Situating Digital Participation

Incorporating material, contextual, and performative learnings into digital toolkits

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Complex planning problems like the mobility transformation require the inclusion of stakeholders and situated knowledge. Generic map-viewers, surveys, or visualisations often fail to incorporate situated, complex, and contingent aspects of participatory negotiations – aspects which are more central to artistic, performative and analogue formats. In the context of a New European Bauhaus project, we discuss a participatory process through which mobility-related interventions, so-called NEBourhood-hubs, are located, configured, and designed. We propose a hybrid approach to combine the potential of digital participation methods with contextual and situated perspectives. Firstly, we developed several experimental analogue formats, highlighting bodily, spatial, and interactive dimensions of participatory involvement. Building upon these learnings, we explore how these aspects can be incorporated into the design of digital tools. We tested this approach in a design studio with students of architecture and urbanism, who explored the analogue participation formats and translated these contextual learnings into an array of digital tools. Through an analysis of these prototypes, we critically reflect on the underlying approach and its potential contribution to the collaborative planning of the mobility transformation.

Keywords: *Digital Participation, Mobility Planning, Performative Urbanism, Augmented Reality, Crowd-Sourcing, Digital Design Education, Digital Urbanism*

INTRODUCTION

There seems to be a broader consensus that complex urban planning problems – like the sustainable transformation of urban mobility – require both evidence-based planning tools like traffic data analyses and the cooperation of diverse stakeholders.

Analogue participation approaches have become more and more open to artistic engagements and open-ended forms of expression in recent years. Prominent participation processes – like the "Planbude" in Hamburg – combine contingent expression forms like collective drawing and modelling with open discussions and activities in urban space (Tribble, et al., 2017, p. 271). Therefore, the process is situated in specific urban spaces, allowing for improvisation and incorporation of - also unexpected - stakeholder perspectives.

We argue that the usage of digital participation tools often falls short of including these forms of qualitative and situated knowledge. Furthermore, digital tools for participatory information gathering can impose biases – like the planner's prejudices of specific stakeholders – onto participation processes

(D'Ignazio & Klein, 2023). On other occasions, digital technologies may introduce categorisations or topics that are not aligned with the actual needs of the local population and appear relatively inflexible to spontaneous adaptations during a collaboration process. This paper aims to bridge this gap by "situating" digital media in open-ended participation processes.

We explore this question in the context of the EU-funded "NEBourhoods" project addressing the mobility transformation of Neuperlach, a car-centred late modernist housing estate in Munich. It involves a participation process through which we learn about mobility-related problems and potentials, leading to the installation of two NEBourhood-hubs.

We will describe a hybrid approach, aiming to create an array of situated digital participation media in the context of urban mobility. We introduced both experimental analogue methods and the digital toolkit to a design studio with students of architecture and urbanism. Through this, we explored how to create various digital participation tools that correspond to the specific context and incorporate crucial dimensions of analogue exploratory formats.

SITUATING DIGITAL PARTICIPATION MEDIA

Over several decades, mobility planning has been characterised by a car-centred, top-down perspective. Thus, planning methods, standards, and simulations are biased because of a historical path dependency (Peters, 2019). For this reason, developing new planning tools better suited to foster a sustainable mobility transition and include bottom-up perspectives is a big challenge. In the context of our research project, the NEBourhood-hubs should support more sustainable modes of traffic but also react to the individual needs of diverse resident groups in the specific context of Neuperlach.

According to Rittel and Webber (1973), such a design question can be considered "wicked" since it involves diverse unknown factors, like unexpected local conditions, the reaction of different social groups, and context-specific factors. Digital participation tools like map-viewers or questionnaires often appear too generic and lack open-ended interactions to respond to these insecure conditions (Gebhardt, et al., 2014, p. 116 f.). Furthermore, urban data, planning tools and digital platforms introduce specific presumptions and categorisations, which may turn out as misconceptions or problematic biases (D'Ignazio & Klein, 2023). While the latter point is unavoidable, we – as planners and makers of digital tools – must deal critically and consciously with these restrictions.

Donna Haraway (1988) coins the term "Situated Knowledge" in contrast to abstract modernist perspectives. "Situating" refers to being conscious of the observer's positionality, processes of knowledge production, and corporeal dimensions of knowing. By this, Haraway challenges disembodied and seemingly objective ways of knowing – a crucial insight, especially when we think of digital media and data-based processes of knowledge production.

Following this perspective, our paper discusses two aspects concerning both digital media and our methodology. On the one hand, we will ask how digital media can correspond to situated knowledge and local stakeholders' perspectives through interactions, visualisation, and data-gathering modes. On the other, we will propose how the prototyping of participatory digital media itself should be reconsidered as a situated and embedded process.

Regarding the first aspect – concerning the design of participation tools – it is crucial to learn from existing processes and methods of local citizen engagement. Analogue socially oriented projects and artistic formats are crucial resources in this regard. For instance, the aforementioned "Planbude" process in Hamburg involved various

playful analogue tools and formats. Methods emerging from this project included drawing and model-building – open-ended practices that do not require previous experience. This also allowed combining qualitative and quantitative methods and valuing local knowledge (Tribble, et al., 2017, pp. 271-272). Critical mapping projects bring together social formats and data gathering, relating physical, emotional, and political aspects with digital technologies (Crampton & Krygier, 2006, pp. 17-18). To include these perspectives in our research project, we decided to collaborate closely with local artists and creatives with experience in social work and civic participation formats. Furthermore, we build upon several experiments in critical design in urbanism and architecture (Förster & Bratoev, 2022).

Secondly, the process of developing participation tools has to be reconsidered critically since it determines how specific actors are involved in design decisions and which presumptions regarding the planning process are made (Rosner, 2020). "Critical Makers" like Matt Ratto (2011) argue for including stakeholders directly in digital design workshops, during which prototypes become catalysts for a sociotechnical controversy. Making prototypes involves political decisions about what perspectives are to be incorporated, which issues have to be discussed, and in which domain participation is valuable. Following a similar strain, Nerea Calvillo coins the making of digital visualisations as an "attunement" with urban issues like air pollution (Calvillo, 2019, p. 67). In earlier papers, we have discussed different methodologies that consider sociotechnical engagements with digital tools (Förster, et al., 2022).

THE HYBRID PARTICIPATION PROCESS

In the first phase of our project, we worked with creatives from Munich to develop analogue tools for the participatory localisation and configuration of the NEBourhood-hubs. Together with residents from Neuperlach, we enacted and tested these methods in open-ended workshops. Besides methodological learnings, we gathered possible locations and ideas for functions which could be used for planning the hubs. In this way, maps were created showing the popularity of different locations, the need for different functions or services, and their spatial distribution in the neighbourhood. These maps were then used in a workshop with representatives of local authorities, local public companies, creatives, local initiatives, and SMEs to jointly find the best locations, the best mix of functions for each location and to develop joint uses with local initiatives and operator models. Based on the results of this event, the production of the hubs was commissioned (Figure 1).

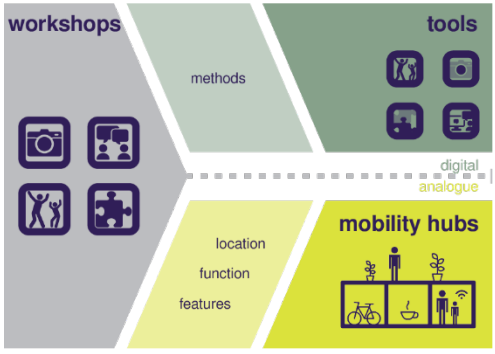


Figure 1
Our hybrid participation process builds upon experimental analogue workshops, from which we extract requirements and inspiration for the design of digital tools.

In the winter semester of 2023/24, we introduced a design studio of the TUM Chair of Architectural Informatics to our analogue participation approaches. We discussed how to incorporate learnings from these approaches into digital participation tools. These tools should allow residents to describe mobility challenges, locate their own NEBourhood-hubs and add various functions to suit their tastes.

A digital toolbox was created to support the prototyping process with crucial technical components. These tools will be available for testing at the same time as the hubs arrive on location in the summer of 2024. They will then be assessed by residents and used to evaluate the

function of the hubs and their acceptance by the population. In autumn 2024, the results of the various project phases will be evaluated and assessed by employees of the Chair of Architectural Informatics.

SCALES AND FORMATS OF THE PARTICIPATION PROCESS

The design of our hubs involves four fields which require participatory involvement. Information related to each field is gathered through our participatory workshops. In the later stages of the project, each of these domains should be covered by at least one prototype for a digital participation tool.

Large-scale localisation: Locating the NEBourhood-hubs on the scale of an entire district poses various challenges. On the one hand, it is crucial to clarify the criteria to identify the most suitable locations. A vote based solely on the participants' place of residence or neighbourhood should be avoided. Therefore, the participants were informed at the beginning of the event that their choice of location must be publicly justified in a feedback round. This also allowed for the collection of qualitative information about the choice of location, which helped in the subsequent planning process.

Small-scale localisation: Once a decision has been made in favour of a rough area or neighbourhood, a specific site for the hub must be determined. Traffic regulations, pipework, ground loads, and clearance areas are essential to consider, as well as practicality, proximity to various facilities, and design ideas. Bringing these two poles - hard and soft factors - together is the challenge that needs to be mastered.

Configuration of functions: Various functions are conceivable for the hubs. However, they must be adapted to the needs of a concrete location and react to local conditions. The challenge is, therefore, finding a method that allows us to gather, compare and discuss desired configurations. Furthermore, an operator model and concrete steps for the implementation need to be discussed.

Design: How can small-scale ideas such as bookshelves or lockers be integrated into the hub design? What are the concrete requirements of the place? What ideas do residents have about colours and materials? The respective participation format must encourage residents to be creative and, at the same time, convey the technical limitations and necessities.

ANALOG, ARTISTIC AND COLLABORATIVE EXPERIMENTS

Together with three local creatives and the NEBourhoods cocreation team, we developed different experimental participation formats. Through this, we explored different methods which were developed in the concrete local context and aimed at a situated engagement with mobility planning. On the other, they collected data for the concrete design process of two NEBourhood-hubs.

Multimodal drifting: In this workshop, large-scale and small-scale localisation were combined through collective movement through urban space. The format was developed with Ralf Otto, a local dancer, who already had experience with “drifting” as a collective practice of spatial and social exploration. During the workshop, the participants roamed the selected area on foot and by bike to find the best potential locations for NEBourhood-hubs. Firstly, the participants were introduced to the workshop’s objectives and rules: both by bike and on foot, they were supposed to move slowly and stay very close to each other. One person could take the lead and force the group in a direction they find interesting. The same principle was used to decide whether to cycle or walk. If the group agreed on a potential location, this was recorded using geo-referenced POIs. In conclusion of the workshop, it can be stated that Drifting bears some real potential for finding spaces on a small scale in a co-creative way. Also, it gave us the

opportunity to experience the urban space intermodally and empathise with other people's perspectives and ideas. The result is an intermodal travel chain and a collection of suitable locations.

Photographic Data Gathering: This format took place in cooperation with the local adult education centre and was developed with the photographer Sandra Singh. It started with a free urban photography workshop for Neuperlach residents. Consecutively, they were introduced to a photo competition which ran for two weeks. The task was to identify places in Neuperlach that are crucial for future mobility and to take creative pictures of them. Also, participants had to reason for their choice through writing or sound recording. Afterwards, all images were localised on a neighbourhood map and evaluated in a discussion round with local planning experts. While the number of competition entries stayed behind our expectations, the overall format introduced some fascinating aspects for the collaborative search for hub locations. The workshop established a very welcoming atmosphere and introduced photography as a collective engagement with urban spaces.

Collaborative Design: Together with Enrica Ferrucci, a local architect working with design-centred pedagogy, we held a workshop focusing on the configuration and the design of individual hubs. In the first phase, cardboard cubes were covered with pictures, collages, or symbols representing various functions. Multiple configurations were produced by stacking and combining these cardboard cubes. Also, the interactions between different functions were discussed. At the end of the first phase, the participants weighted the functions using sticky dots. Based on this voting, the most important functions were then built on a scale of 1:20 in the second workshop phase. Wooden parts, plastic rings, and paper constructions were used for this. This allowed us to concretise various functions and check for feasibility. In addition, the participants developed designs that best support the respective function.

Learning from these experiences, we concluded a list of six crucial dimensions. The list is not exhaustive but contains aspects that we saw as specifically promising to allow for contextual and open-ended engagements with the topic of mobility:

Bodily movement: While drifting heavily relied on bodily movement, motion was also a crucial part of the photographic workshop. Instructed ways of movement forced participants to explore urban spaces in unexpected ways – e.g., to discover personally unknown areas or focus on the materiality of the ground and different pavement types.

Group interactions: Model building and drifting were collective experiences that put a focus on collaborative interactions and collective output – a designed model or a collectively experienced drift. The participation format becomes a catalyst for open-ended discussions.

Interactions with the environment: Drifting and photography concretely engage with their physical environment. Different photographic tasks force participants to position themselves and their camera in relation to the material environment. Drifting is a physical exploration that also involves negotiating where people go and where they are not allowed to go.

Mapping: Exploring spaces in a structured way and representing the gathered information graphically was an essential aspect of the drifting workshop. Thus, groups could discuss and shape spaces that were hard to understand otherwise.

Design interactions: The design workshop involved interactions like model building as a catalyst to discuss different aspects of mobility and as a way to prioritise different functions for mobility hubs.

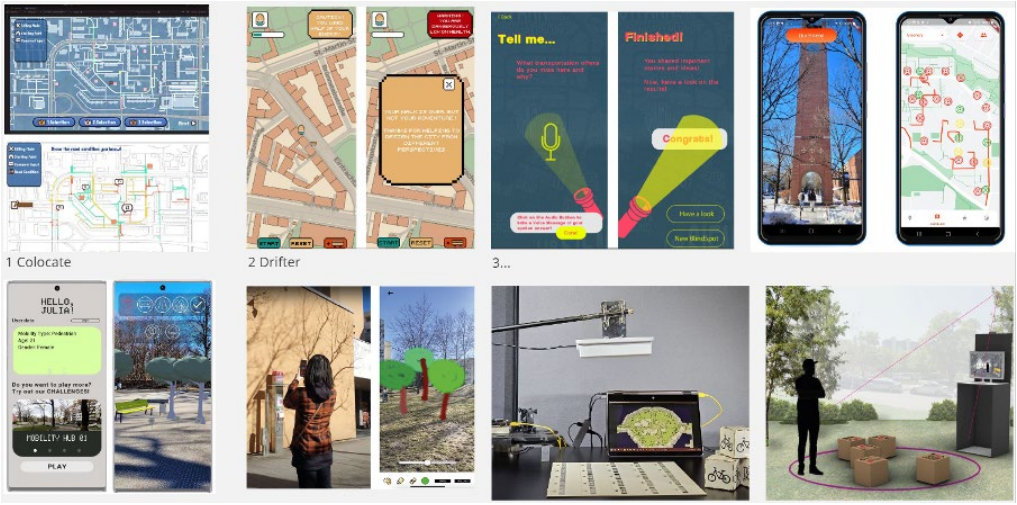


Figure 2
Pictures of the prototypes

Feelings: All three workshops involved subjective experiences with the topic of mobility and feelings related to urban spaces. While these aspects are hard to quantify, subjective positions were a crucial aspect of how stakeholder narrated mobility issues and presented their perspectives.

A TOOLBOX OF DIGITAL MEDIA

While the analogue participation workshops investigated different approaches to incorporate situated, bodily, and contextual factors in the participation process, our approach also builds upon a technical foundation, which should allow the fast and flexible creation of different prototypes. We selected the popular game engine Unity as a flexible foundation since it already includes a wide array of resources regarding interaction and visualisation – but also an active community and a variety of tutorials. On this foundation, computer scientists in the research project created components that would implement essential functions for the prototypes. Thus, a toolbox of small custom libraries, templates, tutorials, data sets, and assets emerged.

The toolbox should allow experimenting with digital features like *location-tracking, tangible interfaces, gamification, or Mixed Reality* to incorporate interactions and aspects of our analogue participation formats. Additionally, the toolbox should support *working with geospatial data,* including information from the city's Digital Twin project and open-source data in the prototypes.

Partly, technical features were selected beforehand. However, the list was also extended as new requirements emerged during the prototype development. Hence, the toolbox became a constantly growing output during the project.

MERGING PROTOTYPES

Following the theme "Data drifts and tactical toolkits", thirty students of architecture and urbanism were introduced to our analogue exploration formats as well as to the technical foundation of our toolbox. The project development was structured in three phases: The first part involved investigating the area of Neuperlach and local issues concerning mobility. Also, the students researched different digital

technologies and discussed how these could correspond to the specific requirements of the participation process. During the second phase, each group of students created a concept for a digital participation tool – specifically considering how it would be embedded in the participation process and what "situated" perspective it could provide for planning the NEBourhood-hubs. Lastly, these concepts were implemented as an array of working prototypes (Figure 2) and tested in Neuperlach. Thus, a range of creative tools addressing different scales and aspects of the participation process emerged in this process:

Co-Locate (Yun Lou, Maximilian Schulte, Xiaochen Sun, Yuan Zhang) is targeted at users of mobility aids like wheelchairs or walkers. The project proposes a map-based desktop application for collaborative workshops. In the first step, participants map mobility challenges, the condition of streets, and barriers within a given area. Additionally, they set up routes specifically relevant to their everyday life. In the second step, the participants add possible locations for hubs and discuss relevant functions with respect to the gathered routes and issues.

Drifter (Justine Morin, Wen-Schan Cui, Buket Göksen) begins with citizen interviews on personal mobility experiences – female read persons walking home at night, children in the traffic to school, or older persons with mobility impairments. Based on these conversations, a location-based mobile phone game is set up. Experiences from the interviews are encoded as simple rules: your movement radius and speed, simple interactions with objects like light posts, and when you need to rest. In our case, the prototype focused on the journeys of older persons. After a certain distance, the game requires you to find a bench (sometimes a challenging task in the given area); on other occasions, it forces you to walk slower. On the one hand, discussing and encoding game rules is an interesting collaborative format that sheds light on different stakeholders' perspectives. On the other hand, the game builds awareness and informs participants of decision-making workshops.

Blindspots (Luisa Herklotz, Jana Liszewski, Nicola Pfennich, Charlotte Schöffend) investigates areas with bad traffic network coverage and mobility problems. These mobility "blindspots" are identified through geospatial data analysis and parametric design approaches. Using a mobile phone app, the participants investigate the "blindspot" through three tasks: After a short exploration phase, the users give feedback through voice, text and an image. The gathered opinions, ideas, and comments are visualised as a media cloud on the map – slowly filling the "blindspot" with local perspectives.

City Swipe (Bruna Gerling, Carolina Meirelles, Gony Amir, Paula Von Houwald) proposes a mobile phone app that asks users for feedback on possible hub locations over a more extended period. Every time the user's GPS location passes by one of multiple predefined locations, the app pops up and asks for feedback on this spot. Participants swipe the picture left or right according to a category like subjective safety, comfort, or accessibility. Afterwards, they are asked to leave a comment about the place.

AR Canvas (Agi Hidri, Neziha Ismali, Julia Wegrzyn, Viktoriia Yursinova) is an augmented reality app that allows participants to locate and design hubs and suggest possible functions. Participants go for a walk and place 3D props in the augmented reality scene – ranging from benches to zebra-crossings and traffic lights. Thus, participants are enticed to explore urban spaces and add ideas to concrete urban situations. Each prop is saved with its coordinates and an optional comment so planners can create maps of the results.

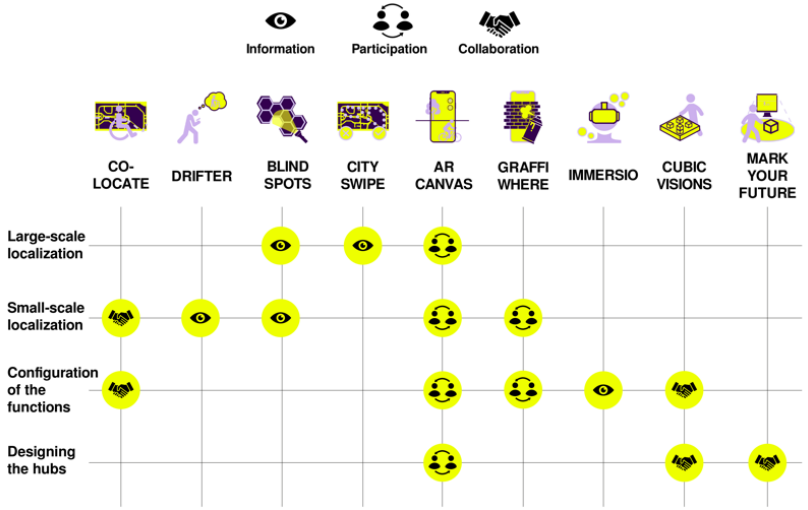


Figure 3
The diagram shows the prototypes and their relationship to different participatory "learnings" in the design of mobility hubs. Also, it differentiates the level of integration: passive (information) to active (collaboration)

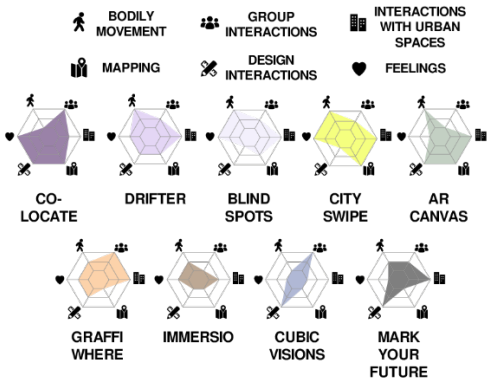
Graffiwhere (Mariam Suwwan, Taiane de Melo Nepomuceno, Chenyuan Wang) Inspired by local subculture, this prototype allows participants of a workshop to spray urban 3D paintings in an augmented reality experience. This approach offers some advantages regarding physical spraying: Besides being legal, the graffiti become a valuable source of situated data. The app gives suggestions like: "Where do you find a barrier?" or "What mobility offer would you suggest for this place?". Answering through graffiti involves bodily engagement with urban space and entices creative and playful answers.

Immersio (Daniel Gaar, Tuan Pham) consists of a virtual reality experience based on Neuperlach's digital model. Participants can place different props according to their mobility needs in the urban context. However, props like vehicles, vegetation, or public furniture are not represented as mere 3D objects but rather as fuzzy clouds of smell, activity, noise, pollutants, and swarms of bees, which also react to each other. Thus, the prototype aims at showing the interactions between different design decisions.

Cubic Visions (Carla Sauvant, Chenxuan Ren, Ruilin Dong) envisions a hybrid building block kit for collaborative workshops. Physical cubes with mobility-related symbols are placed on a gridded board. Both cubes and the board are equipped with re-combinable RFID chips. Thus, an RFID scanner recognises a new cube constellation on the board and sends this information to a digital visualisation program on a desktop computer. During workshops, participants engage with an urban area, place functions, and discuss ideas. On the screen, the cubes appear as 3D props and animations that interact and merge with each other. This visualisation entices experimentation and discussion of the current setup.

Mark your Future (Lisa Ableitner, Alissa Schulteß, Anna Zieziula) runs on a media column placed at a selected hub location. The column is equipped with a touch screen and a camera both facing the interaction area. The participants move large, physical cubes recognised as image markers by an AR application on the media column. The app places assigned virtual hub modules on the marker cubes – cargo bikes, lockers, and repair stations. Thus, the users interact intuitively with the digital models and receive direct visual feedback. The screen on the media column becomes a digital mirror.

Figure 4
The diagram shows which aspects each prototype incorporates from the analogue participation formats.



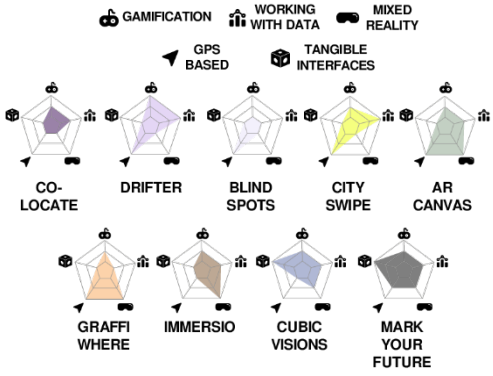
DISCUSSION:

Finally, the presented method led to various prototypes focussing on different aspects of the participation process and using different technologies. The prototypes covered all scales of decision-making, from large-scale localisation to the concrete design of single hubs (Figure 3). Furthermore, they address different depths of involvement. While most small-scale formats focus on "information gathering" (e.g., CitySwipe), larger-scale formats involve participants by asking for ideas and wishes (Graffiwhere) or even aim to involve participants in decision-making discussions (e.g. workshop kits like Cubic Visions). Also, the projects envision different time scales and functions within the participation process. While platforms like "Blind Spots" or "City Swipe" are designed for a longer data-gathering period, other tools are to be understood as complementary to concrete workshops (e.g. "mark your future"). In general, the topic of localising and configuring the hubs is best covered, while only a few projects involve inhabitants deeply in the open-ended design decisions. However, this also corresponds with our experience from the analogue participation formats.

Learning from the exploratory and artistic formats and incorporating these learnings seemed very productive in this approach. The analogue workshops made us and the students engage with concrete urban spaces and situated problems. Furthermore, these formats allowed us to test and discuss specific methods with Neuperlach citizens. This experience had a substantial impact on the prototypes, which could not have been developed in this way without the workshops. Thus, the prototypes are built upon these crucial dimensions of analogue workshops (Figure 4). Projects like "Drifter" or "Graffiwhere" were clearly inspired by different stakeholders' perspectives and findings from the explored spaces. Both worked with "Bodily Movement" and concrete "Interactions with urban spaces" to achieve this goal.

Other prototypes took up methodological aspects. "Cubic Visions" and "Co-locate" were inspired by design interactions during the workshops and included aspects like "Design" and "Group Interactions." For projects like "CitySwipe", the impact may seem less direct. However, the workshops helped to get a feeling for relevant categories and productive formats of exploration. Hence, starting from analogue experiments helped us to "situate" digital tools – delving into local perspectives, learning from open-ended explorative methods, and adapting to concrete spatial problems.

Figure 5
The diagram shows which technical features each prototype uses to incorporate crucial aspects of the analogue participation formats.



Introducing digital tools puts the focus on concrete user interactions, interfaces and modes of data gathering (Figure 5). Engaging with digital technologies forced us to be very specific about which aspects of the analogue formats should be incorporated and how they are integrated into the participation process. Projects like "City Swipe" required translating the findings of the "Drifting" workshop into concrete interactions. Furthermore, user input had to be structured according to the requirements and scales of the participation process. To reflect on the context of their tools in more detail, each group produced a "manual" with instructions on how to use their prototype in a participatory situation. Thus, engaging with digital technologies fostered a methodological reflection regarding the participation process. As argued in the beginning, making digital tools is not only to be seen as the construction of technical solutions but rather as an "attunement" (Calvillo, 2019, p. 67) and a critical engagement with urban issues like mobility.

CONCLUSION

In conclusion, our methodology connected a concrete task within an innovation project to a semester studio. For the students, this task sparked their creativity and enticed them to experiment with digital technologies. At the same time, this method helped to innovate a planning sector that is not widely known for its participative approaches in Germany. As an outlook, the presented approach could be extended to tool-building workshops with other participating groups like residents or local school classes. Collaboratively designing digital devices could become a catalyst and corrective for participatory planning projects.

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