—or even Arabic—do not target 25% or more of the population, which is a significant percentage to be ignored.

Figure 3 also shows how significantly billboard advertising affects the street experience of the general public passing by the bridge. Moreover, it illustrates the influence of the billboards on the built environment nearby, as they are constructed on the facades and rooftops of buildings. In the same vein, Abotera and Ashoub (2017) discuss the dominance and exclusivity of billboards in Egypt, describing them as "reproducing nature and dominating spaces of representation." They argue that billboards focus on marketing the scarce resources of water and greenery in the Egyptian urban environment (Abotera & Ashoub, 2017). The analysis in this article also shows that the promise of green living was one of the main messages continuously observed on the bridge billboards. Additionally, other dominant messages were communicated through the names and slogans of the real estate projects promoted by the billboards. Examples include: "Castle Landmark….More space, better life," "The Ridge Villas….Elevated life," "La Fontaine….Live the waterfront," "Stella Park….Every home with a view," etc. On the one hand, this illustrates the dominance of English and French names. On the other hand, it demonstrates the nature of the promises communicated through billboard advertising. In ANT terms, billboards as material actants emphasize other material actants (water and greenery) while simultaneously covering nearby materials (the surrounding buildings).

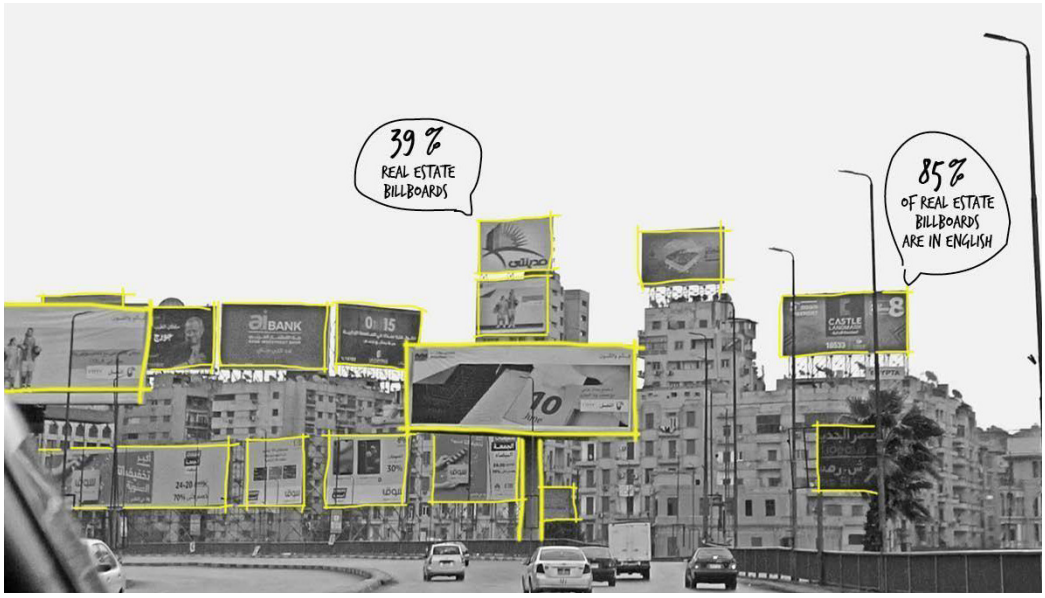

Figure 3. Analysis of the content and language of the bridge billboards.

4.2. Patterns of Real Estate Billboards on Cairo's Bridge

Two main patterns of real estate billboards were observed (as seen in Figure 4). Pattern 1 included mostly text with the name and slogan of the project, the contact information of the developer, and their logo and slogan. Pattern 2 included this text in addition to 3D-rendered images of the project. These images visualized the promises mentioned above and were generated by the commissioned planning offices.

Rose et al. (2014), utilizing ANT, have emphasized the link between the computer-generated images of urban projects and the contextual national and international discourses of visual culture. By examining the images communicated through the billboards more closely, it was found that most of the images featured large green spaces, numerous trees, and water features, promising a good life that is unattainable by the majority of the population. At the same time, very few of the billboards depicted inhabitants, who, if present, reflected a high socio-economic status. By taking a broader perspective on the context of the advertising communicated through the billboards, the geolocations of the ads were determined and are presented in Figure 5.

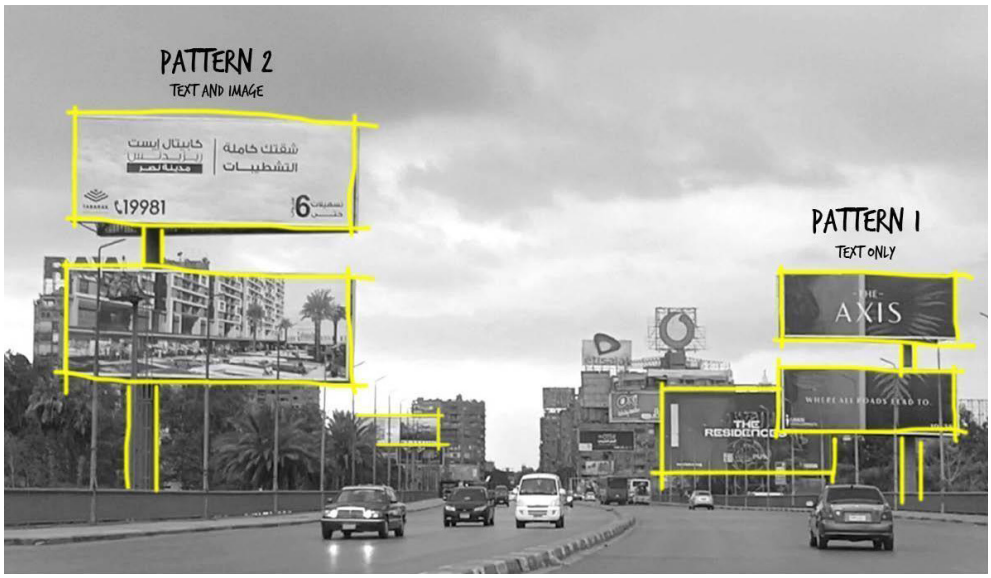

Figure 4. Patterns of real estate billboards in Cairo.

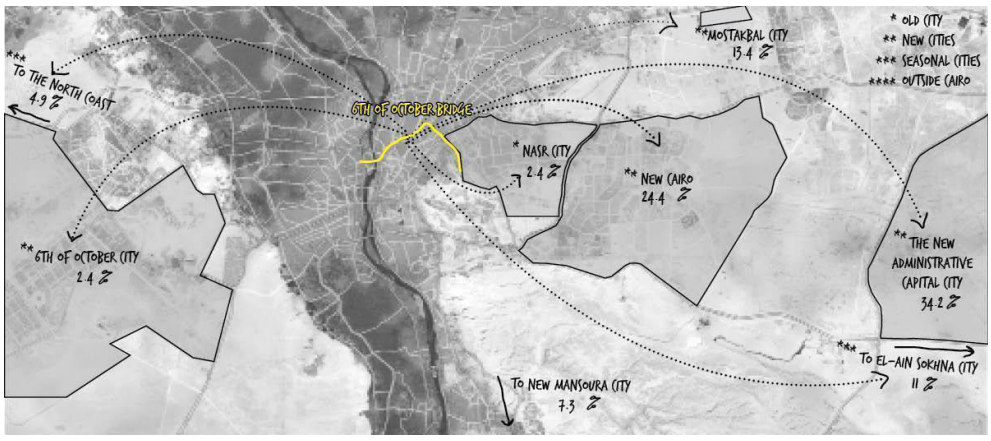

Figure 5. Geolocations of 82 real estate ads (out of the studied sample of 209 billboards).

4.3. Geo-Positioning of Cairo's Bridge Billboards

Figure 5 shows that 74.4% of the communicated ads were for projects in new cities, 23.2% for seasonal projects, and 2.4% for projects in the old city. While this mapping indicates that, in terms of size, ads seem spatially relevant, in terms of population, statistics from 2006 showed that only around 2.5% of the Egyptian population had actually moved to the newly built cities that most real estate ads market (World Bank, 2008). Meanwhile, approximately 15% of Egyptians can afford to live in the promoted elite compounds (Sims, 2011), and a minority of the population own a private car, as mentioned above, and hence can afford to live in the suburbs. These figures, in parallel with my analysis, show that the billboard ads were exclusively targeting a minority of the general public and highlight the need for massive infrastructure to support the development of these new cities.

According to the Central Agency for Public Mobilization and Statistics, in 2019, it was noted that the private sector established 221,187 housing units with a total investment of around LE 77.3 billion (approximately $1.63 billion; "Over 326k housing units," 2019). Assuming that families in Egypt consist of four persons, the 221,187 housing units accommodate around 56,000 families. Given that the price of one 16 × 10 meter billboard on the bridge costs LE 200,000 (around $12,000) per year (Issa, 2019), this also means that the advertising budget is allocated towards only 0.002% of the 100,972,073 Egyptian population (Worldometers, 2019). This accordingly raises several questions about the large size of these ads in contrast to how little of the population is served in the end. The previous analysis shows that a highly targeted elite has invaded public space. Therefore, the regular population is not only subjected to the communication of these projects but also, in one way or another, coerced into accepting them.

This deconstruction of the billboards reflects not only the kinds of messages they communicate but also the targeted audience. In a context with high illiteracy rates and most of the population living in informal areas (40% of the population in the Greater Cairo region live in informal areas; El-Shahat & Khateeb, 2013; and only 2% have moved to the promoted compounds; Shawkat & Hendawy, 2016), the current billboards do not target, nor do they include, the majority of the population. Accordingly, the symbolic icons and images communicated to the general public through the billboards during their everyday street encounters contribute to creating an exclusive city perception. In the case of Cairo, the billboards target and are accessible to certain segments of society (in the case of the 6th of October Bridge, those who understand the English language and own a car or use privileged transportation [taxi or Uber] and pass over the bridge).

At the same time, the plurality of billboards densely placed on the bridge and in front of existing buildings creates a sonographic facade and shapes the physicality of the bridge. This transformation has significant implications for the surrounding urban environment, affecting visual aesthetics, residential quality of life, economic inclusivity, environmental health, and public safety.

While the bridge is expected to provide its users with an aerial view of the city, the extensive use of billboards changes these expectations, transforming the cityscape into a commercial scape. This visual dominance impacts the surrounding areas by creating visual pollution, overshadowing local cultural and historical features, and continuously exposing residents and passersby to aggressive advertising, which can increase stress levels and create a sense of constant commercial bombardment. Moreover, neighborhoods close to the bridge, such as Zamalek, Dokki, and Mohandeseen, are diverse in terms of socio-economic

status and are affected by the presence of the billboards in several ways. The visual and noise pollution from the bridge can reduce the quality of life for nearby residents, leading to lower residential satisfaction.

Additionally, billboard placement and content have several impacts on urban quality. Billboards, particularly illuminated or digital ones, contribute significantly to light pollution, disrupting the natural day-night rhythm and causing discomfort for nearby residents. Visual pollution from bright and constantly changing ads can be overwhelming and reduce the aesthetic quality of the urban environment ("The true cost of billboards," 2024). Continuous exposure to advertising can lead to "advertising fatigue," where residents feel overwhelmed by constant commercial messaging (Abrams & Vee, 2007). The nature of advertised content can influence the socio-economic dynamics of the area. High-end advertisements may cater to wealthier demographics, which can feel exclusionary to lower-income residents and reinforce social stratification. Conversely, local business advertisements can support community identity but are often outnumbered by larger corporate ads (Woo, 2006). Billboards can obstruct important views, including natural scenery and traffic signals, posing potential safety risks. They can also block sunlight and ventilation for adjacent buildings, affecting the living conditions of nearby residents (Muvombo, 2017). Finally, the proliferation of billboards can erode the cultural and historical identity of the area, replacing it with a commercialized image that may not resonate with or benefit the local community (McMahon, 2023).

5. Following the Real Estate Billboards as Actors

The previous analysis has shown that billboards reshape not only the city's visual experience but also its spatial everyday encounters. Additionally, the analysis demonstrated that 39% of these billboards are occupied by real estate ads promoting an idealized version of a good life. While the themes of these billboards are mainly created by advertising agencies, the 3D images used as content are developed by urban planners. Moreover, the analysis has shown that many of those who are not targeted by the real estate advertisements on the billboards are made invisible by them. Yet still, the billboards standing on the public streets of the city are seen by everyone, including those who are not targeted by them. Elsewhere, I have investigated the extent to which this invisibility results in social and spatial exclusion. I have argued that through the visibilities and invisibilities communicated by planning visualizations, justice in planning becomes a question, constructing spatial and visual injustice in cities (Hendawy, 2022).

A standard actor analysis (i.e., stakeholder analysis) of the billboard would focus on the interaction between key social actors such as the urban planners who visualize the images on the billboards, the marketing agency that markets them, the general passerby public, the targeted public, etc. This is demonstrated in Figure 6, which illustrates the social actants in the billboard network.

Looking at the network from an exclusively human actant lens analyzes the production of the billboards but alienates the role of the billboards in the network (and other material elements) by perceiving them as only tools, receivers, or reactants to social actors. Thus, the use of an ANT lens reflects material–social relationships (particularly the billboard–planner relationship).

With a focus on planning visualizations that are primarily used as tools to communicate urban visions, Rogers and Hunt (2019) note, "the conceptualisation, planning, preparation and realization of any 'future city' is a complex but necessary requirement in a world where cities transition, transform, shrink, expand and evolve."

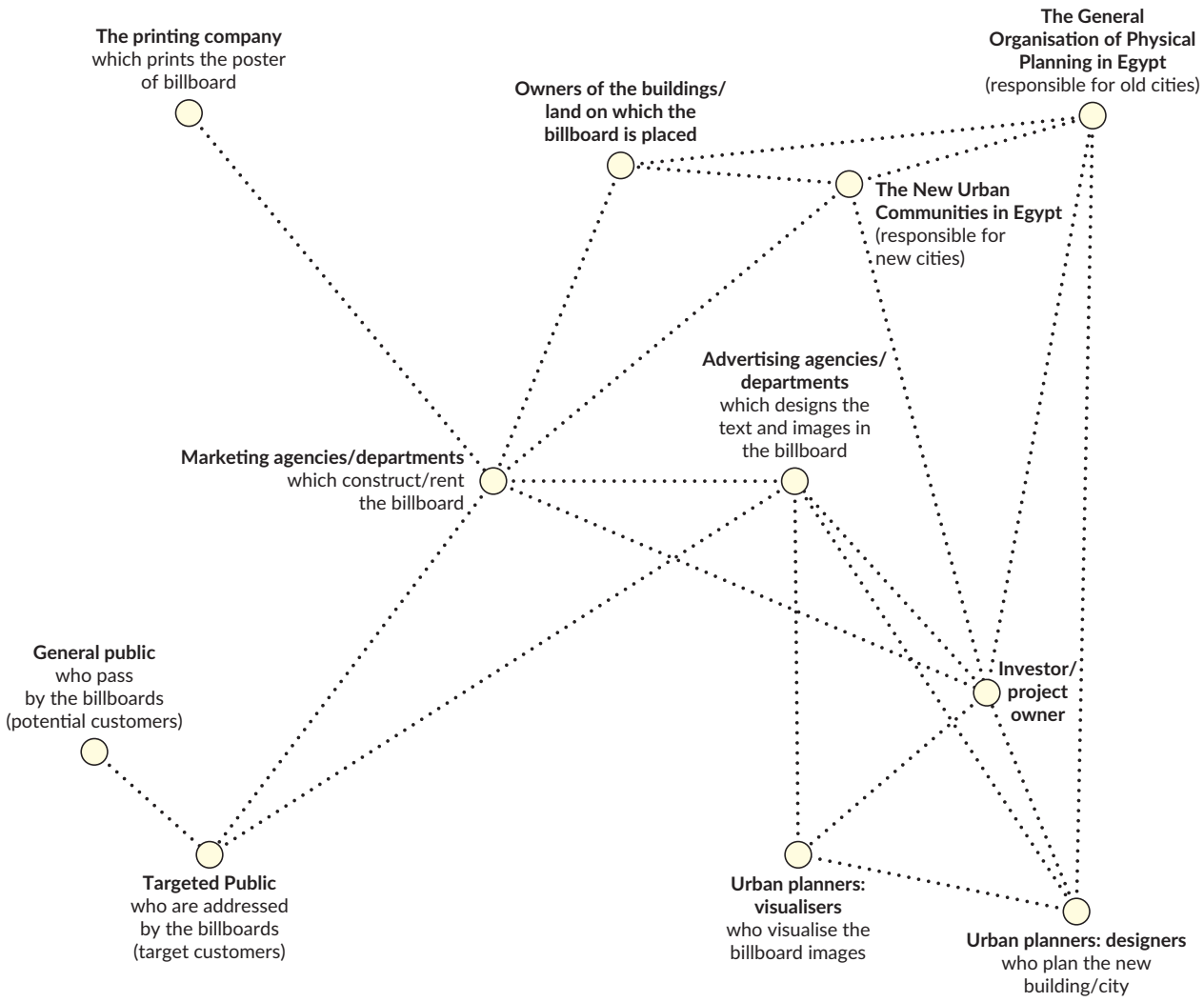

Figure 6. Visualizing the human actants in the billboard network.

Earlier, Culkin (1967, p. 70) had said, "we shape our tools and thereafter our tools shape us," based on the work of media theorist Marshall McLuhan. Through using ANT, I aim to unravel the layers behind the construction of street billboards as a spatial phenomenon (tool/product) and the embedded actions by planners and planning offices that produce them. Given that a full ANT analysis of all actants contributing to the assemblage of billboards would be too complicated, as an actor-network is essentially infinite (Callon, 1986), the analysis in this article takes only a snapshot of the planning network behind the billboard; this snapshot is chosen based on the data collected from field visits to planning offices and discussions conducted with planners working there.

To capture the equal role of material actants in the network, another scenario that does not alienate the billboards emerges, contrary to the one presented in Figure 6. I integrate the key non-human actants into the social network presented in the previous figure, now shown in Figure 7. In this mapping, other material actants become an integral part of the network, such as the billboard text or theme, the construction of the billboard, the buildings on which the billboard is placed, advertising codes and legislation, the paper or poster on which the billboard is printed, the images produced by planning offices and selected by the marketing agency, the computer software used to create these images, and so on.

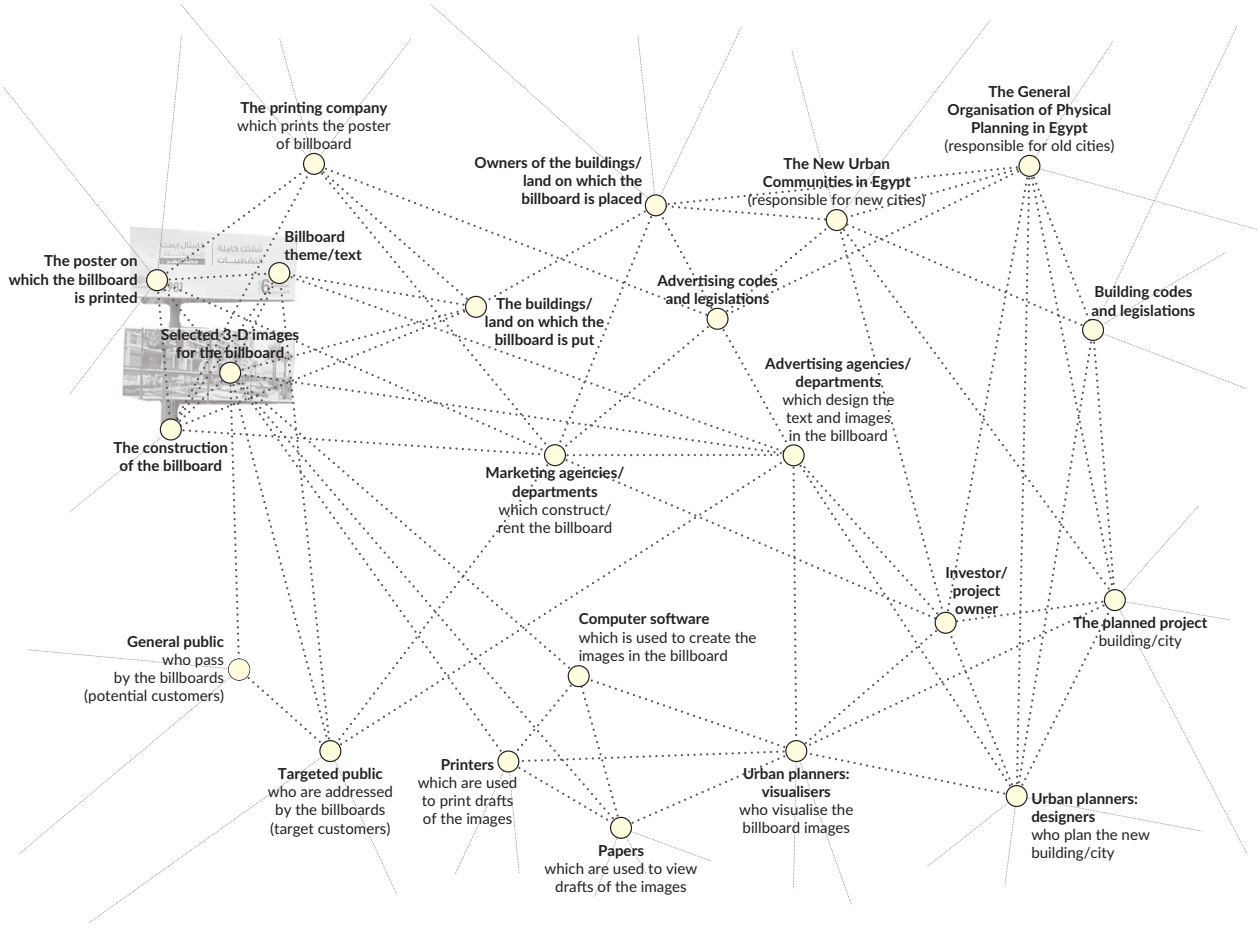

Figure 7. Following the never-ending network of billboards through an ANT perspective.

This proposed ANT diagram removes the centrality of social actors and illustrates the interaction and interdependence of both social and material actants in the billboard network. One of the many observations that arise from looking at the network in this way is how material actants are also actors in the network. For example, the images initially produced by planners also co-produce the final billboards and influence the planners who produce them.

Moreover, the diagram shows that the communication flow among actors indicates a lack of direct communication between planners and both the general and targeted public. Marketing and advertising agencies have become the connecting social actor, while the use of 3D images in the billboards produced by planners has become the connecting material actant. On one hand, this refutes the current global demands for communicative, collaborative, and participatory planning practices where direct communication between planners and those they plan for is expected (Cilliers & Timmermans, 2014; Healy, 1996; Rietbergen-McCracken, 2003). On the other hand, it confirms the financialization of land, property development, and the privatization of the real estate industry (see Hendawy et al., in press).

Visualizing the network with and without material actants helps highlight the mixed local and global networks (in Murdoch & Marsden's [1995] view, local and national) that the billboard reflects. It is still noteworthy to clarify that visualizing the network does not aim to draw a boundary for it. That's why in Figure 7 I kept the

boundaries of the figure open, resembling infinity. Additionally, I removed the colors from Figure 6 to indicate the equality of humans and things. ANT provides a different view whereby, in the construction of billboards, there is not only the abstract interaction of social actors but also the involvement of other assemblages such as knowledge, economy, text, images, and more. To study how these actants function in relation to one another and how they engage each other in the network, with a focus on the billboard–planner interactions, the next section reflects on planning practice in Egypt, the kind of city Egyptian planners see or plan, and the kind of public sphere they co-produce or are part of.

6. From Street Billboards to Planning Offices

This study has shown that most bridge billboards are occupied by real estate ads. While the themes of these billboards are mainly created by advertising agencies, the 3D images used as content are developed by urban planners. To meet these market needs, urban planning offices ensure that appointed urban planners possess strong visualization skills. We find that most job descriptions call for urban planners to master computer visualization software like 3ds Max and Photoshop. As such, the practice of urban planning and the planners' communication with the general public are limited to an exclusive view of the city.

During my research on Cairo's urban mediatization (see Hendawy, 2022), a graduate student told me, "We are asked to be visualizers, not designers or planners." This sentiment was echoed by many urban planners I met. Additionally, the owner of an architecture and planning office in Cairo mentioned in an informal discussion, "I build my image based on the mentality of the sales agency; this is paralyzing." These remarks were thought-provoking and highlighted the challenges faced by urban planners in the current mediatized environment.

Using ANT, Rose et al. (2014, p. 385) have argued that computer-generated images (CGIs) are not only alluring images found in urban spaces but also interfaces "circulating through a software-supported network space." Viewing billboards and visualizations as actors in the planning network reveals that the planning process is driven by investors, with no place for an inclusive urban planning process; rather, there is only urban media generated by planners. Understanding that planners are meant to generate urban media reflects a billboard–planner connection.

As the planning process becomes increasingly dependent on visualizations, the role of urban planners in Egypt is simultaneously reconstructed, entailing a shift in the professional roles and responsibilities of urban planners. As their work becomes more reliant on advanced visualization techniques, urban planners are increasingly required to possess technical skills in visualization software. This shift emphasizes the importance of creating visually appealing representations of urban projects, which cater to market demands and advertising strategies. Additionally, this reconstruction implies that urban planners are now key contributors to the visual culture of urbanization. Their work not only shapes the physical layout of cities but also influences the public's perception of urban spaces through the imagery displayed on billboards. As a result, urban planners play a pivotal role in crafting the visual narratives that define new developments and cityscapes. However, this focus on visualization can also limit the scope of urban planning to an exclusive view of the city. The communication and connection between planners and the general public become constrained by the need to produce market-driven, visually compelling content. This exclusivity may lead to a narrowed perspective on urban issues, potentially overlooking broader community needs and inclusive

planning practices. Consequently, while visualization skills enhance the marketability and appeal of urban projects, they also reshape the urban planning profession, raising critical questions about the balance between aesthetic representation and comprehensive, community-oriented planning. Notably, this shift does, in a sense, make urban planners visualizers, focusing on the creation of aesthetic representations that meet market and advertising demands.

Professional planners being asked to work as visualizers change correspondingly their self-understanding concerning their practice. They shift from planning a shared city to visualizing an exclusive city driven by the market and attainable only by the upper segments of society. Although the objective of planning is to create cities that function inclusively for all citizens, providing opportunities for both affluent and disadvantaged populations (UN-Habitat, 2010), these types of planning projects in Egypt, of a developmental social nature, are not seen in Cairo's street billboards or in most private planning offices. In the context of Cairo's billboards, planning complies with rather than resists the contextual political economy, which involves only the privileged minority.

The reconstructed role of planners as visualizers outlines the type of exclusive public spheres urban planners produce and are part of. A significant concern of this study relates to how and the extent to which planners and planning practice are shaped by the material environment they create and, more importantly, what happens afterward. This study has used ANT to reflect on these dynamics by tracing the relationships and interactions between various actors involved in the creation and dissemination of planning visualizations. ANT helped to uncover how different elements—such as urban planners, advertising agencies, visualization software, billboards, and the public—are interconnected and influence one another. By following the billboards as actors and their networks, the study reveals how the material environment, represented by visualizations, impacts the practices and roles of urban planners. It also explores the ongoing effects and transformations that occur as these visual representations circulate and interact with the public and other stakeholders. Through ANT, the study provides a nuanced understanding of the complex, reciprocal relationships that shape and are shaped by the visual culture of urban planning.

Chavarría and Stollmann (2018, p. 46) have claimed that "if designers become aware of their networked practice, they avoid reproducing existing power constellations unknowingly. Plus, they become more receptive to the expertise and knowledge types of the so-called laypeople, amateurs, or opponents." This study emphasizes not only the importance of understanding the networked practices of urban planners and advertisers but also the need to recognize and incorporate the diverse perspectives of various stakeholders. By doing so, urban planners can avoid unintentionally perpetuating existing power structures and work towards creating more inclusive and equitable urban environments. This recognition and integration of multiple perspectives are crucial in addressing the territorial inequalities that urban advertising both reveals and conceals, ultimately contributing to a more holistic and inclusive approach to urban planning and development.

Reflecting on the planner–billboard interactions raises some critical concerns: Are we seeing a professional construction of exclusion in Egyptian cities, and what is the actual role of professional planners in this network? With the increasing reliance on visualizations, it seems urban planners are no longer just planning and designing future buildings and cities—they are now primarily visualizing them. Has the task of creating visualizations overshadowed their core responsibilities? In some ways, visualizing has become a strain on

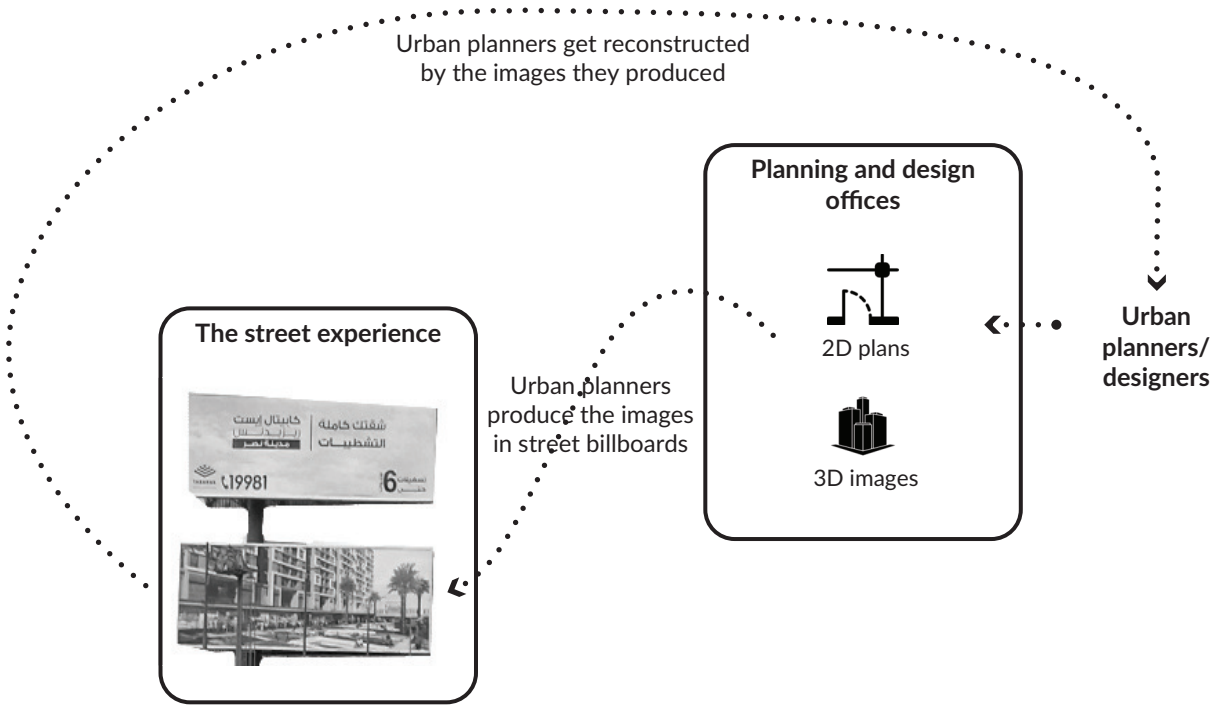

Figure 8. Production and reproduction processes of planners and billboards.

planners' professional self-understanding. Alarmingly, even urban planning students are outsourcing the visualization of their projects to external offices (see Hendawy, 2021, 2022). The real issue here is the invisibility created by this visibility—the lack of diversity and inclusivity that these uniform visual representations generate.

Urban planners, being the central professionals focused on in this article, indicate that in the process of constructing the images/visualizations in planning and billboards, planning practice and planners themselves are closely linked, highlighting the changing profession of the planner. Hence, I link the billboards back through their production to the people or professionals and the computer machinery that made them (Figure 8).

This study provides an original analysis of urban advertising in Cairo, extending beyond a mere interpretation of project images. It reveals the significant role advertising plays in highlighting the territorial inequalities at work in Cairo, even as it attempts to conceal them. By employing ANT, the article demonstrates the integral role that advertising plays in both urban planning practices and the shaping of urban landscapes. The article confirms the heuristic value of using billboard advertising as a focal point for urban research. It incorporates unpublished empirical material that is particularly noteworthy and deserving of attention.

7. Conclusion

This study has provided a comprehensive analysis of urban advertising in Cairo, focusing on the role of street billboards in shaping both the visual and spatial dynamics of the city. By employing ANT, the research traced the intricate relationships between billboards, urban planners, and other network actors, revealing how these visual tools contribute to the restructuring of the planning profession.

The findings highlight the significant impact of billboards on urban landscapes, often promoting exclusive real estate projects to a socio-economic elite and reinforcing territorial inequalities. This visual dominance not only reshapes the cityscape but also influences the professional roles of urban planners, who are increasingly becoming visualizers. This shift in roles underscores the need for urban planners to possess advanced visualization skills, which are now central to their practice.

However, this emphasis on visualization has led to a narrowed perspective on urban issues, potentially overlooking broader community needs and inclusive planning practices. The study underscores the importance of recognizing and incorporating the diverse expertise and knowledge of various stakeholders, including laypeople, amateurs, and opponents, to avoid perpetuating existing power structures and to work towards more inclusive and equitable urban environments.

By using ANT, the study provides a nuanced understanding of the complex, reciprocal relationships that shape and are shaped by the visual culture of urban planning. It highlights the necessity for urban planners to navigate and influence these dynamics thoughtfully, balancing aesthetic representation with comprehensive, community-oriented planning. In conclusion, the research contributes to the literature by demonstrating the heuristic value of using billboard advertising as a focal point for urban research. It calls for a more inclusive approach to urban planning that addresses the territorial inequalities revealed by urban advertising, ultimately promoting a more holistic and equitable urban development.

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Conflict of Interests

The author declares no conflict of interests.

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COMMENTARY

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Thinking Geomedia Futures: Indigenous Futurisms, Afrofuturisms, and Counter-Mediations of Temporality, Spatiality, and Digitality

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Abstract

For critical scholars, abiding concerns about geomedia futures have included utopian–dystopian formulations of geomedia in popular culture and governance, the deep harms and inequalities that inevitably flow from technocapitalist geomedia regimes, and the urgent need for a plurality of counter-normative ways of theorizing and engaging geomedia. Toward these concerns, I argue here that Indigenous futurism and Afrofuturism hold vital conceptual and analytic insights for thinking and realizing geomedia futures that assemble time, space, and digitality in just and life-sustaining ways. Here, I briefly explore work by geographers, historians, and digital studies scholars that has engaged Indigenous and Black feminist speculative traditions to critique the structural, embodied, and emplaced violence of racial capitalist and settler colonial histories, chronopolitics, and futures. The minoritarian futures expressed and circulated through speculative fiction, visual arts, everyday digital practices, and technocultures by structurally-oppressed groups for whom the future has never been taken for granted hold vital conceptual and analytical insights for thinking geomedia futures beyond the limits of its technocapitalist roots and present structures.

Keywords

Afrofuturism; digital geographies; geomedia; Indigenous futurism; speculative imagination

For critical future studies, Indigenous studies and Black geographies scholarship offer vital inroads, in particular through their insistence that time and place are political claims: To imagine or work toward a future is to make claims about the lives, lands, and relations that comprise that future. Lou Cornum (Diné/Bilagáana) writes, "Alongside the question of what the future holds is the question of who holds the

future. Black futures, Indigenous futures, Latinx futures, Dalit futurism, disabled futures, queer futures" (Cornum, 2023, p. 166). Closely related, Danielle Purifoy argues:

> The long Black practice of recognising what makes life possible is perhaps part of what makes life precious enough to sustain….The enduring parable of Black places is the urgent evidence of another future where life is no longer made impossible. (Purifoy, 2021, p. 832)

In the writings from which these passages are drawn, Cornum and Purifoy use Black feminist and Indigenous speculative fiction as theoretical-analytic lenses for apprehending abundant possible futures beyond the violent relations of racial capitalism, settler colonialism, and associated ideologies of modernity, progress, and technology. They argue that Black and Indigenous traditions of theory and life crafted at the intersections of speculative fiction, activism, vernacular cultures, and more offer vital reservoirs of wisdom and praxis for "making a way out of no way": Crafting thriving, repair, and right relations to lands, waters, human, and non-human lives in spite of enduring structures that seem to preordain dispossession and death.

These articulations of Black and Indigenous futurities, in a wide range of spaces and media, enact conceptual-epistemological innovations and grounded practices of thriving by oppressed groups for whom the future has never been taken for granted. Also relevant, but beyond the scope of my commentary, are theorizations of queer futurity (first articulated by Jose Estaban Muñoz to challenge normatively white theorizations of queer negativity and anti-relationality). For critical geomedia studies, these diverse traditions of futuring chart profoundly important ways of rethinking and remaking relations between peoples, technologies, space, and place.

This edited collection of articles on geomedia futures (Fast et al., 2024) coalesces around deep concerns with the celebratory and singular futuring that is often woven into mainstream representations of geomedia, and the socio-technological arrangements that ever-deeper geomediatization of everyday life is purported to advance. The academic editors traced how these hegemonic visions of the futures that geomediatization enables are entangled with technocapitalist structures and logics (Fast & Abend, 2022; see also Hartmann & Jansson, 2024). They identified critical futures studies as an arena of thought that refuses such singularity, opening up multiple possible geomediatization futures and the socio-technological relations that they might support. Building from these propositions, I argue that scholarly and creative work on Black and Indigenous futurities has a vital role to play in knowing and supporting critical geomedia futures that reassemble time, space, and digitality in just and life-sustaining ways that exceed the structural, embodied, and emplaced violence around which technocapitalist histories, presents, and futures are too often structured.

Scholars in geography are already charting epistemological-political openings from Black and Indigenous futuring expressed in fiction, artworks, and other creative forms, and exploring how these works represent pasts and presents, to open onto multiple otherwise futures. Summers (2022) engages Black feminist speculative fiction as an analytic frame for contemporary urbanism, tracing how the dystopian futures of social and environmental catastrophe envisioned by Octavia Butler, China Mièville, N. K. Jemison, and Nnedi Okarafor are the wholly unsurprising continuation of the catastrophic urban landscapes that technocapitalism racialized removal and extraction create. Importantly, Summers simultaneously uses utopian visions from these Afrofuturist authors to read the urban present, arguing for attention to already-existing socio-technological practices of "intrepid urbanism" that are already doing reclamation,

repair, and repurposing from within urban ruination, demonstrating otherwise futures to technocapitalist urban hellscapes. Purifoy (2021) also turns to Black feminist speculative fiction, reading Octavia Butler's *Parables* series as a theorization of the United States as dystopia assembled through labor exploitation, mass incarceration, and environmental harm, and as a framing of futures in which the survivors of these devastations craft restorative land-life interdependencies. These moves reject normatively white social science theory that apprehends Black places through a dystopian conceptual repertoire, Purifoy (2021) argues, instead theorizing Black places as, "parables of the threats of industrialisation, technology, and white ideals of progress, and [as] parables of adaptation, interdependence, and supportability" (p. 830). Curley and Smith (2024) point to the ways in which Black and Indigenous futurities have theorized how time, temporalities, and history are weaponized in support of settler colonial extraction, via ideologies of modernity, progress, and technological advancement. They call attention to futuring expressed through visual art that advances Indigenous temporalities and future relations of abundance and thriving. Analyzing a Phoenix, Arizona, mural depicting Diné and Tohono O'odham stories, they trace how the visual narratives in the mural situate the past and future in close proximity to one another, and draw throughlines from longstanding Indigenous natural law and technologies to contemporary renewable energy technologies.

These examples demonstrate some of the theoretical and analytic insights that geographers and other critical social and spatial thinkers might catalyze through deepened forging engagements with Black and Indigenous futurities. These arenas of critical futuring have an especially vital role to play in re-casting theorizations of the past and present to, among other things, more clearly apprehend already-present seeds of alternative futures beyond racial, technological, and environmental harms. These perspectives matter for critical geomedia studies because they unpack how linear and singular notions of time enable socio-temporal frames such as "modernity" and "progress," how these temporalities are bound up to technology, and how they are used to justify the structural arrangements and material practices of racial capitalism and settler colonialism (Cornum, 2023; Curley & Smith, 2024; Whyte, 2018). Some readers may ask how fiction, art, and other creative works are materially consequential in the face of these deep structural harms, or precisely how these creative expressions shape lived worlds. Toward this question, I would echo a foundational claim from many analyses of Afrofuturisms and Indigenous futurisms: Creative works are at once fully steeped in the sociocultural and political economic hegemonies within which they are created, and also engaged in expressing *speculative imaginations* that need not conform to the limits of these existing orders, and thus can demonstrate alternative futures (Muñoz, 2009; Yaszek, 2006). This externalization of speculative imaginations bridges literary-artistic worlds and lived worlds through representations that re-think past and present, in order to build propositions about alternative futures. As art and literature are created, circulated, and engaged, their speculative futurings condition societal imaginations of the kinds of land–life relations that are possible and desirable, with concrete implications for the worlds that communities and collectivities demand and strive to create (Cornum, 2023).

Of particular importance for thinking geomedia futures, some scholarship on Afrofuturism and Indigenous futurism explicitly centers the role of digital practices in critical futuring, paying particular attention to digital mediations of socialities, spatialities, and temporalities. For instance, Cornum (2023) notes the crucial role that listservs, forums, blogs, and other networked media in the co-creation of early collections of Indigenous and Afrofuturist speculative fiction, tracing the generative cross-circulation of "minoritarian" futurities from these creative writings with those being framed in Black and Indigenous feminist theory and activisms. Through these examples, he illuminates digital mediations of *collective* imaginations across spacetimes,

"in the modality of prophetic possibility, suffused with connection to a prior…living memory among oppressed people" (Cornum, 2023, p. 170). Here, Cornum's emphasis on collective creation, imagination, and living memory charts ways of being and doing with digital media that are decidedly otherwise to the individualistic socialities and linear-singular histories and temporalities that anchor technocapitalist futures. Relatedly, Brock (2020) calls attention to the presence and significance of Afrofuturisms created and circulated through everyday "Black enactments" (p. 14) in online and social media. He argues that everyday practices of Black sociality enacted in digital media (call-out, showing the receipts, active/communal witnessing, critical-political re-framings) create a "post-present" that wrestles with enduring histories of racial harms while also collectively imagining and demonstrating other futures. Brock's analysis of these quotidian digital practices demonstrates modes of futuring that refuse the ideologies of efficiency, utility, and individualization that infuse hegemonic technofutures, and refuse the deficit, respectability/uplift, and resistance frames through which social science and popular culture too often read Black technology use.

For critical geomedia studies, scholarship on Indigenous and Afrofuturisms opens up countless vital conceptual and analytic directions. It charts how everyday digital life can function as site and mode of futuring. It illuminates how past, present, and future are, in these traditions of theory and life, coalesced and imagined around plural non-linear temporalities and life-affirming justice-seeking sociospatial relations. It draws our analytic attention to already-existing digitally-mediated futuring that exceeds the terms of hegemonic technocultures. All these conceptual and analytic moves offer ways of apprehending geomedia futures as already being crafted beyond the confines of technocapitalist structures and imaginations, through affective-political orientations that are more than only acceptance/resignation or resistance. For critical geomedia scholars, this means continuing to look for and learn from solidarity—and justice-oriented initiatives that deploy geomedia in ways that rewrite geohistories, insist on life-affirming sociospatial relations, and demonstrate otherwise futures to technocapitalist visions of a geomediatized future.

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COMMENTARY

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Geomediatization and the Messy Futuring of Geodata Commons

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Abstract

The concept of geomediatization has proven to be productive for describing current processes of geodatafication and geospatial technologies. With its focus on their future, this thematic issue calls for research into geomediatization beyond a narrow geomediatization realism. In my commentary, I take up this call and present some reflections from my research on recent corporate involvement in OpenStreetMap and the messy politics of digital commons. I argue that OpenStreetMap can tell us something about geomedia futures that challenges geomediatization realism but is also a sort of geomediatization pragmatism. This is not disruptive futurism but a project of digital commons that is constantly negotiating power, access, and enclosure.

Keywords

digital commons; digital geography; geomedia; OpenStreetMap

Geomediatization is a productive term to understand the historical tendency of an increasing entanglement of space and technology. It points to "a social regime where human subjectivity, media and space/place are co-constitutive of one another" (Fast et al., 2018). While on the one hand, these entanglements are constitutive of the history of media and technology at large, a history that has always been a history of the social production of space, it is the recent process of digital transformation for which the concept of geomediatization is most fruitful. Geomediatization brings into view mobile, real-time, location-based geomedia that are closely linked to digital codes/spaces (Kitchin & Dodge, 2011) and helps us to think in new ways about processes of geodatafication, i.e., the progressive translation of the world into machine-readable geodata. Geomediatization is therefore linked to infrastructures and even becomes a tool of infrastructurization, inscribing itself in everyday social practices. This has immense political and economic implications since all of this affects the social production of space and how territories, places, scales, and

networks are organized, perceived, and acted upon. Furthermore, the concept of geomediatization not only provides a valuable lens through which to examine the "spatial architecture of digital capitalism" (Alvarez León, 2024), but it also offers insights into the role of spatial technologies and geodatafication as key drivers in the reproduction of digital capitalism.

The previous special issue on *Geomedia Histories* called for interrogating past, failed, and forgotten trajectories of geomediatization as starting points to make clear "that alternative futures could have been produced" (Fast & Abend, 2022, p. 2389) and discusses pre-digital moments of geomediatization (Borbach, 2022; Thielmann, 2022; Wilken & Thomas, 2022) in the early computer age (Bender & Kanderske, 2022; Krämer, 2022; McQuire, 2022) and the first wave of mobile and location-based geomedia (Frith, 2022; Özkul & Humphreys, 2022). The current thematic issue follows from this discussion and calls us to think about the future of geomedia in a way that is not exhausted by the dominant narratives of big tech, geospatial industries, state planning, and technocentric ideologies. It calls on us to understand geomediatization as an open process that holds other futures that lie beyond a resigned "geomediatization realism" (Hartmann & Jansson, 2024). In my brief commentary, I will point out two aspects that I perceive as gaps. Firstly, a future beyond geomediatization realism and secondly, the politics of geodata. To illustrate this, I will touch upon some considerations from my research on the participatory and open geodatabase OpenStreetMap.

Most of the contributions in this thematic issue work through narratives of the future that are closely linked to the hegemonic narratives about technology and progress. One could argue—and most articles in this issue do—that those offer little hope for a better world beyond neoliberal solutionism. Be it the corporate story-telling of the GIS behemoth ESRI, which bundles everything from animal welfare and sustainable urban planning to warfare into one software package (Atteneder & Rodriguez-Amat, 2024), the phantasms of megalomaniacal urban planning in the case of NEOM (Kopitz, 2024), the visual politics directed at urban elites (Hendawy, 2024), or the painstaking work of community working groups to defend civil rights and privacy over the surveillance technologies of the smart city (Berniker & Humphreys, 2024). On the other hand, there are indications that participatory methods can help generate visions of the future that go beyond these imaginaries of commercial platforms (Braunerhielm et al., 2024).

I would argue that the search for socio-technical imaginaries of a more just, democratic, and open future should be less about the outlandish futurism of tech bros and the glossy fantasies of starchitects and venture capitalists. Although it can be argued that the discourse of capital, planners, and opinion makers can be used to gain insights into shaping desirable futures, it remains within the limits of geomediatization realism. So I very much sympathize with Elwood's assertion that we should try to learn from Indigenous futurism, Afrofuturism, and queer approaches to think and envision new and different futures and presents (Elwood, 2024).

One field in which I am doing research is the politics of geodata using the example of OpenStreetMap (Bittner et al., 2016; Michel & Schröder-Bergen, 2022) and I believe that OpenStreetMap can tell us something about geomedia futures that challenges geomediatization realism but is also somewhat messy realpolitik–geomediatization pragmatism if you will. This is not disruptive futurism but a project of digital commons that is constantly negotiating power, access, and enclosure.

One of the pillars of all digital geomedia is digital geodata, and among the most fundamental geodata are those that form the basis for cartographic representations and geographical calculations. They are the foundation

for locating, tracking, and tracing things and people through digital technologies. Digital geodata is a central infrastructure for digital geomedia, and like many infrastructures, it receives relatively little attention. But these geodata are extremely relevant, influential, and political. Hardly any current geomedia functions without geodata and the question of who creates, controls, and maintains this data is important.

OpenStreetMap is a free and open geodatabase. Since its establishment in 2004, it has become a widely used map service and the world's largest open-source project for geospatial data. It serves as the foundation for numerous base maps, cartographic projects, digital services, tools for navigation, and geospatial applications. OpenStreetMap is frequently regarded as the epitome of open, participatory, cartographic knowledge production and volunteered geographic information and thus heralded the possibilities of free and democratic cartographic knowledge and geodata. While the dominant representation describes OpenStreetMap as communities of individual mapping enthusiasts, institutional actors have always played an important role. Be it in the form of the provision of satellite images in 2006 by Yahoo!, massive data dumps by government agencies, or the utilization and further development of the infrastructure by small and medium-sized enterprises in the geospatial industries. Nevertheless, the role of large players gained importance over the last years. This applies at the level of data production and use, the tools as well as the institutional framework. Corporations such as Meta, Grab, or Apple started to employ teams of mappers to contribute and edit data in the OpenStreetMap database and seemed to be trying to exert increasing influence on the project (Sarkar & Anderson, 2022; Schröder-Bergen et al., 2022). The scale of this involvement has consequences and generated a range of conflicts and resistances among the OpenStreetMap community. In a variety of ways, this growing role of institutional actors represents a challenge to the primacy of the local and the ethos of local ground truth.

Within this context, the Overture Maps Foundation was established in 2022. Developing reliable, easy-to-use, and interoperable open map data, the aim, it says, is to create a product that provides users with cartographic data and services that are flexible and can be customized to their needs. Technical and economic reasons, issues of data quality and consistency, cartographic conventions, and novel next-generation map products are cited as motives (Overture Maps Foundation, 2024). The founding and steering members of the Overture Maps Foundation were Amazon, Meta, Microsoft, and TomTom, and since then, further companies have joined as contributing members. A couple of months after its launch, previews for data schemes and datasets were published and in April 2024 the first beta version of a dataset was released.

From the perspective of critical research on geodata and geomedia, several points stand out. Firstly, an alliance of competing tech companies that are dependent on geodata has come together. The elephant in the room is undoubtedly Google with its dominance in the field of commercial map services. Secondly, it stands out that Overture is based to a considerable extent on data from OpenStreetMap. This means that a project that has long stood as a key example of open geodata and digital commons is now closely integrated into an endeavor led by three of the five Big Tech companies. Thirdly, Overture itself is advertised as an open project and, with it being affiliated to the Linux Foundation, it is linked to one of the central players in free and open software.

In a sense, Overture appears to be just another example of the enclosure of a digital commons and "openwashing." The founding of Overture could thus be described in resigned terms of geomediatization realism: Corporate takeover and expropriation are what happens in a world dominated by platform capitalism. Digital commons, as calimaq argues, increasingly become "capital commons" (calimaq, 2018).

They get incorporated into commercial ecosystems and are increasingly reliant on them to sustain their services. On the other hand, the story of Overture can also be described as the consequence of a failed takeover. The establishment of Overture shows the resilience of a digital commons that builds an open geodatabase but resists the universalizing tendencies of large commercial platforms. Big tech, one could argue, has been trying for years to infiltrate OpenStreetMap and adapt it to its needs. The story may therefore also be one of big tech's failure. This might be a different future for geodata and geomedia. It might teach about safeguarding geomedia commons against enclosure and a future that is less dependent on a rhetoric of disruption and revolutionary new socio-technologies. Instead, it points towards new modes of labor and care of moving slowly and fixing things.

Among the reasons for this failed takeover are cultural and ethical differences between the digital commons of OpenStreetMap and the resistance to seeing one's contribution as free labor for a company like Meta. The institutional and legal structure of OpenStreetMap provided necessary fences. On the other hand, the open and diverse structure in which geodata is created in OpenStreetMap also blocks adoption on a more technical level. While cartographic conventions generally aim for uniformity and unambiguity, the tagging scheme in which geoinformation is entered into OpenStreetMap is open, allowing polyphony and local differences. Although OpenStreetMap is a global database of geospatial data and provides the tools for global mapping and geospatial services, its practices are very local. This is true not only of local communities and the ethos of ground truth, but also of the way things are done. OpenStreetMap is full of local idiosyncrasies. While this might be an advantage for local users, it poses a challenge for applications scaled towards a uniform global scale. In a way, it is ironic, but not coincidental, that it is precisely a global geodata project that indicates the importance of spatial difference and situatedness of data and datafication, and thus opposes a discourse that continues to associate the digital with ideas of universality, frictionlessness, and placelessness. With this example, I would like to encourage the search for geomedia futures in current projects of digital commons and open data and software. This is less radical and disruptive than some calls to think radically differently and openly about the future. It is more a pragmatic reference to the painstaking and messy work on geomedia that operate at the blurred edges of commons and capital.

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