Urban Planning
2026 • Volume 11 • Article 10675
https://doi.org/10.17645/up.10675

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Open Access Journal

Playful Reconfigurations: Learning, Making, and Playing Geogames for Urban Participation

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Submitted: 30 April 2025 **Accepted:** 22 September 2025 **Published:** 12 January 2026

Issue: This article is part of the issue "Geogames: The Future's Language of Urban and Regional Planning" edited by Bruno Andrade (Federal University of Bahia), Alenka Poplin (Iowa State University), David Schwartz (Rochester Institute of Technology), and Marta Brković Dodig (Swiss Federal Laboratories for Materials Science and Technology – EMPA), fully open access at https://doi.org/10.17645/up.i451

Abstract

Participatory engagements with digital tools and urban data have become a defining trend in smart city and digital twin projects. However, many platforms, interactive apps, and immersive media fall short compared to analog participation formats regarding open-ended collaborations and the inclusion of situated perspectives. In this article, we explore the potential of geogames to address these contextual and contingent aspects of urban participation. Drawing on Suchman's concept of "situated actions," we argue that gameplay and game making enable "reconfigurations" between structured game systems and open-ended play. We further propose that these "playful reconfigurations" bear the potential to attune digital media to contextual perspectives on urban planning issues and specific places. We illustrate this approach through three engagements with geogames conducted within the New European Bauhaus project Creating NEBourhoods Together, focusing on the co-creation of several mobility hubs. First, we introduce core geogame principles developed in three co-creation workshops with citizens in Neuperlach. These formats highlight the corporeal and performative dimensions invoked by digital media. Based on these insights, we discuss the making of participatory geogames as a reciprocal reframing of game systems and the urban issues at stake. Finally, we reflect on the resulting geogames by playing them on-site and observing how they co-constitute participatory engagements with the topic of mobility. In conclusion, we propose these "reconfigurations" as a resource to play with—a means of mediating between digital technologies and urban worlds, data and situated perspectives, presumed problems and contingent controversies.

Keywords

digital tools; co-creation; co-design; geogames; mixed reality; mobility; participation

1. Introduction

Alongside a growing critique of techno-centric urban digitization projects, many European and international cities put a focus on the potential of digital technologies for civic participation and co-creation. Playful media and geogames have emerged as prominent means of incorporating urban data and virtual models into participatory formats. A plethora of digital-city-twin teams began experimenting with game engines and playful prototypes, ranging from Minecraft models (Schrotter & Hürzeler, 2020, p. 109) to immersive experiences (Dembski et al., 2020, pp. 10–12) and narrative mapping applications (Kitchin & Dawkins, 2025, p. 5). Gamification is frequently discussed as a method to foster motivation and engagement, thus enhancing quantitative results of participatory processes (e.g., Heryanto et al., 2024, p. 149399; Lu et al., 2024, p. 4; Muehlhaus et al., 2023, p. 331). Other researchers focus on game-based approaches to support communication and cooperative deliberation (Kavouras et al., 2025) and to make participatory planning processes more effective (Kavouras et al., 2023, p. 22).

At the same time, gamification and platformization remain controversial approaches. Planning issues often resemble dynamic "wicked problems," requiring the contingent negotiation of multiple stakeholders (Rittel & Webber, 1973). In this regard, digital tools and online platforms may frame participation too narrowly, passively, and teleologically. Referring to "FixMyStreet," a map-based platform for gathering citizens' suggestions and reporting problems, Gabrys (2016) illustrates how digital media can exclude perspectives that deviate from their inscribed problem framing (p. 232). Thinking with Jacques Rancière, Rosemann (2013) suggests that genuine participation never follows a predefined structure but instead emerges in moments of conflict and contingency. Moreover, Loh (2019) remarks that gamification can lead to problematic paternalization or manipulation when conceived as a "psycho-motivational" optimization strategy (pp. 276–277). Additionally, digital media may introduce barriers related to digital literacy (Kavouras et al., 2025, p. 1).

Analog formats focusing on qualitative, dynamic negotiations (e.g., Nochta et al., 2021, pp. 269–270) appear more flexible in responding to unforeseen problematizations. There is a growing consensus among municipal institutions that digital tools and analog formats must go hand in hand (e.g., Connected Urban Twins, 2024) to bridge this gap. Yet, this relationship still requires closer investigation (Stelzle et al., 2017). This article revisits the perceived opposition between highly structured digital methods and more flexible and context-aware formats. As we argue, geogames bear the potential to bridge this gap, synthesizing geospatial technologies with serious gaming approaches. Gameplay always incorporates both a pre-defined structure (the game system) and open-ended play. We term this quality of games "playful reconfiguration" and explore it as a potential resource for shaping participation tools. Hence, we discuss how digital methods, such as data gathering, can be brought into a dialogue with analog and situated participation approaches.

We explore these questions in the context of a specific co-creation process conducted as part of the New European Bauhaus project Creating NEBourhoods Together. Through participatory engagements, two multifunctional mobility stations were placed, configured, and ultimately implemented to improve the mobility situation in Neuperlach—a late-modernist housing district on the outskirts of Munich. In parallel, the project developed a digital participation toolbox that incorporates insights from the mentioned co-creation process. The toolbox aims to support future participation for additional mobility stations or site-specific infrastructure, such as public furniture or local climate adaptation measures. It builds on data

and models from Munich's Digital City Twin initiative. While focusing on geogames was not a prerequisite for the NEBourhoods project, playful interactions and game concepts were a central resource for creating engaging co-creation tools.

This task revealed conceptual challenges concerning digital geogames and their role in participation processes. First, our team developed a concept for a gamified platform designed for longer asynchronous usage. Through a gamified application, citizens would propose locations and configurations for NEBourhood Hubs (see Figure 1, right side). This concept presumed the co-creation of mobility stations to be a relatively well-defined issue. Central questions, such as location-finding or functional configuration, would be framed as interactions of a game system. Moreover, this system would incorporate data on pathways, points of interest, or public furniture. Game patterns like a currency and a vote-based scoreboard would contribute to an engaging experience and foster relevant results.

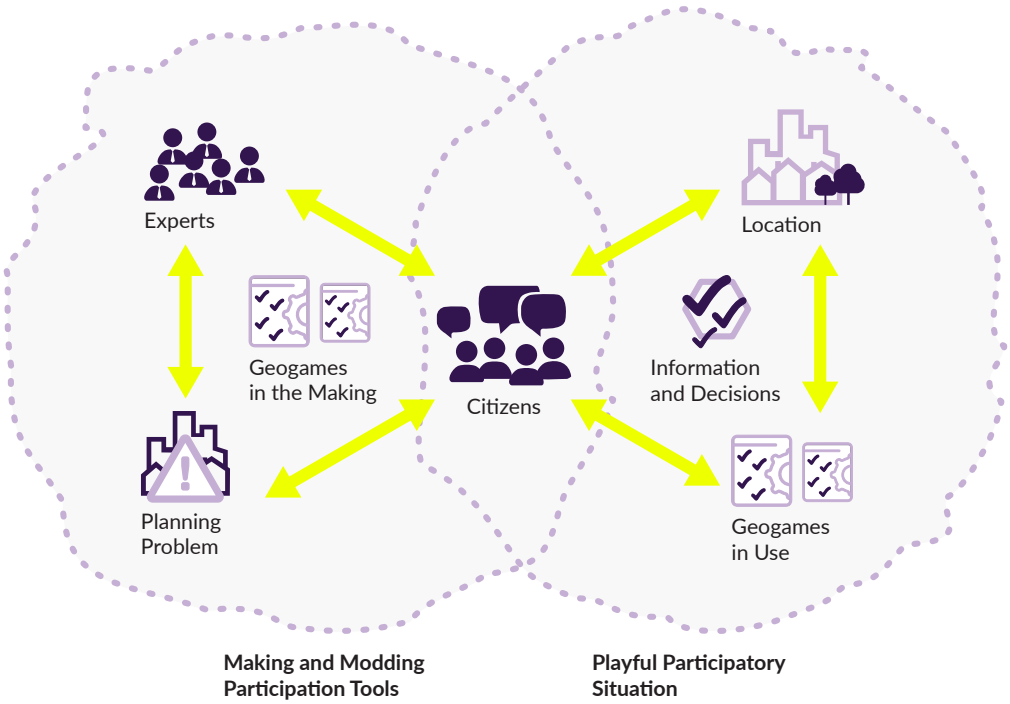

Figure 1. Extending participatory engagements with and through geogames.

However, experts from the TransitionHub team, conducting the overall co-creation of Creating NEBourhoods Together, argued for more open-ended participatory engagements. With a focus on social formats, stakeholder collaboration, and the local context, they were generally wary of developing digital tools and "doing" the participation thereafter. Arguably, a highly structured digital game would be less effective in including informal knowledge and would introduce biases regarding the player-citizens and their concerns. Furthermore, mobility issues in Neuperlach were complex and contextual. Understanding mobility required exploring extensive footpath systems, tunnels, and bridges. We became aware of "mobility hacks," such as subversively borrowed shopping carts and patterns of lost e-scooters. Experiencing access and barriers involved diverse social and material dimensions. Conversations with citizens revealed aspects such as collective grief for public furniture, which has been progressively removed since the 1990s. In cooperation with the TransitionHub team, we reconsidered the role of games: Instead of treating them as

merely a means to an end, we envision them as a broader field for co-creative activities, including making and adapting geogames, just like playing them (see Figure 1, left side). Each engagement with games addresses the framing of mobility issues, situated perspectives, and everyday knowledge.

In this article, we follow a series of experimental formats to bring digital technologies into an active dialogue with open-ended and context-centered approaches. As a theoretical foundation, we combine research on digital geogames with insights from critical game studies and game-inspired approaches in science and technology studies (STS). We discuss the playing and making of geogames as a contingent reconfiguration between a structuring game system and an open-ended situation. Thereafter, we introduce three distinct engagements with geogames involving "playful reconfigurations" and explore their participatory potential—learning from experimental and playful workshops, making and modding as a contextual attunement, and lastly, playing as a performative activity generative of unforeseeable situations. Through this, we propose "playful reconfigurations" as a crucial resource for participatory game making and playing.

2. Game/Play Reconfigurations

For our discussion of geogames, we have to revisit how the playing and making of games mediate between a predetermined system and a contingent situation in which a game unfolds. This juxtaposition resonates with the classical distinction between "game" and "play." The latter "is an open-ended territory in which make-believe and world-building are crucial factors" (Kampmann Walther, 2003). Conversely, games "are confined areas that challenge the interpretation and optimization of rules and tactics—not to mention time and space" (Kampmann Walther, 2003). Games appear as quasi-technological systems, which preconfigure the interactions between players and game elements. Thus, Flanagan (2009) highlights the central function of "rules in constructing games, with varying degrees of storytelling, conflict, and competition added into the (often, technology-driven) system" (p. 7).

Correspondingly, Ahlqvist and Schlieder (2018) characterize these game systems as structured by patterns representing "generic solutions to a specific class of design problems" (p. 3). Following this logic, a game can be described as a combination of interdependent, rule-based, or even algorithmic functions. The authors continue mapping relationships between geographical concepts and familiar game mechanics into "spatial game patterns" (Ahlqvist & Schlieder, 2018, p. 9). Concerning participatory geogames, these patterns allow for the involvement of geo-spatial data in the gameplay with instructions like "find a specific location" or "place this object." At the same time, the game-as-system introduces a framing of an urban planning problem, for instance, by directing the gameplay towards predefined questions, promoting particular interactions, and formatting the results that players may produce.

Against this background, games appear as rather deterministic systems. Yet playing a geogame involves a radically different experience based on corporeal interactions, improvisation, or the exploration of urban worlds. While game and play may appear as a paradox, Kampmann Walther (2003) argues for their necessary entwinement: "games *should* not be play; but that does not imply that they do not *require* play" (emphasis in original). A treasure hunt can be conceived as a technical system of GPS trackers, target coordinates, and a scoring mechanism. However, it also involves open-ended exploration of the surroundings, overcoming physical barriers, and unforeseen social encounters.

The anthropologist Lucy Suchman conceptualizes the enactment of technical scripts as "situated actions," involving a "reconfiguration" of both human and technology (Suchman, 2007)—or, in our example, player, game, and urban space. Playing as situated action is characterized by contingency, embodiment, and an open-ended engagement with the material environment (Suchman, 2007). While this situated aspect of digital technologies is often overseen, it represents a central aspect of gameplay. Flanagan (2009) points towards the subversive dimension of this reconfiguration: Play usually involves a creative reinterpretation or even the unmaking of the rules of the game (p. 8), thus shifting between normative compliance and destabilization of a predetermined system (p. 13). In this regard, enacting a digital geogame reconfigures geospatial information and digital media: Data overlap with material urban environments, and game mechanics are re-articulated as spatial performance and social encounters. Using the rudimentary example of hopscotch, Flanagan (2009) discusses how different rule sets invoke specific player relations and interactions with the surroundings (p. 8).

Reconfiguration through playful behavior bears the potential to mediate between distinct perspectives on urban issues and different framings of a planning problem. Loosely structured tools, which can be playfully adapted to a momentary setting, have a strong tradition in civic participation. Referring to the bottom-up process around the "Planbude" in Hamburg, Tribble et al. (2017) describe how participation tools are tailored to the context to facilitate a meaningful and creative collaboration between different stakeholders (p. 270). Playful devices, such as building kits or collaborative drawings, function very differently from the well-structured game systems discussed at the beginning of this section. Instead of imposing a discreet structure on the players' interactions, the tools appear as material to play with. Analogous to the concept of participatory "design things," playful interactions successively frame and reframe a controversial planning issue (Varga, 2018, pp. 37–41), blurring the distinction between a mere enactment of a game and its adaptation or remaking.

Hence, we extend the concept of "reconfiguration" to the creation of games. Making a geogame is an open-ended design practice that reframes planning problems and knowledge and bears the potential to involve diverse stakeholders' perspectives. Dumit (2017) discusses analog game design as an ethnographic research method that enables the exploration of complex socio-technical systems and the investigation of different actors' perspectives. Farías and Sánchez Criado (2023) likewise consider game making as the ongoing framing of a "para-ethnographic" field (p. 109). They describe how previous ethnographic observations are rearticulated as game rules, tokens, and materials. At the same time, playing the resulting game in public becomes a research site of its own, both through the gameplay and the conversations it provokes (Farías & Sánchez Criado, 2023, pp. 107–108). This methodological proposal underlines that game making and gameplay may be understood as reciprocally interconnected activities, which allow the successive bounding of urban issues, the mediation between different actors' perspectives, and the collaborative exploration of possible solutions.

These approaches are not limited to analog games: Ratto (2011) describes how the "critical making" of playful microcontroller flowers interweaves material collaboration with open-ended discussions (p. 255). Calvillo (2019) proposes data visualizations as a form of cooperative research and an attunement with complex urban issues such as air pollution. Visualization becomes a critical reassembly of available data, their interpretation, and their significance for citizens' everyday lives as well as the planners' strategies (Calvillo, 2019, p. 270).

With this excursus, we elaborated on the capacity of geogames to structure participatory interactions and to frame urban problems through game patterns and mechanics, which are often inscribed into digital media. Thus, digital games allow for the integration of urban data and the collection of structured information. Concurrently, we drew attention to game making and gameplay as open-ended activities, facilitating a reconfiguration of a game system to specific contexts and situated perspectives.

3. Methods: Learning, Making, Playing

To explore "playful reconfigurations" in practice, we turn to the co-creation process of Creating NEBourhoods Together, which defines the boundary conditions of this study. The geogames discussed in the following sections integrate qualitative insights from the co-creation process for two NEBourhood Hubs—multifunctional mobility stations in Neuperlach (see Figure 2). Hence, the emerging games should support future participation processes regarding mobility stations or site-specific infrastructure in public space.

A NEBourhood Hub is a modular pavilion offering free-to-use functions related to sustainable mobility, such as a shared cargo bike, a repair station, and mobility aids. Furthermore, the hubs are intended to enhance accessibility and quality of stay by offering benches, outdoor games, and tools to borrow. The co-creation process ensured that each hub met the needs of the local community by involving citizens in relevant design decisions (see Table 1; for more details, see Drechsel et al., 2024). Since Neuperlach is a large area, identifying general locations for intervention was crucial. These spots were then explored with particular attention to local features of urban space. Next, specific functions were configured for each site—for instance, should a large table or a bike repair station be included? Lastly, participants were involved in the design aspects. While

Figure 2. The installed NEBourhood Hubs are adapted to the urban surroundings and the neighborhood's needs.

technical aspects remained in the manufacturer's domain, the question was how a hub could contribute to the quality of the surrounding space. These fields of decision-making were addressed in three workshops, described in the following section. On this basis, hub proposals were refined in a scenario workshop with citizens, the manufacturer, local institutions, and public officials. Finally, two hubs were installed in Neuperlach.

This process provided requirements and insights for the design of geogames. The emerging prototypes should address relevant decision-making fields such as location finding and functional configuration (see Drechsel et al., 2024). Additionally, they should incorporate insights regarding qualitative aspects of mobility and participation methods from Neuperlach. As previously mentioned, many mobility problems turned out inherently "wicked" (Rittel & Webber, 1973), and relevant aspects emerged unexpectedly and anecdotally. This provided challenges for designing meaningful digital participation games—which we address through the concept of "playful reconfigurations."

Specifically, we introduce three ways of exploring a geogame's capacity to open up engagements with a particular urban context and situated perspectives on mobility (see Figure 3). Each reconfiguration described in the next sections involves a distinct methodological setup, through which a predetermined game system unfolds in a specific context. For the "Learning to Play" reconfiguration, we follow three co-creation workshops through which NEBourhood Hubs were designed. This allows us to explore how game concepts and interactions unfold in playful engagements in Neuperlach. "Making and Modding" describes the prototyping of several geogames and discusses how this process brings together insights on "situated play" with digital technologies and modular game components. Finally, we turn towards "Playing Geogames" to examine the resulting prototypes in action and investigate how they become co-constitutive of participatory situations. While we present these methods sequentially, we do not propose a fixed or teleological order of preparation, prototyping, and use. Each reconfiguration contributes specific interactions, encounters, and knowledge forms.

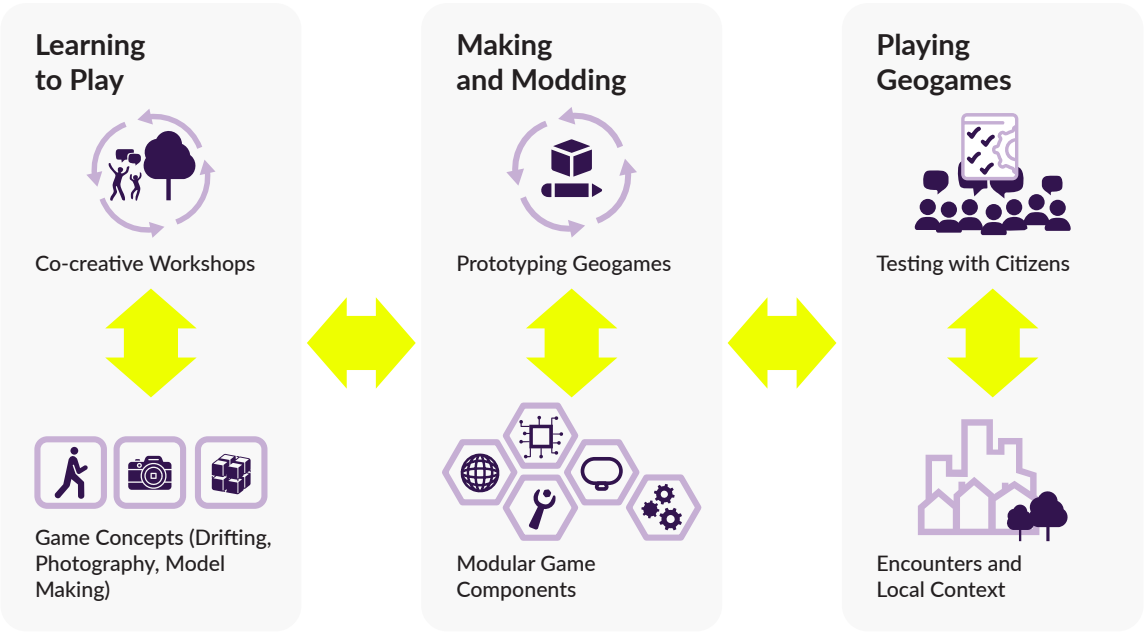

Figure 3. Methodology: Three reconfigurations are introduced for shaping and testing geogames.

4. Learning to Play

First, we examine the unfolding of (digital) game concepts in specific playful situations in Neuperlach through three co-creation workshops. We have described digital geogames as quasi-technological systems whose elements and patterns configure interactions, present information, and determine possible feedback types. In this initial step, however, we shift the focus towards open-ended game play, namely, to how game mechanics are enacted in social situations and urban spaces. With reference to Suchman's (2007) concept of "situated actions," we explore dimensions of "situated play" that emerge from enactments with citizens in Neuperlach.

Table 1 provides an overview of the workshops developed and conducted in collaboration with the TransitionHub experts, who supported the project's co-creation activities. The events were publicly announced and conducted with citizens of Neuperlach in the autumn of 2023. Each workshop addressed relevant questions regarding NEBourhood Hubs, such as location finding or functional configuration (for more details, see Drechsel et al., 2024), and was conceived as a collaboration between stakeholders, creative practitioners, and experts. Citizens were invited via several media channels, such as a mailing list and direct contact at the project's pavilion (see Table 1). Given the demographics of Neuperlach, it was crucial to include older citizens. The Model Making format also targeted young locals and their parents. Each workshop was conceived and hosted with creative practitioners who had prior experience with the chosen participation methods. Furthermore, our team members participated in the workshops to gain an inside perspective on the emerging interactions.

Table 1. Overview of the methods and proceedings of the four workshops.

Method	Group Size	Age	Participants	Invitation	Duration	Results
Drifting	9	30–80	Citizens, team, creatives	Posters, mailing list, passersby (project pavilion, in public)	3 h	Locations on a small scale, qualitative aspects of mobility
Photography (workshop, competition)	7 + 6	30–60	Same as above	Same as above, adult education center	2 h + 2 weeks	Images with locations on a large scale, comments
Model Making	17	6–80	Same as above, students	Posters, mailing list, passersby (project pavilion, in public)	2 h	Models with functions and aesthetic aspects
Scenario workshop	30	30–80	Citizens, team, creatives, officials, institutions	Active invitation via email	3 h	Scenarios for hubs (location and functions)

Within the scope of this article, we discuss these workshops as an opportunity to learn about geogame interactions from a qualitative perspective, in specific social situations and urban contexts. Nonetheless, it was crucial that the workshop formats were contributing to the actual implementation of mobility hubs since participants may behave differently than in a playful situation without real-world consequences. Each

workshop followed a promising concept for a participatory geogame. Drifting focused on location-based interactions using GPS trackers. The Photography workshop investigated "camera-mediated" interactions, common in mobile games and augmented reality (AR) applications. Model Making explored tangible design interactions and collaboration. The fourth workshop, which is not discussed further here, aimed at combining the results (and some methods) from the three previous formats. Given our aim to learn about the situated unfolding of geogame concepts, this section focuses on playful social and material interactions. Digital technologies were used in ad-hoc and hacked ways, such as "manual" GPS tracking, smartphone cameras, and material models.

4.1. Drifting

Ralf Otto, a dance instructor who often works with elderly citizens, introduced us to Drifting, a collective urban-exploration exercise. He had developed the format inspired by the "dérives" of the Situationist International, a Marxist group of artists who practiced collective Drifting as a "playful-constructive behavior" and a phenomenological hijacking of the dominant (spatial) order (Debord, 1958). Situationist Drifting became a central reference for performative projects in urban space and many of today's digital geogames (Souza e Silva & Hjorth, 2009). At the beginning of our experiment, the participants were introduced to the format's goals and rules: They were to move slowly and stay close together. When a participant felt attracted to a specific direction, they carefully led the group in this direction until someone else took over. The group remained silent until everyone agreed on a potential site for a NEBourhood Hub. At this point, there was a short break to discuss this place and the participants' observations. After exploring an area, the group continued to another part of the district by bike to cover a larger portion of Neuperlach. This multimodal journey was documented using GPS tracking. Additionally, we took notes on the participants' comments and opinions. Thus, the workshop resulted in a travel chain, which included several suitable hub locations. Moreover, the stroll led to a psychogeographic re-reading of the explored spaces, corresponding to Debord's (1958) proposal. Gathering geo-locations for potential hubs likewise involved Drifting through the participants' memories and everyday anecdotes connected to these places.

4.2. Photography

Our second experiment was led by Sandra Singh, a photographer with experience in community work, and co-hosted by a local adult education center. Of course, smartphone cameras are a common feature in many participation apps and immersive games, allowing the capture of images or augmenting real-world representations on screen. However, we intended to treat the camera as an active agent rather than a passive sensor. Accordingly, we focus on camera-mediated interactions and the social and spatial dimensions they provoke. Favero (2017) discusses camera-based exploration practices as a powerful ethnographic inventory and an opportunity to assemble diverse mediated perspectives on urban space. Furthermore, we were inspired by discussions around participatory photography, which can enable specific co-creative formats and social encounters (e.g., Prins, 2010). Our Photography format followed a two-step approach: During an on-site session, Sandra introduced the participants to several exercises that encouraged them to engage photographically with the urban environment, for instance, by exploring visual features ("Search for lines!" "Play with background and foreground!") and by investigating the environment ("Find an interesting shot and wait until somebody passes by!"). These exercises involved a bodily exploration of urban spaces. After the initial session, the participants were invited to continue individually and submit their

results to a photo competition. The challenge involved capturing locations in Neuperlach central to their mobility practices and problems in a single picture, accompanied by a written explanation or voice recording. Finally, the photographs were placed on a map and assessed in a discussion with local planning experts.

4.3. Model Making

In collaboration with Enrica Ferrucci, an architect specializing in design pedagogy, we conducted a workshop on configuring and designing individual hubs. In this session, we introduced interactions with material models as a prominent playful approach in participatory design (e.g., Rambaldi, 2010) and as a method to allow tangible and intuitive interactions with digital media (see Memis et al., 2024). First, the participants covered cardboard cubes with images, collages, or symbols representing different functions. These cubes were then stacked and combined to create various configurations, prompting discussions about the interactions between different functions. At the end of this phase, participants used sticky dots to vote for proposed functions. Based on this voting, the most critical elements were constructed at a 1:20 scale. Wooden parts, plastic rings, and paper constructions were utilized to represent these functions and assess their feasibility. Moreover, participants shaped design ideas and discussed aesthetic preferences. As playful collaboration media, the models stimulated discussions around mobility. They allowed for materially grounded speculation about the role of NEBourhood Hubs in the neighborhood and in participants' everyday lives.

4.4. Situated Play

Through the described workshops, we explored how different game patterns and digital elements could be reconfigured to participatory situations in Neuperlach. These workshops provided insights into location-based exploration, camera-mediated investigation, and tangible design interaction. Whereas game patterns, such as location finding, movement rules, or competition, were integral to this experience, these engagements highlighted the "side effects" of these game systems. For instance, Drifting fostered a sense of community among participants and established an atmosphere in which personal anecdotes and memories were shared. Photography involved unexpected corporeal interactions with urban spaces, as well as encounters with interested inhabitants and sometimes suspicious pedestrians. The enactment of games in public involved several aspects of performativity. Fischer-Lichte (2015) identifies "unpredictability," "ambivalence," "perception as a performative process," and "transformative power" as central characteristics of performative actions (p. 31). These situations led to unexpected outcomes and blurred boundaries between participants and instructors. Data gathering became an active corporeal practice that affected the surrounding spaces. Building upon these principles, we specify five dimensions of "situated play" that we deem especially relevant for participatory geogames. This categorization draws on our discussion of design principles in previous articles (see Drechsel et al., 2024; Förster et al., 2025). The dimensions are as follows:

- Bodily Movement was a crucial aspect of both the Drifting and Photography formats. In particular, Drifting focused on the sensorial experience of moving with and responding to each other in a collective. This bodily engagement drew attention to obstacles, potential barriers, and material aspects of mobility.
- Collective Experiences emerged from group activities during the workshops and fostered a sense of community among the participants. Drifting together or collaborating on a model establishes trust and

open communication. Flanagan (2009) notes: "By playing together, people form close communities and develop a group identity and a sense of belonging" (p. 5).

- Interactions with the Environment emerged from camera-mediated explorations and Drifting exercises. Taking pictures encouraged people to take different positions or wait for something to happen. Drifting comprised an intimate phenomenological exploration of material and social spaces (for example, a drift might end up in a parking garage). Hence, these formats fostered a (re)exploration of everyday surroundings and led to new perspectives on the urban spaces under discussion.
- Material Making was most prominent in the Model Making workshop. Playing with material objects can serve as a speculative catalyst, open up associations, and ground participatory conversations (Guggenheim et al., 2017). In this way, resulting models, maps, and objects should not be regarded merely as "data," but also as active agents within the collaboration.
- Open-ended Storytelling provided the context for engagement with quantitative information, such as geo-coordinates or distinct suggestions for functions. While storytelling is also a classical element of gamification (Muehlhaus et al., 2023, p. 333), we refer not to predefined narratives but to the emerging narrations of participants—their memories, anecdotes, and affective responses.

These aspects of "situated play" were crucial to the workshops' outcomes and contributed to understanding mobility in Neuperlach. They led to diverse insights that did not directly derive from the introduced game mechanics. Whereas the initial goal of Drifting was to search for locations, or more technically, coordinates and comments, the workshop led to a deeper qualitative understanding of the visited urban spaces. This included the collective experience of visiting the spaces together, bodily engagement with the barriers of the pedestrian network, and historical anecdotes about a lost quality of public spaces. Although locations could be gathered with a GPS sensor and text comments, it would be difficult to collect this information solely through a standardized digital game.

5. Making and Modding

Based on our exploration of "situated play," we discuss how these insights can be incorporated into geogames—in our case, for co-creating NEBourhood Hubs. Our aim was not to create a single participation game, but to experiment with a toolbox that is configured to specific contexts and co-creation formats. With reference to our discussion on game making, we explore how the collaborative creation of different tools allows for critical engagement with the context, the integration of diverse perspectives, and the framing and reframing of mobility issues. Making and playing geogames should not be understood as two sequential steps but rather as intertwined collaborative knowledge-building activities (Farías & Sánchez Criado, 2023). As depicted in Figure 4, making games entwines game patterns and digital technologies on the one hand and integrates qualitative dimensions of "situated play" in Neuperlach on the other.

This approach involves two steps. First, we describe the preparation of technical game components, allowing for the relatively easy creation of geogames in collaboration with a group of students who, although untrained in programming games, contributed expertise in urban design and architecture. In the second step, we discuss how the making and modding of tools reconfigure these technical modules to different forms of "situated play" and enacted participation formats in Neuperlach. In this way, we present game making as a "situating" activity that contextualizes urban data and digital media within a specific participation project—in our case, the co-creation of mobility hubs.

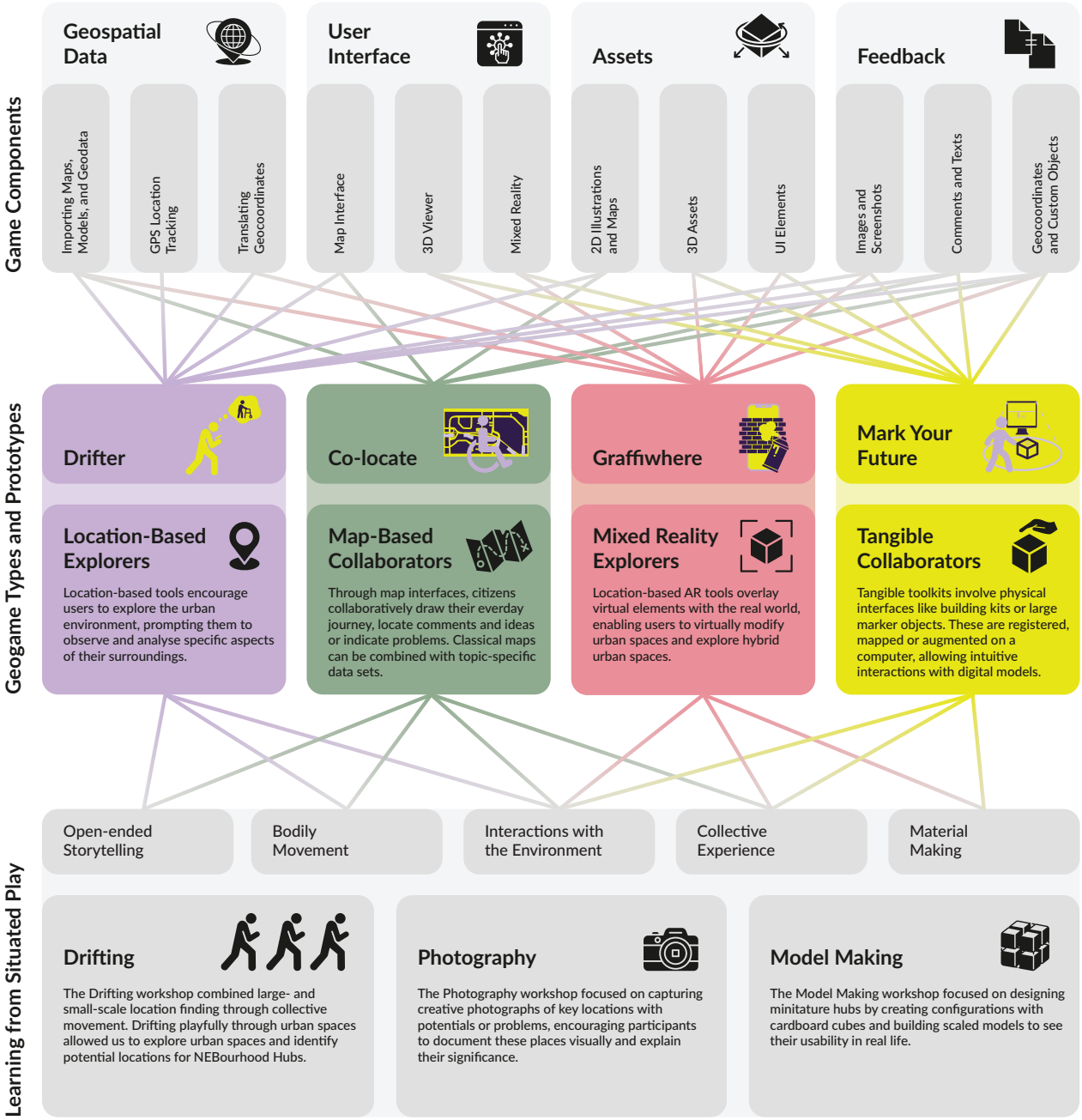

Figure 4. A map of game making: The prototyping process attunes geogame modules to dimensions of situated play and contextual understandings of mobility in Neuperlach.

5.1. Game Components

Our collection of game components is designed to enable the creation of digital geogames based on central interactions from our three workshop formats (see the upper section of Figure 4)—predominantly GPS location tracking, camera-mediated experiences, and design interactions. Additionally, these components integrate relevant functions for the co-creative design of NEBourhood Hubs, from location finding to configuration and design. Based on these requirements, we prepared game components for four relatively abstract geogame types (in the middle of Figure 4). "Location-Based Explorers" are built on GPS tracking and existing urban

data (for instance, maps), and focus on urban exploration and location finding. “Map-Based Collaborators” center on collaborative interactions with maps or models. “Mixed Reality Explorers” integrate AR and optional GPS tracking to investigate urban space and interact with physical and virtual elements. Finally, “Tangible Collaborators” emphasize haptic design interfaces, which could be integrated via AR marker tracking.

The game engine Unity was chosen as the foundation because it integrates several relevant functionalities and is relatively beginner-friendly. Additionally, this environment supports cross-platform deployment on smartphones, tablets, PCs, and virtual reality headsets. On this basis, the computer scientists in our team prepared scripts for accessing the device camera, GPS location tracking, and AR features. They also created custom scripts to support the integration of geodata and models from the digital city twin as well as from other sources. Further requirements, such as a library of 3D assets and visualization techniques, emerged during the prototyping process. The resulting toolbox of technical components comprised a set of custom scripts, assets, and adapted templates. To disseminate relevant skills, the computer scientists further prepared several live and video tutorials covering topics from basic programming to the adaptation of supplied scripts.

5.2. Assembling Prototypes

The prototyping process began in a collaborative design studio with 30 students on bachelor’s and master’s levels in architecture and urbanism during the winter term of 2023/2024. While we decided to produce the prototypes in an academic studio rather than, for example, with a school class in Neuperlach, we aimed to understand the making of geogames as a critical engagement with the local characteristics of Neuperlach and context-specific perspectives on mobility.

First, the group was introduced to the topic of mobility in Neuperlach and the process of co-creating NEBourhood Hubs. They partly observed the aforementioned workshops with citizens. Additionally, the creative practitioners responsible for these formats introduced the group to the specific methods of Drifting, Photography, and Model Making by reenacting them on-site. Hence, the group experienced “situated play” firsthand and gained insight into different aspects of mobility.

Through several ideation and concept-development formats, we explored how these insights could be rearticulated as participatory geogames—using performative exercises, storyboards, and paper prototypes. In parallel, the computer scientists on our team introduced the group to the game engine Unity and the prepared game components, thereby supporting participants with little prior programming experience in creating a set of working geogame prototypes. Furthermore, each group considered the social setting of its prototype, for instance, whether it would be played individually or collectively, synchronously or asynchronously. The prototypes were accompanied by a kit, including a short manual and any necessary additional material. Ultimately, nine exemplary geogames were developed as working prototypes, seven of which were further prepared for testing by a team member. The games were implemented as basic functional prototypes to showcase the key features of the participation format. Secondary features, such as automatic storage of results in a database or a dedicated user login, were omitted in favor of manual hacks.

Prototyping involved a second reconfiguration of game systems in response to different understandings of mobility in Neuperlach. While the experimental Drifting, Photography, and Model Making formats focused

on the unfolding of geogames through play, the making of games mediated between the assembly of game patterns, urban data, and digital media on one side, and the specific urban context on the other. This activity allowed for the reframing of planning issues and the incorporation of diverse stakeholders' perspectives. The process began with the predefined and necessary areas of decision-making for the co-creation of NEBourhood Hubs (location finding, configuration of functions, and design suggestions) and potential geogame types to address these questions.

However, game making also involved reframing, shifting, and contextualizing these decision-making fields, as we discuss using the example of the emerging prototypes. The games entangle issues such as location-finding with heterogeneous dimensions of mobility, ranging from the perceived quality of urban space to feelings of safety and experiences of barriers in Neuperlach's footpath system. As discussed in Section 2, prototyping geogames unfolded as the reciprocal framing and reframing of a "field" (Farías & Sánchez Criado, 2023) for participatory engagement, enabling an attunement between given geodata, different perspectives on mobility, structuring game systems, and "situated play." After articulating the basic interactions of a geogame prototype, filling this system with content and "modding" it to a specific situation added another layer of reconfiguration. Inserting and exchanging 3D models, texts, or urban datasets further adapted the game systems to a specific site, problem framing, and format. Thus, each of the geogame types shown in the center of Figure 4 was articulated in the form of specific prototypes and allowed a distinct recombination of digital technologies and open-ended engagements with mobility.

5.2.1. Location-Based Explorers: Drifter

Several games focused on urban exploration, mainly based on GPS location tracking and the presentation of geodata using a map interface on a mobile device. Players interact with this system by following paths, searching locations, or exploring specific areas, contributing geo-referenced feedback in combination with images, sound recordings, and text comments. Concerning the design of NEBourhood Hubs, such games supported large-scale location finding and a deeper understanding of mobility practices in Neuperlach. Additionally, different aspects of "situated play" were crucial for these projects. Drifting and Photography highlighted especially the relevance of bodily movement, interactions with the environment, and the possibility of relating geospatial data to open-ended storytelling.

The prototype Drifter by Wen-Shan Cui, Buket Göksen, and Justine Morin shows how these aspects intersect in a specific geogame (see Figure 5). The game follows a two-step approach of configuration and play. During the first phase, the game is configured through open-ended conversations with citizens of Neuperlach about their individual mobility experiences, for example, women feeling (un)safe walking at night, or the lack of public furniture for elderly citizens. In the second phase, these scenarios were encoded into a map-based exploration game that relates geodata on urban infrastructure to the discussed topic. The player re-enacts situations from the interviews, such as an older person walking to buy groceries. The game introduces a decreasing energy bar that prompts players to stop at bench locations. If no bench is found, they place a "joker" bench. The prototype demonstrates how a generic location-based game is reconfigured to different groups' mobility experiences by modding through interviews.

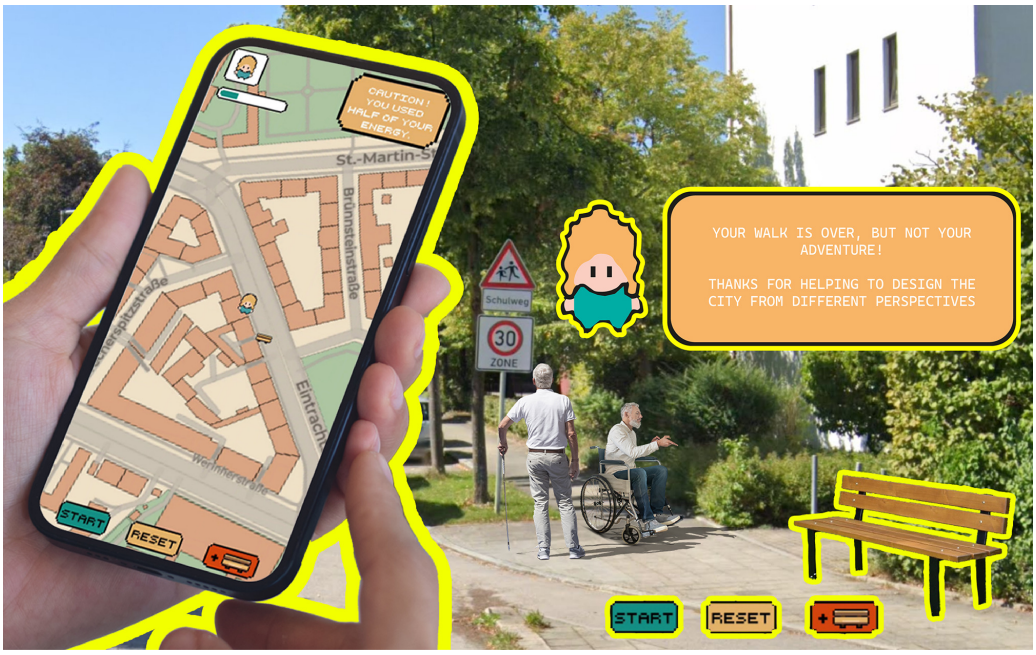

Figure 5. Drifter rearticulates situated mobility experiences as a location-based exploration game.

5.2.2. Map-Based Collaborators: Co-Locate

"Map-Based Collaborators" focus on large-scale patterns and potential sites for hubs. However, rather than emphasizing bodily movement, they draw inspiration from the design negotiations and the collective experience of the Model Making format. Accordingly, they support participatory discussion through cooperative map interfaces. For this purpose, they visualize urban datasets, models, and maps and allow for design interactions such as marking specific areas, adding items, or annotating ideas and opinions.

Co-locate by Yun Lou, Maximilian Schulte, Xiaochen Sun, and Yuan Zhang aimed to shed light on the experiences of citizens using mobility-aiding devices, such as wheelchairs, strollers, rollators, and walkers. Since the footpath system of Neuperlach suffers from diverse barriers, this perspective was crucial for the co-creation process and the installation of new mobility stations. The game prototype involves several phases during which users map their everyday routes and mobility challenges on a tablet or touchscreen (see Figure 6). Finally, the players configure and locate potential hubs based on this information. In an ongoing voting, each proposal receives points from the participants. Since the emphasis lies on the players' negotiation, the game elements are integrated more subtly than in the other prototypes and focus on structuring the discussion, incorporating the participants' narrations, and allowing for engaging interactions with the map.

5.2.3. Mixed Reality Explorers: Graffiwhere

"Mixed Reality Explorers" operate on a smaller scale than the previously mentioned game types and focus on visual and spatial interactions with urban spaces. Using mixed reality features on smartphones and tablets, they augment urban spaces with virtual elements and prompt players to respond to challenges positioned in urban spaces. Results can be saved as screenshots or database entries with GPS coordinates. By enticing the

Figure 6. Co-locate engages players in a playful map-based collaboration on accessibility.

players to move to specific locations of interest, these prototypes draw on the camera-mediated interactions of the Photography workshop, combining bodily movement and interactions with the urban environment. Also, they were influenced by the design interactions of the Model Making format.

The game Graffiwhere, by Mariam Suwwan, Taiane de Melo Nepomuceno, and Chenyuan Wang, was inspired by a strong graffiti culture in Neuperlach—a bodily activity that plays creatively with the material context (see Figure 7). The emerging geogame translates this practice to 3D-spraying in AR. This represents another form of modding, here with a focus on the interactions rather than on exchanging game assets. The gameplay consists of a collective spraying session in a public area. Different prompts invite players to create graffiti on themes such as "barriers" or "improvements for public spaces." Spatial drawing exercises encourage players

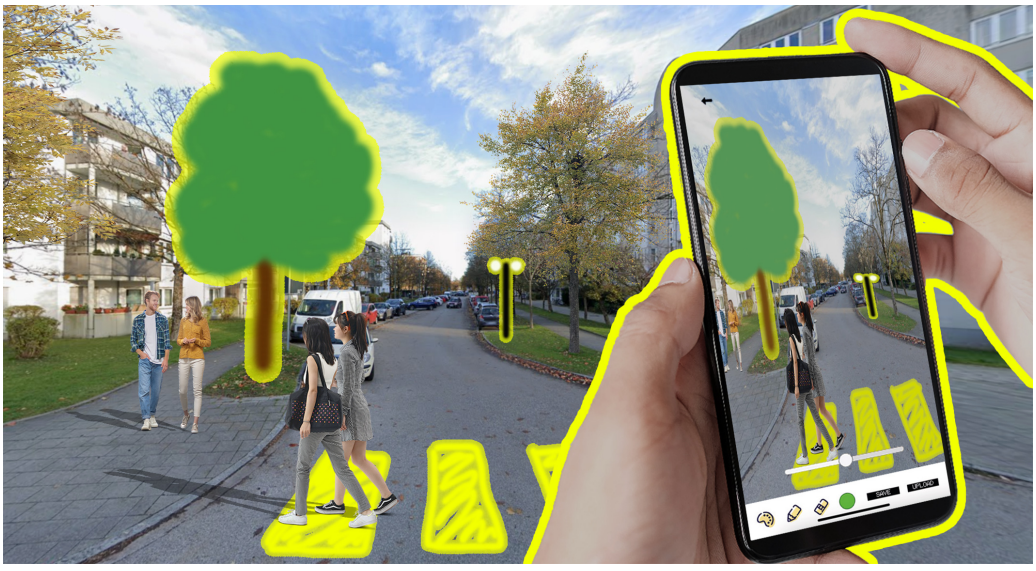

Figure 7. Graffiwhere introduces "virtual spraying" as a bodily engagement with urban space.

to move their smartphones like spray cans and interact performatively with the urban surroundings. Showing each other the resulting graffiti adds another layer to this playful engagement.

5.2.4. Tangible Collaborators: Mark Your Future

"Tangible Collaborators" link physical interactions with building blocks of physical items with an additional digital layer. In doing so, they enable explorative and playful engagement with digital models. While the two prototypes in this group tested different technical approaches for coupling physical items with a digital game system, an AR approach with marker objects proved to be a feasible way to achieve this result. The games aimed to incorporate tangible design interactions and collective collaboration, drawing on the Model Making format. In this way, they focus on the functional and spatial configurations of mobility hubs.

Mark Your Future by Lisa Ableitner, Alissa Schulteß, and Anna Zieziula consists of a physical installation at a potential location for a NEBourhood Hub (see Figure 8). This arrangement contains several large cubes recognized as markers by a camera. A large screen mirrors this camera's view but allows players to replace the cubes with diverse assets to construct a mobility station and redesign the location. Thus, the prototype entices playful, explorative, and collaborative interactions that unfold through the interplay between urban space, digital space, the marker cubes, and other participants. Hence, the prototype reconfigures a digital technology into a hybrid on-site interaction.

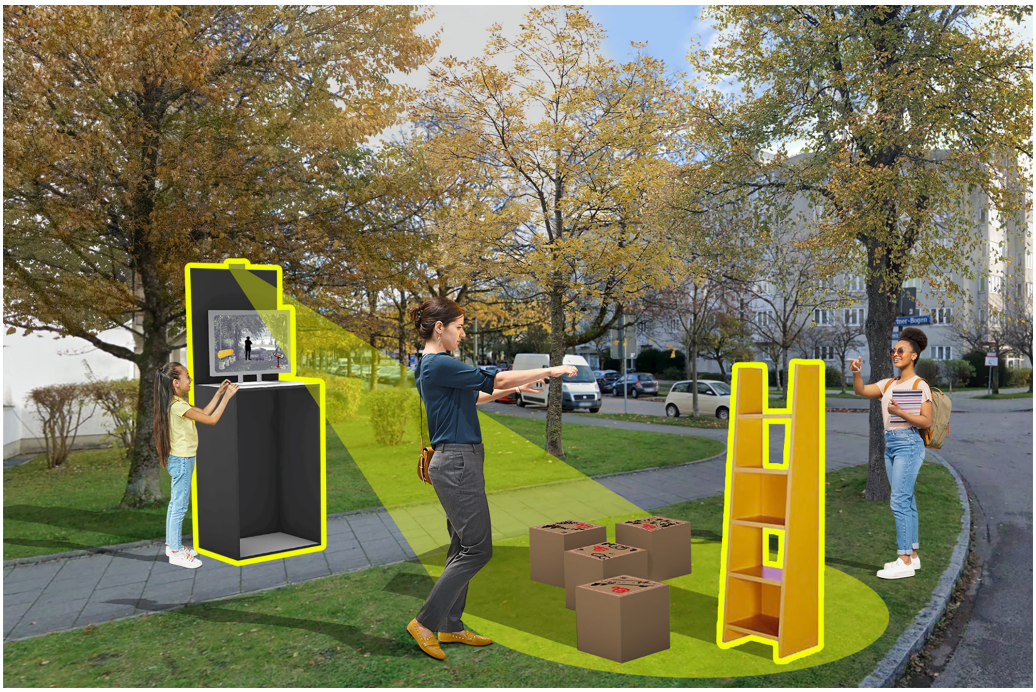

Figure 8. Mark Your Future supports discussions on mobility through playful material interactions.

6. Playing Geogames

Lastly, we discuss a third reconfiguration—the enactment of geogames in Neuperlach. While we consider game making and gameplay as reciprocally connected, this last section focuses on how the described geogame

prototypes were involved in playful on-site situations. We discuss two public "test play" events held in July and August 2024 in Neuperlach. Six games, four of which were described in the previous section, were prepared for gameplay next to an installed NEBourhood Hub (see Figure 9). The media column of Mark Your Future was set up on an adjacent lawn, while the collaborative mapping game Co-locate was presented on a screen on a table. The other prototypes were installed on smartphones and tablets. Each game was accompanied by a printed manual explaining its steps and activities. Test sessions lasted between 10 and 20 minutes and were supported by a member of our team, who took notes during the sessions. Furthermore, feedback generated through the prototypes was recorded (for instance, placed AR objects were documented via screenshots). Finally, players were asked to complete a survey about their experience and the games' potential for future participation processes.

Figure 9. Gameplay next to a NEBourhood Hub in Neuperlach.

We announced the events in advance through the project's mailing list, newsletter, and website, and also contacted interested stakeholders from earlier workshops. On the event days, we approached passersby to invite them to participate in a test play, which accounted for the majority of testers. In total, 46 players engaged with one or more prototypes and completed the complementary survey. Different age groups were represented, with a bias toward citizens below 35 (64%) and only 5% above the age of 68. This section focuses on gameplay observations and the players' qualitative feedback. In doing so, we trace emerging interactions between players, geogames, and their surroundings, and discuss the types of participatory situations the games generated.

6.1. Surrounding Formats

Exploring social constellations and participatory settings in which a game would be used was crucial to the prototyping process. Each game requires a specific process and social setting. Our test play highlighted this aspect, revealing its relevance for both the user experience and the outcomes of the participation games.

For instance, it was crucial to carefully introduce the players to the different prototypes and find a common understanding of what a game interaction means in the context of participation—e.g., is a virtual object placed in AR a suggestion or a marker for a problem? From the Drifting workshop, we learned to begin each format with a warm-up, while the Photography format introduced a longer asynchronous phase with an intensive workshop. Similarly, players engaging with the AR games in our test play required an introductory phase to explore the user interactions without considering the relevance of their contributions. Some people (especially older participants) had difficulties interacting with digital prototypes. In this case, it was particularly important to provide support and incorporate social formats that could compensate for these difficulties.

6.2. Unforeseen Multiplayer

Even games initially conceived as individual and asynchronous experiences evolved into collaborative gameplay. Our team members were supposed to behave passively by introducing the games and then observing, but in practice, they contributed much more actively to the gameplay. As mentioned previously, many older players struggled with digital interfaces such as AR features. Assistance and cooperation became so central that many testers attributed a high level of collaboration to the games in the survey, even to those designed as individual and asynchronous formats. While this aspect might be mitigated to a certain degree with improved user interactions or better tutorials, we view this "involuntary multiplayer-ness" as an intriguing dimension of "situated play" with digital media. The collaborative setup had a significant impact on how each geogame unfolded. Rather than functioning as streamlined media, smartphones and tablets became tokens passed among players, mediating social interactions—helping one another, discussing, and working together.

6.3. Conversation Catalysts

Some players were less interested in using the comment fields of our geogames as a feedback function than in verbally sharing their ideas with another person. Although Drifter was intended as a data-gathering game, the resulting coordinates were far less interesting than the conversations and shared stories triggered through gameplay. The tested AR games also elicited intriguing comments complementing the placed objects. One player casually explained that she had placed virtual lanterns so that trees would not occlude them—a significant problem for her sense of safety. The underlying reason for this thoughtful placement may have been lost in a screenshot, a saved geo-coordinate, or a brief comment. Talking about and "talking around" (see Calvillo, 2019, p. 67) the games were central to the testing session. At times, this aspect took over, and the geogames became mere conversation starters. Based on this observation, we highlight the importance of including open-ended formats in the gameplay to capture unexpected or easily missed responses.

6.4. Material Presence

The gameplay demonstrated the importance of the material presence and performative effects of geogames in public spaces. The prototype Mark Your Future combined a large screen-installation with several physical marker cubes that invited passersby to interact with it and gave the prototype a prominent appearance. Players arranging these cubes and checking the result on the screen manifested a performative activity. As a result, this prototype appeared the most appealing during the test sessions and attracted the highest number of players.

Other tools, like Co-locate, were presented on an inviting table for collaboration. In contrast, smartphone and tablet-based apps lacked this ostensive expression. Nonetheless, players moving through public spaces with their phones or interacting with an invisible reality also produced a particular effect on the environment and drew the attention of pedestrians.

6.5. Digital Minimalism

Several participants commented on imperfect and only partially implemented functions, such as a dummy multiplayer board or buggy navigation. Although we were transparent about the games' prototypical state, these obstacles confused the players and disturbed their interactions. A central lesson, therefore, was the value of creating minimalist games that focus on essential game mechanics. Other functionalities, such as multiplayer statistics, a shared map of results, or a user login, could be handled through social formats and ad hoc solutions. During our test gameplay, we added a notebook to the prototypes for additional comments and asked the players to take screenshots, which would later be collected. This reductive approach also opens up new opportunities to make and modify games with non-computer scientists and limited time resources. It leads us to the idea of a geogame as a minimalist medium accompanied by social practices, analog media, and hacks. Instead of an intricate system, the minimalist digital medium draws inspiration from games such as hopscotch (Flanagan, 2009) and is therefore robust enough to adapt to unforeseen situations. For instance, the game Graffiwhere consists of a relatively simple 3D drawing concept. However, these interactions enabled multiple playful expressions and engagements with the urban environment.

In conclusion, playing on-site added another layer of reconfiguration to our geogames. On the one hand, the games operated as media allowing for exploration of space and the contribution of opinions and ideas. On the other hand, they revealed themselves as active agents that co-constituted a playful situation, similar to the "speculative" devices described by Varga (2018). Rather than serving merely as a passive medium for gathering information, they manifested a material presence, operated as conversation catalysts, and became tokens mediating social situations.

7. Discussion

We have explored three "playful reconfigurations" of geogames—between digital game systems and open-ended play. Each of these reconfigurations allowed an opening towards situated perspectives and unexpected occurrences. Thus, they reframed both the participatory interactions and the issues at stake, combining necessary information for implementing mobility hubs with unforeseen issues and contextual knowledge. In this section, we revisit how each format allows for such reconfigurations and discuss challenges and potentials for future work. For this purpose, we introduce our reflections alongside some friendly yet critical remarks from collaborators of the Creating NEBourhoods Together project.

Through three workshops, we learned how game concepts unfold in formats with citizens in Neuperlach. The experiments revealed dimensions of "situated play" as a rich resource for further development. They allowed for low-cost experimentation with as-found digital media and exploration of the participatory situations such media would entail. However, these formats also faced significant challenges, such as finding a sufficient number of participants. Retrospectively, one member of the TransitionHub deemed the workshops too experimental, while another suggested they did not integrate well with the events of existing

institutions such as the local family café or youth centers. These issues raise interesting questions regarding the situations and contexts to learn from and point to possible connections to critical design discourses. For instance, Rosner (2018) documents how collaborating with a knitting circle reframed the role of digital tools and opened up space for situated exploration (p. 67). Or to put this differently: How could a GPS sensor be "reconfigured" through a workshop in a family café?

Making and modding geogames reconfigured digital technologies in relation to local mobility issues and the context in Neuperlach. The process involved collaboration among computer scientists, creative practitioners, and students from different backgrounds. On-site explorations and engagement with various stakeholders' perspectives were crucial for developing interactions and game concepts. As a result, the emerging prototypes linked digital participation tools to practices such as graffiti spraying and insights gained from interviews. Modding further adapted the games to contextual narratives and location-specific challenges. At the same time, the co-creative potential of these activities has to be explored in further research. The prototyping process described in this article remained within an academic context for practical reasons, such as the obligation to produce working prototypes. Yet there is considerable potential in opening these activities to local groups, school classes, or maker spaces, allowing for engagement of varying complexity and effort. Combining prepared modules in a game engine still requires technical support, whereas adapting game assets and the storytelling may be much easier. Such co-creative formats with geogames could be linked to "critical making" approaches, reassessing game making as a contingent material-semiotic deliberation (see Ratto, 2011).

Playing with the resulting prototypes produced specific performative and sociomaterial situations and provided crucial insights into the agency of the geogame prototypes. Rather than acting as passive media, the games emerged as active agents that contributed to social situations, manifested a material presence in urban space, and enticed performative effects. This reconfiguration links the playing of geogames to discussions of performative urbanism (Wolfrum & von Brandis, 2015). Nonetheless, the digital games were not equally accessible and attractive to all players, as noted by other researchers in this field (Kavouras et al., 2025, p. 3). Many participants required careful support during the gameplay. The testing session also highlighted the potential of these frictions to open up conversations and unexpected encounters. These insights challenge us to consider how digital and analog elements, structuring game elements, and open-ended play can be productively combined for an inclusive participatory format.

8. Conclusion

In this article, we began with a perceived gap between digital and analog methods. While the former provide innovative interaction types, integration of urban data, and new forms of communication, the latter appear more flexible in responding to unforeseen contexts and open-ended controversies. Through the concept of "playful reconfigurations," we propose that geogames have the inherent potential to bring these two sides into a productive dialogue.

We explored these reconfigurations through three engagements with geogames. Each attuned a game system—workshop methods, game components, and digital prototypes—to a social and material urban context. Furthermore, we investigated how these engagements can be combined into a distributed cooperative learning process. Exploring "situated play" in a specific context allowed us to identify specific

qualities of play in Neuperlach. Making and modding prototypes incorporated these insights and approached game making as a successive process of shaping urban issues and participation formats. Finally, playing on-site highlighted the contingency and performativity of "playful reconfigurations," leading to unforeseen encounters and interactions.

This lack of control is precisely what makes geogames interesting for us. Instead of "improving" participation technologically or enhancing motivation, we discussed making and playing participatory games as experimental activities and opportunities for collaborative learning. This article aimed to bring different engagements with geogames into a productive dialogue. Nonetheless, these combinations deserve further exploration, intertwinement, and reconfiguration. This article does not conclude with a perfect game. Instead, it is an invitation to play and mod, to reassemble data, rules, planning issues, and urban media.

The game is on!

Acknowledgments

We express our gratitude to the TransitionHub team of the Creating NEBourhoods Together project and especially Jana Köstler, who supported conceiving, conducting, and documenting the described workshops. In this context, we want to thank the creative practitioners, Ralf Otto, Sandra Singh, and Enrica Ferrucci, as well as all participating citizens. Dedicated students at the TUM Chair of Architectural Informatics and our computer science team, Dominik Berger, Wolfgang Hobmaier, and Ivan Bratoev, enabled the game making process. We thank Carolina Meirelles Coutinho for preparing the games and supporting the testing phase.

Funding

Funded by the European Union (Project No. 101080052; Program: Horizon Europe). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Council Executive Agency. Neither the European Union nor the granting authority can be held responsible for them. Publication of this article in open access was made possible through the institutional membership agreement between the Technical University of Munich and Cogitatio Press.

Conflict of Interests

The authors declare no conflict of interests.

LLMs Disclosure

Grammarly was used for spelling correction.

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