CITY STORY

D4.1 State of the art overview of existing ways of involving a variety of stakeholders in the creation of and reflection on content creation within an urban context (Chapter II)

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General Introduction and Content Overview

The current report represents **chapter III** of a multi-chapter document, which is continuously updated with the latest findings of task (T) 4.1: Knowledge Synthesis of work package (WP) 4: Interaction Design of the CityStory project. The central challenge of this WP is to understand how physical interaction components (e.g. installations in the city, mobile units) can be intertwined with digital interfaces (e.g. smartphones, public displays). The results documented in this report will further serve as input to inform the ongoing research activities of WP2 and WP3 and will be evaluated within WP5.

This particular chapter contains the findings of the research activities from this WP, carried out in between May 2020 (M09) and April 2021 (M20). In essence it presents a rigorous revision of D4.2, chapter 2. Besides an extension of the reviewed literature of the previous two reports, it adds additional insights, critique and opportunities in regard to the state of the art placemaking interface deployments.

Contents

ABSTRACT

Although public interfaces are promised to facilitate placemaking by offering a dialogical platform to mediate between different stakeholders, little is known about whether they actually brought decision makers and citizens closer together towards local transformative change. By systematically analysing the adopted infrastructural concepts, methods and tools of 40 placemaking interfaces, this review synthesises a relational model through which three distinct types of civic agency can be afforded. We discuss how most of these interfaces are based on utilitarian motives rather than facilitating placemaking; provoke dialogues among citizens instead of between stakeholders; fail to upend the hierachical dependencies between stakeholders; make use of certain technological means that limit citizen agency; and are controlled by covert gatekeepers who operate without much accountability. Based on these findings, we propose five "middle-out" considerations that can inform the next generation of placemaking interfaces to facilitate iterative and meaningful bilateral dialogues between decision makers and citizens.

1 INTRODUCTION

Placemaking describes the philosophy and the practical process of reshaping a neighborhood, city or region in order to establish a sense of place within a community [53]. This sense of place is often created by setting up an inclusive platform for dialogue [56] between community members and decision makers that allows community members to form and share their own narratives. By revealing the polyphonic (i.e., many-voiced) nature of the resulting community narrative, the perceived unanimity behind the official plans for future actions can be broken, and the seeds for alternative actions be planted. However, the widespread and inclusive use of such placemaking platforms is faced with a wide range of challenges, as not all citizens have a meaningful opportunity to take part. Participation at on-site meetings or workshops can be biased because citizens self-select whether to attend these or not [49], which favors those people who are educated (social bias), have free time (availability bias) or have a great interest in the issues at stake (preference bias). Moreover, community gatherings have currently become highly restricted and even practically impossible due to urgent public health concerns in regards to the COVID-19 pandemic.

Public interfaces, i.e. interactive devices that are physically situated within public space, have been promised to solve many of these concerns because they are able to set up a completely voluntary and opportunistic dialogic platform by offering simple questionnaires, voting, or brief text entries on easily approachable, safe and informal interaction mediums, such as touch-enabled displays, tangible user interfaces or prototyping booths. Sometimes described as social IoT [34] or tactical [51], pop-up [22] or DIY-urbanism [26] interventions, these public interfaces yet all share one common goal, i.e. to instigate a platform for dialogue at the relevant physical 'place' that requires 'making'. In this study, we merge all these interface concepts into the more open-ended term 'placemaking interface' to denote technologically-facilitated interventions that afford a physically-situated dialogue between decision makers and citizens towards local transformative change, which can range from making a community more aware of local issues [8] or predominant values, beliefs and assumptions [20]; over empowering a community to formulate and share its needs and desires [29, 49, 55, 62]; to enabling a community to self-organise towards a certain social change [27, 34].

Initial research endeavours in the field of Human-Computer Interaction (HCI) on public interfaces focused on revealing basic usability issues, such as their vulnerability of being ignored due to expectations of irrelevant content [43], their struggle to communicate interactivity [45] and tendency to cause social embarrassment [3]. As a result, a multitude of guidelines has been proposed to tackle these issues and enable passers-by to notice interactivity, such as by incorporating on-screen reflections of themselves [41] or curiosity objects [30]; support their understanding of how to interact (e.g. by presenting gesture instructions in a dedicated section on the interface [64] or using appropriate affordances [10]); and reduce social embarrassment by balancing anonymity and social interest [59] or enabling covert interaction [54]). Further efforts include detailed models that provide insight into the spatial aspects of display placement [18], the role of the socio-economic context [40], social activation loops that promote audience engagement [66] and the importance of aligning the content to the location and people [50] and communities over time [46].

Despite this wide range of actionable insights, relatively little is known about the actual value of a public interface in the dialogic process of placemaking, i.e. whether and how it empowers the different placemaking stakeholders, such as citizens and decision makers to actually engage with each other. We believe that critically analysing this value requires exposing some preconceived assumptions that ground many current placemaking interface designs, such as in how decision makers choose a placemaking interface as an appropriate medium; how citizens are called to action; how they can contribute; which of the personal narratives are filtered out and fed back to them; and ultimately, how the resulting community narrative is used to influence the official narrative.

This review is based on the analysis of 36 academic publications that together describe the deployment of 40 different placemaking interface studies. By systematically identifying and grouping their adopted infrastructural concepts, methods and tools, we generated an encompassing placemaking interface stakeholder relationship model that expresses how these interfaces facilitated a dialogical platform between the different stakeholders. We then distilled three distinct interface typologies that differ by how they empower stakeholders to shape a community narrative from a collection of personal narratives. From these findings we discuss five critical tendencies in the current practice of placemaking interface research. Inspired by the smart engagement framework of [21], we then propose a set of "middle-out" considerations that can inform the next generation of placemaking interfaces to facilitate a true bilateral dialogue between decision makers and citizens.

	ID. Name [Ref]	Input Component	Feedback Component	Data Type	Interface Typology	Stakeholders		
						Decision Makers	Gate Keepers	Supporters
Story-based	1. Animato [61]	[icon]	[icon]	Adaptable	● ●	Open	Researcher	Volunteer
	2. Byhøst [42]	[icon]	[icon]	Foraging data	● ●	Social entrepreneur	Designer	–
	3. Capture the Moment [38]*	[camera]	[digital]	User-gen photos	○	Open	Researcher	–
	4. CitySpeak [36]*	[app]	[digital]	Adaptable	●	Open	Researcher	Bar owner
	5. Climate on the Wall [24]	[digital]	[digital]	Climate improvements	● ●	City council	Researcher	–
	6. CO2nfessions [24]	[camera/audio]	[digital/audio]	Climate improvements	●	City council	Researcher, Designer	–
	7. Discussions in Space [49]*	[app/social]	[digital/social]	Urban planning ideas	● ●	City council	Researcher, C. council	–
	8. Kerro Kartalla [42]	[digital]	[digital]	Adaptable	●	City council	Designer	–
	9. Maptionaire [42]	[digital]	[digital]	Adaptable	●	Open	Designer	–
	10. MStoryG [31]*	[digital/social]	[digital/social]	Fictional story	○	Open	Researcher	–
	11. MR-Tent [63]	[tangible]	[digital/audio/tangible]	Urban planning ideas	●	City council	Researcher	–
	12. OpenWindow [67]*	[digital]	[digital]	Adaptable	○	Home owner	Researcher	–
	13. SMS Slingshot [19]	[physical]	[digital]	Adaptable	●	Open	Researcher	–
	14. Stalltalk [23]	[app]	[app]	Adaptable	●	Open	Researcher	Volunteer
	15. Stories of Exile [65]	[pen]	[digital]	Refugee itineraries	○○	Refugee	Researcher	Visual Jockey
	16. Storytelling Machine [48]*	[pen/camera]	[digital]	Collective story	○	Open	Designer	–
	17. The InstaBooth [4]	[tangible/pen/physical]	[digital/tangible]	Adaptable	●	–	Researcher	–
	18. Travelling Suitcases [15]*	[tangible/audio/pen]	[pen/tangible/audio/physical]	Ideas of living	● ○	Estate owner	Researcher	Core group of residents
	19. Ubinion [29]*	[camera/digital]	[digital/social]	Youth opinions	●	Youth worker	Researcher, Y. worker	Youth worker
	20. Zwerm [13]	[audio/physical]	[digital]	Game-like	●●	City council, Citizen	Researcher, Neighbour	Neighbours
Polling-based	21. Bicycle Barometer [7]	[physical]	[digital]	Biking specific data	●	–	Researcher	Workshop participant
	22. Fair Numbers [32]	[app/digital]	[digital]	Visitor opinions	● ●	Community member	Researcher	Artist
	23. MyPosition [59]	[camera]	[digital]	Adaptable	●	–	Researcher	–
	24. Pinsight [35]	[physical]	[digital]	Adaptable	●●	Community member	Researcher	Pub owner
	25. Poster Vote [62]*	[physical]	–	Citizen opinions	●●	Local activist	Researcher	Activist
	26. Traject Yourself [12]	[physical]	[digital]	Perception, use of space	●	–	Researcher	–
	27. Viewpoint [55]*	[physical]	[digital]	Citizen opinions	●	Local official	Researcher, L. official	Shopkeeper
	28. Visualizing Mill Road [32]	[physical]	[physical]	Community opinions	● ●	Community member	Researcher	Artist, Shopkeeper
	29. Vote With Your Feet [52]	[physical]	[digital]	Adaptable	●●	–	Researcher	–
	30. Voxbox [25]	[physical]	[digital]	Event insights	●	–	Researcher	–
Data-based	31. Chemicals In The Creek [47]	–	[physical]	Water violation data	●	Environmentalist	Researcher	Student
	32. Citizen Dialog Kit [11]	[physical]	[digital]	Air quality / adaptable	●● ●	Citizen representative	Researcher	–
	33. Data on Site [5]	[physical]	[digital]	Air quality / shopping data	● ●	–	Researcher	Home owner
	34. Flora Luma [20]	[physical]	[physical]	EMG data of plants	●	–	Researcher	–
	35. Neighborhood Scoreboards [60]	–	[physical]	Energy consumption	●	–	Researcher	Home owner
	36. Reveal It! [58]	[digital]	[digital]	Energy consumption	● ●	–	Researcher	Workshop participant
	37. Sensors In The Sky [33]	–	[physical]	Air quality	●	–	Researcher	Workshop participant
	38. Staubmarke [44]	–	–	Air quality	●	Public health advocates	Researcher	–
	39. Street Infographics [8]	–	[physical]	Demographic data	●	–	Researcher	–
	40. Urban Telescope [6]	–	[digital/tangible]	Civic data	●	–	Researcher	Workshop participant

Legend:

Input / Feedback Components: [icon] = Physical interface (e.g. noticeboards, keyboards, custom-made buttons, chalk / tape visualisation, graffiti) [icon] = Digital interface (e.g. custom websites, photo / video players, projections, light installations, sensors) [icon] = Tangible interface (e.g. prototyping toolkits / booths, interactive tables) [icon] = App [icon] = Image input (e.g. photo/ video recording, motion tracking) [icon] = Audio input (e.g. microphones, intercom) [icon] = Audio output (e.g. speakers) [icon] = Card game [icon] = Social media (e.g. Facebook, Twitter) [icon] = Pen and paper
Interface Typologies: ● = Official inquiry ● = Open Inquiry ○ = One-directional communication ● = Bi-directional communication ● = Reflection

4

Table 1. Full overview of the reviewed works, including their technical components, participation themes, involved stakeholders and interface typologies
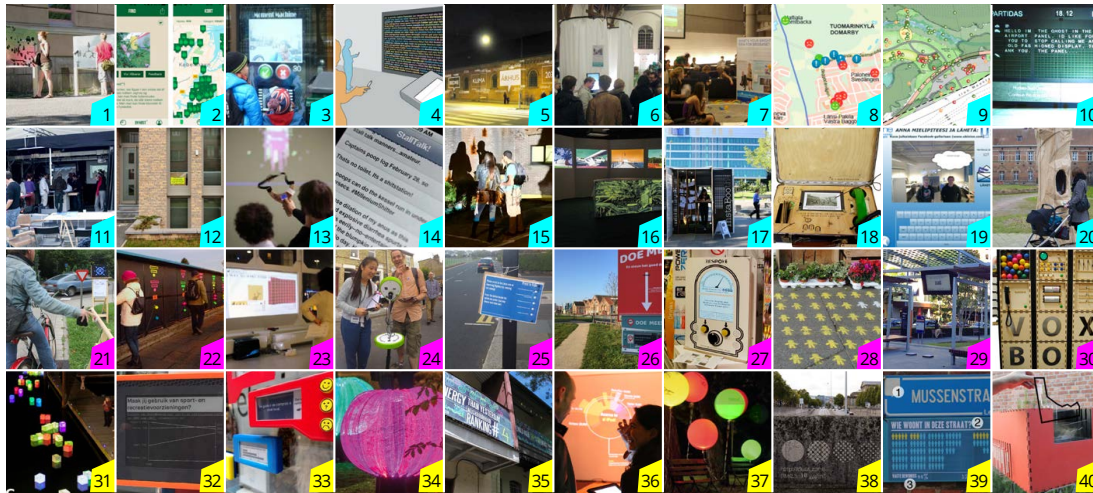
2 METHODS

Fig. 1. Matrix of the 40 placemaking interfaces that were analysed in this review (cyan: story-based, magenta: polling-based and yellow: data-based interfaces). Note that the numerical annotations correspond to those that are used in Table 1).

We adopted a non-systematic narrative review methodology [17], in order to ensure that our literature selection was more comprehensive and open-ended in nature, yet realise that it consequently lacks representative power [14]. The initial collection was seeded by sourcing a small convenience sample of 10 peer-reviewed publications, which are marked with an asterisk in Table 1. Each selected publication was required to transparently report on the design or deployment of at least one digital or tangible interface located in public space that allowed different stakeholders to initiate a placemaking activity by creating or sharing narratives with one another. This convenience sample was then broadened with 26 more publications by querying keyword combinations such as "urban participation", "citizen participation", "placemaking", "public interface" and "public display", and by scanning the reference lists of already selected works. While most publications (22, N=36) originated from academic venues related to human-computer interaction (e.g. CHI and DIS), 14 were published in venues from alternative disciplines such as participatory design (e.g. PDC) or visualisation studies(e.g. TVCG and VISAP). As three publications reported on multiple implementations, our final sample consists of 40 distinct placemaking interfaces, all of which are illustrated in Figure 1.

2.1 Stakeholders

The collection of codes, summarised in Table 1, revealed that 19 (N=40) deployments explicitly involved specific **decision makers**, i.e. external parties with a position of civic power, such as governmental agencies or private companies, but also NGO's and citizen organisations. For instance, city councils used placemaking interfaces to gather ideas and opinions from visitors of major participation events [24]; urban planning departments to collect location-specific input from citizens [49, 63]; local elected officials to poll citizens about administrative changes [55]; design agencies to engage citizens in collaborative storytelling [48] and estate owners to involve residents in building more cohesive communities [15]. Although these decision makers seemed to co-determine or financially support the overall placemaking context, they often did not actively take part in its deployment. In contrast, 13 deployments (N=40) received no direct support of a specific decision maker, and instead seemed to be primarily driven by academic research agendas. For instance, researchers deployed a placemaking interface in a university setting to investigate the anonymity of public polling by asking an artificial question [59], whereas [52] polled relatively artificial hyperlocal

5

questions to passers-by, mainly to investigate situated civic discourse. Despite that the gathered personal narratives were not utilised to tackle a real-world placemaking challenge, they still seem valuable examples, as they prompted citizens to engage with a theme that related to their community and even provoked some social debates between them in the immediate vicinity of the interfaces. Studies involved either researchers (36, N=40) or design practitioners (4, N=40) who were responsible for designing, deploying, managing and maintaining the placemaking interfaces. We borrow their descriptor **gatekeeper** from social science research, where it is used to describe an individual or collective actor who is in a position to control access to resources and rewards that are relevant in a particular social system [28]. More specialised gatekeeping activities included co-authoring polling questions with decision makers [11, 49], editing audio-visual materials to engage observers in reflection [65] or empowering citizens to create narratives [24], as well as moderating [29] or filtering [49] the contributed narrative into a cohesive community narrative. Gatekeepers often collaborate with decision makers (e.g. [24, 49, 55]) or citizens (e.g. [13, 62, 67]) to understand their intentions and needs which were then translated into meaningful placemaking interventions. However, it might be worth noting that four studies [13, 29, 49, 55] within our sample also attempted to allocate gatekeeping tasks to stakeholders other than researchers and designers. The prototypical 'end users' who actively engaged with a placemaking interface generally consist of citizens or citizen organisations representing a community. While some citizens contribute content in the form of a personal narrative or data, others just 'lurk' by only passively consuming content. In the context of online communities, 'lurking' occurs due to personal differences, social processes or technical factors [1].

About 19 studies (N=40) made use of citizens who actively assisted the deployment of the placemaking interface, yet without having any real control over it. These so-called **supporters** included trusted neighbours who facilitated the game dynamics of a city intervention [13] or by hosting placemaking interfaces behind their street side windows [5, 67]; visual artists who chalked community narratives on the street [32]; store owners who reported on how citizens interacted with the placemaking interfaces in their stores [32, 55]; volunteers who provided instructions to engage with an interactive noticeboard [61]; and specially-invited people who participated in evaluations and pilot-tests before in-the-wild deployments [5, 7, 35].

2.2 Interface Components

Fig. 2. The call-to-actions (marked in red) are designed to attract the attention of passers-by and can be combined with the interface itself (marked in green), such as in A) Postervote [62] and B) Viewpoint [55], or partially split-off into separate elements, as depicted for C) Citizen Dialog Kit [11].

In the next step, we analysed each publication's textual and visual descriptions to dismantle the adopted placemaking interfaces into similarly discernible technical elements (e.g. creation and feedback components, storages); the functionalities they afforded (e.g. contributing or responding to narratives by casting a vote, creating text or recording audio-visual material); and the dialogical relations they created between the different stakeholders (e.g. negotiating, inquiring or moderating narratives). As shown in Figure 2, some placemaking interfaces allowed citizens to submit narratives through a **creation component** that was typically comprised of two parts: 1) a **call-to-action** that invites citizens to engage by showing concrete information, such as polling questions (e.g. [11, 55]), data visualisations (e.g. [5, 58]) or graphical indicators (e.g. [7]); and 2) the **interface** itself, which hosted interactive hardware features such as physical buttons [11, 55], keyboards [29, 31], cameras [29, 38, 38], microphones [24] or offered access to communication

6

channels, such as SMS [49], social media [31] or custom made web forms [23, 36] that outsource the authoring to personal computing devices. Some creation components made use of tangible props in order to more deeply trigger inspiration and support the creation of more complex content contributions [24], such as miniature-scale architectural models [63] or magnetic tokens of words and geometrical shapes [61].

Fig. 3. Placemaking interfaces deploy various kinds of feedback components, ranging from "reverse graffiti" in A) Staubmarke [44], over wall-sized split flap displays in B) MyStoryG [31], to kiosks embedded into facades in C) Capture the Moment [38].

As shown in Figure 3, almost all placemaking interfaces contained a **feedback component** to present the personal narratives back as a potential community narrative. Common feedback components made use of digital media such as custom-made websites [23], smartphone applications [42] as well as social media platforms [29, 31, 49]. Other placemaking interfaces conveyed feedback in the physical realm by using digital displays [24, 29, 49], written notes on pre-fabricated cards [15], chalk graffiti [32], official signage [8], verbal presentations [62] or physicalisations [6, 47] to avoid that citizens needed to remember custom points of entry (e.g. website URLs). While creation and feedback components are often integrated within a single interface such as a website or a public display, they tend to be physically detached in separate booths or displays when the chosen media types (e.g. audio, video) could generate serious usability bottlenecks (e.g. [24]).

2.3 Data Components

As shown in Table 1, we coded three distinct narrative types. Data-based interfaces are based on offering or gathering quantitative data such as from automated sensor measurements [33, 44, 60] or open data-sets, such as demographics [6, 8]; polling-based interfaces offer discrete opinion polls [11, 55]; and story-based interfaces facilitate the authoring of more complex and orchestrated types of content [15, 29, 31]. As the narrative typologies are not mutually exclusive, we categorised each interface by its stated primary aim despite its secondary features that might match other narrative types. For instance, a "story" can also emerge when citizens come together to debate over displayed demographic data [8]; or a data-based interface could afford polling functionalities [5]. Dedicated **storages** accumulate these narratives either digitally in the form of traditional databases on site [11, 67] or remote wirelessly networked machines [23, 42]; directly on the physical creation interface, such as on public notice boards [61], photos and notes [15] or via co-designed tangible prototypes [4]. Before personal narratives are fed back to the citizens, they need to be **filtered** as to prevent offensive or off-topic submissions to become broadcasted. This filtering is usually carried out manually by gatekeepers [49] or decision makers [29],yet can also be automated by filtering algorithms [36] or outsourced to social media platforms like Twitter [31] as these provide powerful, already built-in censoring functionalities.

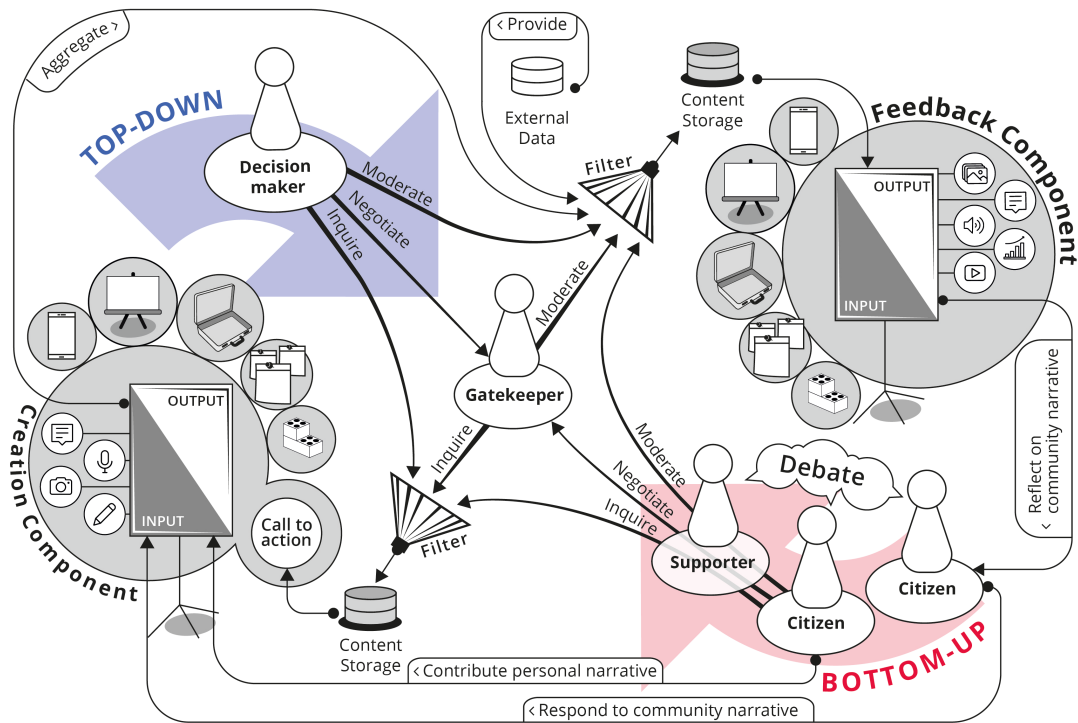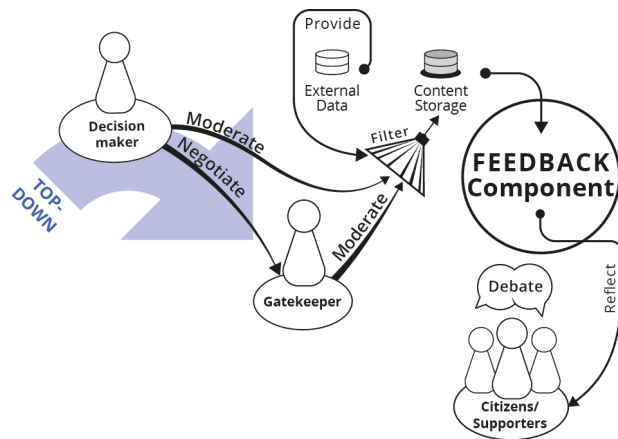## 3 PLACEMAKING INTERFACE STAKEHOLDER RELATIONSHIP MODEL

Fig. 4. The placemaking interface stakeholder relationship model. By placing top-down and bottom-up stakeholders at their corresponding locations, the resulting circular shape of the information flows expresses the platform behind placemaking, in that decision makers and citizens should influence each other in a continuous dialogical feedback loop: the 'aggregated' personal narratives from citizens should inform decision makers to distill a community narrative that is then fed back.

By systematically overlapping each placemaking interface in terms of its stakeholders, components and narratives, a model emerged that describes the relationships between them. As shown in Figure 4, this model demonstrates how current placemaking interfaces allow citizens to influence their dialogue with decision makers in three different ways.

3.1 Reflection Interfaces

8

Fig. 5. Reflection Interfaces enable top-down stakeholders to display community narratives to citizens. While citizens might debate amongst each other, they have no means to contribute or influence what narrative is shown.

As shown in Figure 5, reflection interfaces facilitate placemaking primarily through a 'top-down' approach, as decision makers and/or gatekeepers present community narratives much like how public advertising functions. The placemaking goal is limited to triggering a debate regarding local concerns, such as to inform citizens about environmental (e.g. [20, 44] or demographic [8, 32] concerns. The presumed quality of a reflection interface sits in reaching citizens in opportunistic ways, as the information can be consumed voluntarily and effortlessly. Due to its passive nature, this typology acknowledges a latent community narrative much like how a message board or bicycle counter recognises a particular behaviour by publicly sharing closely related information.

Agency: Because citizens can only consume but not create or respond to the community narrative, its actual impact cannot be recorded. Instead, citizens can only raise their opinion during encounters with other citizens, often with friends or family afterwards [8], or with others who are located around the interface [32], during on-site conversations [20] or follow-up interviews [8, 32] with decision makers or gatekeepers.

3.2 Communication Interfaces

Fig. 6. Communication interfaces enable one-directional (basic model) or bi-directional (including the green lines) engagement with personal narratives.

Figure 6 illustrates how communication interfaces facilitate placemaking by empowering citizens to exchange personal narratives with one another, which can consist of messages, ideas or concerns that often are related to the space that surrounds the interface, such as local urban-planning needs [49] or experiences of living in a deprived neighbourhood [15]. Because of the required creation component, communication interfaces either make use of already existing infrastructures, such as permanently installed public displays [36, 49]; temporary means like location-based QR codes [23] or lightweight public noticeboards [61]. These interactive features either allow that personal narratives remain entirely free and open [19, 23, 31, 61]; or become situated within a broader community narrative such as sustainability [24] or experiences of exile [65]. **Agency:** Six (N=14) communication interfaces allowed only **one-directional** forms of dialogue, as they displayed snapshots [38], fictional stories [31, 48], or personal statements [67] that were created by citizens for other citizens which yet could not react to them. The remaining eight interfaces enabled **bi-directional** dialogues as they enabled citizens to react upon the personal narratives of other citizens, such as via textual messages that would be displayed on a public display [49] or by forming temporary statements via an interactive projection [24]. Communication interfaces that allowed anonymous narrative creation, filtered for offensive submissions either via algorithms [36] or by hand [49]. Others, published personal narratives without filtering because gatekeepers could observe their creation on-site [61, 63]; the underlying interaction

modality limited opportunities to create offensive content, such as by providing a selection of pre-selected words to formulate a narrative [24]; or because their authorship was immediately obvious (e.g. a local household [67]). Yet, notably, some deployments deliberately allowed anonymous citizens to submit a narrative without filtering the contributions [23, 31, 42].
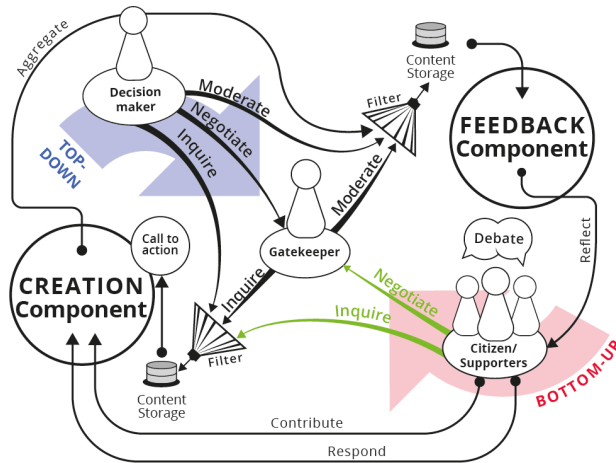
3.3 Inquiry Interfaces

Fig. 7. Inquiry interfaces afford 'official' inquiries organised by top-down stakeholders to poll the public (basic model) as well as more 'open' inquiries that include citizens in creating a the call-to-action (including the green lines).

As shown in Figure 7, inquiry interfaces are characterised by the presence of both, top down and bottom up stakeholders who wish to gather public feedback regarding a specific theme. Its primary aim thus lays in supporting civic consultation, such as sourcing urban planning ideas [49, 63], testing general sentiments regarding administrative interventions [55], mobility plans [62], or climate positive actions [24]. Inquiry interfaces often focus on engaging citizens who normally do not, or cannot, take part in public debate, like the youth [29], time-poor or impassive individuals [49], or marginalised. groups [55]. In contrast to communication interfaces, that rarely require the submissions to fall within specific themes, the personal narratives must always respond to a predefined call-to-action. This call-to-action was typically determined by the stakeholders through a dedicated creation component, such as a web-form [13], a smartphone app [42]; or was decided in negotiation with a gatekeeper who controlled the interface's back-end [11, 55, 62].

Agency: We differentiate between **official inquiries** (18, N=25) where only selected individuals, such as city councils [24, 55] or urban planers [49] had the authority to define a call-to-action; **and open inquiries** (7, N=25), that also empowered citizens, such as local activists [62] or citizen organisations [11] to initiate a call-to-action. However, as this objective was sometimes restricted by the citizen's opportunity to negotiate with a gatekeeper who was responsible for implementing their call-to-action, such as when researchers collaborate only with specific citizen groups [5, 11, 32], we categorised them as both open and official in Table 1. Our results further showed that official inquiry interfaces often targeted relatively shallow placemaking themes, such as open-ended inquiries like "What is the dirtiest spot in your neighbourhood?" [13] or "How busy is this place at the moment?" [12] to avoid any influential placemaking expectation.

4 DISCUSSION

Based on these findings, we discuss five observed critical tendencies within the current published studies of placemaking interfaces in the typical chronological order of their deployment, and frame their potential generalisation within the limitations and shortcomings of our model. For each tendency, we also propose several 'middle out' considerations, i.e. concrete suggestions that future research endeavours could appropriate to help transform placemaking interfaces into a truly dialogical platform.

4.1 How Placemaking Interfaces are Initiated

Most public placemaking interfaces are initiated by utilitarian motives, rather than facilitating placemaking. This can be recognised by at least three distinct indicators:

External gatekeepers. As Table 1 demonstrates, gatekeepers are almost exclusively represented by academic researchers who are motivated by aims that are external to placemaking, such as to evaluate a conceptual or technological innovation in an ecologically valid setting. While this finding can be reasoned away by the fact that our data collection predominantly originated from technology-driven research domains, we however discovered only four attempts to involve other stakeholders in gatekeeping, and we found very few publications that reported on using placemaking interfaces in adjoining scientific domains, such as participative design or urban planning.

Artificial placemaking contexts. Table 1 details how 13 (N=40) deployments did not report the presence of specific decision makers. Moreover, most remaining studies did not describe any active participation of decisions makers, such as to co-determine the actual placemaking theme, the call-to-actions, the gatekeeping actions, and so on. Instead, we noticed that many studies avoided more challenging placemaking contexts as they intervened at sites within or close by universities [29, 59], during (semi-) public events [24, 48] or in more controlled settings, such as in citizen's homes within established communities [15]. This concern might be best explained by a general lack of interested decision makers, the efforts required to get them invested, or the fragile character of evaluating an experimental technological interface in a real-world situation. For instance, a placemaking interface normally requires physical access to energy infrastructure [37] and benefits from a socially predictable setting [2] in terms of targeting a single predominant language, higher digital media literacy skills and limited risks of vandalism. By considering a placemaking context as a controlled circumstance, it is implicitly expected that an identical interface will perform similarly in other contexts.

Placemaking evidence. Few publications reported empirical evidence of the actual impact their interfaces had created on the local placemaking process, beyond if and how citizens interacted with the deployed systems. Moreover, most publications did not target why a specific placemaking theme was selected above others, or how the resulting community narrative was used by decision makers to tackle the actual placemaking issue at hand.

Middle out consideration. Future research could commence from a placemaking perspective rather than evaluating technological innovations. Our findings suggest that this can be achieved by: 1) forcing the researcher "out" of the placemaking interface model and 2) opening up gatekeeping tasks to the stakeholders who already take part in the placemaking process. From a technological perspective, this yet means that the back-end interfaces should become more easily accessible for supporters with a certain technical skill, or for lay citizens without any technical skills. As the context will then be chosen according to real placemaking issues at hand, placemaking interfaces should 3) shift from fragile experimental technological probes to high-fidelity prototypes that are sufficiently robust to withstand more challenging sociocultural environments. Despite these significant efforts, we believe that these strategical changes will

bring about novel problems that could be technologically solved, from overcoming the social and cultural inhibitors that withhold certain citizens to participate, to inventing new interactive media that are intuitive, robust and safe to use during pandemic conditions. Future evaluation studies could then benchmark these new public interfaces in terms of attracting hard-to-reach citizens or substantially influencing a local placemaking agenda.

4.2 How Placemaking Interfaces are Motivated

Despite the goal of placemaking interfaces, to provide a dialogical platform to facilitate interaction between all stakeholders, most deployments enabled discussion between participants foremost.

Interface type frequency. The relative high number of reflection and inquiry interfaces at one side (32, N=40), and the sparse occurrences of truly 'open' inquiry interfaces that allow citizens to have control over both the creation and feedback components (7, N=40), suggest that setting up true bilateral communication

is technically challenging, as each stakeholder would need access to dedicated interfaces that allow exploring, filtering and curating the data storages.

Differences in bi-directional communication. While the majority of inquiry interfaces provided some sort of feedback, such as by displaying pre-defined narratives to acknowledge a submission [35], providing automated data visualisations that summarise all collected responses to a polling question [11], or physically convening various stakeholders at the same location [47, 62], we identified only four deployments (i.e. [13, 29, 42, 55]) that actually allowed decision makers or gatekeepers to personally respond to the submitted narratives via the interface itself. However, even then it cannot be ensured that the feedback also reaches the intended citizens, as they are required to return to the location of the deployment [49].

The fact that most inquiry interfaces do not close the dialogic feedback loop with a renewed community narrative once citizen have submitted their personal narratives can be explained by how the slow-paced administrative decision making process often outlasts the duration of a deployment [55]. Yet we also argue that most back-end systems do not contain this functionality, and even if so, most decision makers were not invited by gatekeepers to help accomplish this task because the underlying studies were not intrinsically interested in evaluating their interfaces for this goal.

Middle out consideration. Future research could develop the technological means to facilitate multiple iterative and bi-directional dialogical loops between decision makers and citizens. Not only does this mean that decision makers require efficient tools to moderate personal narratives into a trustworthy and therefore balanced community narrative, but also that the resulting community narrative can be treated as empirically grounded evidence. Research findings

should then report on how public interfaces support decision makers in addressing real placemaking issues, which includes an objective estimate to what extent the gathered personal narratives are representative; and to what extent citizens trust the resulting community narrative.

4.3 How Placemaking Interfaces are Deployed

Most placemaking interfaces reaffirm the prototypical hierarchy between stakeholders instead of upending them.

Top-down placemaking. From the 19 studies that specified the involvement of decision makers, only two involved non-unionised or everyday citizens (i.e. home owners. [67] and refugees [65]) instead of organizations with established power, such as local governments and business operators (N=9) or NGO's and neighbourhood committees (N=8). From our own anecdotal experience, this might be best explained by how working with existing organizations speeds up access to crucial resources, such as data, official permits or volunteering study participants. Supporting true bottom-up initiatives instead requires more time-consuming and haphazard actions like flyering, door-to-door advertising or social media posts - and even then, one could argue that researchers initiated and facilitated the placemaking.

Limited citizen involvement. Of the 19 studies that involved supporters, i.e. citizens that partook in more meaningful ways than only contributing personal narratives, the majority of them were entrusted with rather incidental tasks, such as hosting technology or providing feedback on particular interface designs. Yet, we only discovered four studies that allowed supporters to contribute or even co-determine how the personal narratives were used.

Middle out consideration. Public interfaces should aim to upend the traditional hierarchy of placemaking by integrating new technological tools that allow each stakeholder to take charge or at least influence each placemaking task. Consequently, the next generation of middle-out interfaces could turn our placemaking interface stakeholder relationship model upside down and enable a local community to determine the most pressing placemaking theme and then allow different decision makers to submit their own—and potentially different—narratives on the matter that then can be filtered by individual citizens. Once placemaking interfaces are implemented more like (open-source) tool-kits rather than one-off technological prototypes, researchers can potentially retreat to objectively observe how stakeholders make use of them.

12

4.4 How Placemaking Interfaces are Represented

The use of certain technological means inherently affords or restricts the agency of citizens.

Interface typology. Our review suggests that the choice of interface typology correlates with the use of certain technological creation and feedback components. Table 1 suggests that reflection interfaces (N=13) almost exclusively display an abstracted overview of narratives through textual (N=8) or visual (N=5) representations of data such as numerical statistics [58, 60] or infographics [8, 32]. While showing anonymized numerical data does not require any moderation by a gatekeeper, data only forms a discrete and limited picture of reality that might be experienced differently by citizens. Similarly, a community narrative shaped in the form of data often abstracts the potential needs of citizens into an average, while it is often the outlying opinions that spark new ideas. In turn, inquiry interfaces (N=25) seem to predominantly utilise polling systems, such tangible voting devices [62] or touch enabled polls [58] (N=13), whereas. communication interfaces (N=14) exclusively afforded the creation of more open-ended personal narratives in the form of audio, video, photo or text [19, 24]. These media types allow for more articulate and qualitative narratives, which contextualise local opinions in more subjective and expressive terms. The underlying opportunities are perhaps most exemplified in the case of tangible inquiry interfaces [4, 63], where personal narratives can only be fully comprehended by those who were physically present during its actual construction.

Middle out consideration. Future research could progress towards public interfaces that exploit the advantages of anonymous, data-driven narratives to show up-to-date holistic overviews with the advantages of story-based narratives to show more expressive yet situated views of reality. For instance, citizens could be encouraged by data-driven calls-to-action that display actual measurements of relevant phenomena, to which they can reflect via more open-ended narratives.

4.5 How Placemaking Interfaces are Controlled

Most placemaking interfaces are controlled by an external party who operates covertly and without much accountability. As a result, citizens are often unable to ascertain the author of a placemaking interface, understand the reasoning behind the filtering of their personal narratives [39], or simply access the collection of narratives for themselves to explore for new ideas or identify potential filtering biases.

Opaque accountability. Our model, shown in Figure 4, illustrates how the power of a placemaking interface is centralized within the gatekeeper. With the ability to filter and moderate both personal and community narratives, this stakeholder has perhaps the most power within the participation process. At the same time, the existence or identity of the gatekeeper seems rarely explicitly acknowledged to citizens, which forces them to interpret the authorship of an interface via textual or graphical legends [8], via the ownership of the physical location of the interface [62, 67], or the materiality of the interface itself [9].

Content and data access. While it is now common in data work to provide users with direct access to the original data source, our review did not reveal similar mechanisms for placemaking interfaces.

Fairness. Most studies did not document how their narratives were filtered, or only described it as an incidental activity that had to be carried out by the gatekeeper. Moreover, most typical gatekeeping tasks seem difficult to delegate to other stakeholders, as it requires a certain degree of technical literacy and availability [49]. Even then, moderating publicly relevant narratives in a representative way is not trivial and open for certain bias, even when it only consists of selecting a range of numerical sensor measurements that represent local air pollution levels [5] or editing an audio-visual story created by local citizens [24]. This bias might even present itself unintentionally, such as when a gatekeeper edits video scenes that seem boring yet were perceived as meaningful by the original citizen [39].

Middle out consideration. The next generation of placemaking interfaces could better articulate and communicate the process of gatekeeping towards citizens as well as to academic peers. Potentially achievable efforts in this direction could comprise: clearly announcing the identity, affiliation and contact details of the gatekeeper; explicitly acknowledging the process of moderation [16], such as by clearly conveying how the shown narratives only forms a sample of the available data (in [36] for instance, inappropriate contributions

were displayed in an encrypted order of letters); and providing direct and open access to all available content. As content creation is suggested to be crucial for the acceptance of a placemaking interface within a community [34, 46], we propose that this 'creation' activity should also include the moderation and filtering of that content. Community champions, who are often trusted and accessible members of a community [57], seem to be the most obvious stakeholders to fulfil these gatekeeping tasks.

5 LIMITATIONS

As we do not position this study as a systematic literature review, our conclusions should not be generalised outside of the currently predominant directions in the field of human-computer interaction in general, and public display research in particular. As such, a more systematic review method might have provided more trust in our main findings, in particular to matters that regard to the relative frequency of the observed phenomena. We also realise that other advances in placemaking interfaces might exist in both practice and academic research that deserve a place in our review, e.g. within HCI as well as in social and urban studies, social geography, arts- or design-based studies, community-based, place-based and participatory (design) research, and many others. Knowing that most of the critical issues that we identified are still technologically constrained, we however have confidence that our findings still apply. We thus believe that our chosen methods, supported with the evidence synthesised in Table 1, provide sufficient transparent data to draw valuable conclusions that are relevant for the future progress of placemaking interfaces. Due to inconsistencies in how the different publications reported the actual processes that drove their deployments, we might have misinterpreted some interfaces to fall within the wrong categories. We note however that our model and its classifications are not exhaustive nor deterministic but meant as an open-ended invitation to pay more attention to the most prevalent factors that inhibit a true dialogue between the different stakeholders.

6 CONCLUSION

This paper presented a critical narrative review of the current state of placemaking interfaces by systematically analyzing 36 academic publications that together describe the deployment of 40 different placemaking interfaces. It contributes to this emerging domain by proposing an encompassing relational model of how placemaking interfaces facilitate a dialogic platform between the different stakeholders, and by recognizing how three interface typologies exist that differ by how they empower the different stakeholders to shape a community narrative from a collection of personal narratives. Top-down reflection interfaces allow decision makers to inform or influence citizen opinions and behaviours, while bottom-up communication interfaces allow citizens to determine the community narrative being shown, and inquiry interfaces facilitate more bi-directional inquiries between both stakeholder groups. Based on these findings, we discussed how most current placemaking interfaces: 1) are still based on solving utilitarian motives, rather than facilitating placemaking itself; 2) focus on enabling a dialogue among citizens, instead of between citizens and decision makers; 3) reaffirm the prototypical hierarchy of stakeholders instead of upending them; 4) make use of technological means that inherently limit citizen agency; and 5) are often controlled by an external party who operates covertly and without much accountability. We then proposed a set of "middle-out" considerations that have the potential to inform the next generation of placemaking interfaces to facilitate a true bilateral dialogue between decision makers and citizens.

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