

Co-Imagining the Future of Playable Cities

A Bottom-Up, Multi-Stakeholder Speculative Inquiry into the Playful Potential of Urban Technology

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ABSTRACT

Here we present a co-design exploration into the potential of technology to playfully re-signify urban spaces. We created a speculative catalog of urban tech and used it to facilitate multi-stakeholder discussions about the playful potential of smart cities. The learnings from our co-design engagements embody different people's ideas of how tech might and might not support rich forms of urban play, and contribute to ongoing efforts at exploring how to playfully reconfigure our cities. We present: (1) a list of inspirational play potentials of urban spaces—i.e. playful things already people do, and enjoy, in the public space; (2) a portfolio of speculative ideas that show how tech might help to realize that potential; and (3) a discussion of stakeholders' responses to these ideas. Our work can provide designers with inspiration and actionable advice for cultivating forms of urban play that cater to people's socio-emotional needs.

CCS CONCEPTS

• **Human-centered computing** → Interaction design; Interaction design process and methods; Contextual design.

KEYWORDS

Play, Smart cities, Urban technology, Situated Play Design, Fun, Speculative design, Co-design

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CHI '22, April 29–May 05, 2022, New Orleans, LA, USA

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ACM ISBN 978-1-4503-9157-3/22/04.
<https://doi.org/10.1145/3491102.3501860>

ACM Reference Format:

Ferran Altarriba Bertran, Cameron Cooke, Ivy Chen, Victor Dong, Binaisha Dastoor, Kelsea Tadano, Fyez Dean, Jessalyn Wang, Jared Duval, Katherine Isbister, Laura Bisbe Armengol, and Adrià Altarriba Bertran. 2022. Co-Imagining the Future of Playable Cities: A Bottom-Up, Multi-Stakeholder Speculative Inquiry into the Playful Potential of Urban Technology. In *CHI Conference on Human Factors in Computing Systems (CHI '22)*, April 29–May 05, 2022, New Orleans, LA, USA. ACM, New York, NY, USA, 19 pages. <https://doi.org/10.1145/3491102.3501860>

1 INTRODUCTION

Smart cities are often presented as opportunities to increase urban efficiency [9], optimize infrastructure [58] and, thus, spur the economy [26]. Less attention is paid to how tech may or may not contribute to enriching the socio-cultural fabric of cities [21] [57], especially in commercial implementations [44]. This as a missed opportunity when it comes to cultivating stimulating urban spaces where people can flourish. Inspired by existing works exploring less techno-centric (e.g. [8] [57] [69] [75]) and increasingly playful (e.g. [42] [64] [71] [80] [84]) urban futures, we have a design research agenda of exploring the potential of play to contribute to the social, cultural, and emotional sustainability of urban spaces.

Research suggests that cities should be far more than productive [64] [80]. Our streets, parks, and town squares are far more than tools at the service of our economy: they are made up of moment-to-moment passing interactions between human beings and, as such, they should be socially rewarding, culturally stimulating, and emotionally rich. While there is value in designing technology that makes our cities more efficient, designers should also pay attention to the impact that technology has on people's mundane experiences of their day-to-day. Here we contribute to an emerging body of work that explores how to do that by adding an element of play to our streets (e.g. the designs presented in [42] and [64], or those described in [84]). In particular, our study investigates the inherent playful potential of urban spaces and speculates as to how we could design interactive technology that helps to realize it.

Here we present the outcomes of a speculative [11] co-design [72] exploration of the playful potential of technology to reclaim the socio-emotional significance of the urban space. Our contribution is three-fold: First, we provide a list of *play potentials* [2] of urban spaces (Section 4): a set of urban play forms that we observed in the ordinary urban practices of people in different parts of the world. As instances of people’s natural, spontaneous playful urban behavior, we present those play potentials as a valuable inspiration source for designers. Our second contribution is an *annotated portfolio* [38] in the form of a catalog of speculative playful urban technology ideas (Section 5). The concepts featured in the catalog build on, embody, and instantiate the aforementioned play potentials to illustrate how they may inspire novel urban tech. Finally, our third contribution is the learnings from discussing our catalog and speculative ideas with people with diverse socio-cultural, geographic, and professional backgrounds (Section 6). The insights from those conversations allow us to provide actionable advice for developing playful urban technologies that are sensitive to people’s social, emotional, and cultural needs. Overall, we believe our work empowers designers to embrace increasingly playful and socio-emotional approaches to urban innovation, providing both inspiration and guidance to facilitate that move.

2 BACKGROUND

2.1 Smart City Innovation: from Productivity to Social, Cultural and Emotional Sustainability

With every generation, technology weaves its way more deeply into our lives, and each time we must remake the choice to care about lived experience. Smart homes represented one such inflection point a couple of decades ago: in response to the increasing presence of digital technology in our lives, the UK EPSRC *Equator Project* (2000–2007) [32] explored how not to lose sight of lived experience in the face of productivity-focused technology trends. Today, chiefly in the industry sector [44], smart cities present similar challenges: while promising increased competitiveness and quality of life [10], innovation often favors techno-centric rhetoric that privileges agendas such as increasing urban efficiency [9], optimizing infrastructure [58], or spurring economic activity [26]. Less attention is put to social intelligence, cultural artifacts, or environmental attributes [55]—all key to socio-emotionally sustainable urban entanglements.

Alternative urban design approaches exist, e.g. human-centered [8] and sustainable [75] smart city design, democratic [57] and inclusive [69] planning, or bottom-up urban innovation [21]. Here we contribute to a subset of this research space focused on the potential of urban play: the *playable city* [64]. Building on recent works in this space (e.g. [42] [64] [71] [80] [84]), we argue that cities should be far more than efficient; they should also be socially rewarding, culturally stimulating, and emotionally rich. We highlight the importance of embracing those values in the design of socio-emotionally sustainable urban spaces. Play can be a way of facilitating that move—a lens through which we can reclaim the socio-cultural function of cities and *resemantize* [68] them so they respond to our need for everyday play.

2.2 The Socio-Emotional Relevance of Play

Humans are not productivity machines—we are motivated by pleasure, social and emotional connection, agency, and joy [19]. If cities fail to afford these experiences, they can become unwelcoming. Fun is not an optional quality when it comes to urban spaces—it is deeply necessary, as we know from Jane Jacobs’ work [22] on what makes cities places to thrive. Cities are made up of moment-to-moment interactions between people, and as such they should cater to our socio-emotional needs. Play can be a way to bring these properties into the urban space: it is a fundamental human need [17] [20] [47] [73] that enriches our experience of the world we live in. [73] call this the *eudaimonic* function of play: even if it does not yield materially productive outcomes, it can be socio-emotionally productive. Inspired by existing research on how play and games can support day-to-day ludic experiences (e.g. [37] [88]), here we argue for the potential of play in urban design. In particular, we focus on three qualities of play that are known to be socio-emotionally relevant:

Play brings joy to situations that might otherwise be unstimulating: it generates positive emotions because it speaks to our inner desire for joy and stimulation [17]. It is commonly said that, when playing, “time flies”. Play puts us in a state of *flow* where we are deeply immersed in, and profoundly enjoy, whatever we are doing [25]. While boredom can also contribute to our well-being [69], through play we escape it whenever necessary—reframing annoying or tedious situations [17] and bringing about fun and laughter. [42] [64] [80] show how that can be relevant in the space of urban innovation: playful tech season countless playless situations we experience daily by turning urban spaces into ephemeral playgrounds. It can create *porous* circles of play [78] that, while not removing us from the situation, afford “entertaining and healthy experiences that improve [our] quality of life” [64] and give us chances to let go of unnecessary feelings of boredom and frustration—feelings that are unfortunately not uncommon in our ordinary urban endeavors.

Play can help us to experience a feeling of agency: it allows us to act in ways that feel meaningful [73] [74]. That can be very valuable in a world where we are increasingly reliant on larger structures, to the extent that we feel a lack of control of our life [77] [82]. Play empowers us to act upon the world around us [74] and cultivates creative ideation [88]. That is, in part, because play is both appropriative and disruptive: it takes over the context where it happens and challenges the state of affairs [59]. Being playful allows us to bring freedom to a context without disrupting it completely [59], setting the right conditions to create [76]. Recent research has positioned those as desirable qualities of urban spaces, noting that playful tech can entice people to play an active part in the ongoing development of their city [28].

Play supports social affordances [49], which is highly relevant as social interaction is key to human flourishing [48]—even more so in a contemporary society that suffers from an increasing lack of meaningful social connection [50]. Some argue that digital tech might contribute to that problem, e.g. through screen-based interactions that distract people from co-located social interaction [46]. Here we argue that technology does not necessarily need to isolate us—it has the capacity (and, arguably, the responsibility)

of enriching our social lives. Play can support that, as it is known to have “a positive impact on the wellbeing of both individuals and groups” [47]. Playful tech can help to bring people together [48], physically or virtually, and give them opportunities to play and discover together—what [43] frame as *meaningful inefficacies*. According to recent research, such kinds of urban designs that privilege relationship-building over efficiency can lead to greater trust in public institutions [43] and support collective bottom-up city-making [55] [71].

These experiential qualities (joy, agency, and social connection) respond to important societal values. We argue they should be carefully considered when designing (for) the urban space—they are desirable social goods that can contribute to the well-being of both individuals and groups. While these qualities are not only present in playful experiences, play can help us to access them—in and beyond the urban space. In a world where tech is increasingly present, designers should cultivate those kinds of experiences; and technology can undoubtedly help us be more productive, but it should also augment the experiential texture of our lives. With the work presented in this paper, we hope to contribute to an ongoing move towards more playful and socio-emotionally sensitive urban innovation.

2.3 The Playable City: Related Work at the Intersection of Urban Technology and Play

In HCI, a plethora of design and research work has explored the intersection of play and smart cities—i.e. *the playable city* [64]. Within this space, different approaches exist. For example, location-based games use urban spaces as physical landscapes within which virtual game worlds emerge. Whether in the form of research designs (e.g. [41]) or commercial products (e.g. *Pokémon Go* [63]), these games typically present alternate realities that take place outside of the player’s ordinary routine—entertainment-focused virtual worlds that hardly interface with the player’s ordinary urban practices.

Another set of works in this space are those that *gamefully* augment urban activity to support productive outcomes—what [84] calls *urban gamification*, e.g. a serious game to reduce energy consumption in smart buildings [36], or a gamified app to optimize urban transportation [30]. Those interventions can also be *playful* rather than *gameful* [56], e.g. a set of piano stairs to promote healthier habits [67]. Unlike location-based games, these designs strongly adapt the gameplay experience to people’s ordinary, non-play activity, and they are often meant to support productive, measurable goals rather than to simply enrich people’s experience of their city—an agenda that is central to our work.

The productive aim behind urban gamification is in part shared by another type of designs at the intersection of play and the city: *urban planning games* [7] [68]. Rather than playfully augmenting people’s experience of the urban space, or any activity taking place within it, those games focus on supporting multi-stakeholder urban planning dialogues—that is, they engage citizens in the decision-making behind new urban developments. An example is *common-spoly* [87], a critical game designed to stimulate a collaborative, commons-based approach to the use of public resources.

Games can also promote *playful citizenship* [42]—or, as [28] puts it, “shift the attention from smart cities to smart citizens”—by playfully empowering people to actively engage in city-making within the context of their day-to-day activity. Unlike urban planning games, which enable people to think about the future of their cities at a conceptual level, *civic games* encourage them to build that future from the very present, through their daily actions and behaviors. Unlike gamified apps or serious games, they are meant to enhance a city’s socio-cultural dimension rather than its productive capacity. For example, *Commons*, is a game about filing claims about community needs by gathering evidence on city streets [51]. The work of [81] has also investigated the potential of urban play beyond the notion of gamified cities, exploring the ways in which games can strengthen social ties, amplify networks, and thereby support *civic learning*. We are inspired by how those games support rich socio-cultural engagements between citizens and their urban space.

Finally, we see playful urban designs that are not games per se but technology-mediated invitations to engage in free-form urban play. These kinds of open-ended playful tech have been characterized as *playscapes* [14], i.e. “ambiguous playthings that invite open-ended and unstructured play”, or *technology for situated and emergent play* [3], i.e. “technology that supports playful engagement that emerges interwoven with our everyday activities outside leisure, and that enriches these activities with socio-emotional value”. Examples abound: *SelfieCafe* fosters social interaction between community members by allowing them to take a selfie and share it on a large display [70]; *spread.gun* allows people to sabotage advertisement screens and “reclaim” them with custom messages [34]; *Urbanimals* [54] and *Hello Lamp Post* [66] allow people to interact with urban infrastructure playfully, let it be physically or verbally, in ways that transcend the doctrine of productivity; or *Wiggle the Eye* [85] is an installation comprised of five interactive benches and a central light that reacts to people’s activity on the benches. These works create space for *meaningful inefficacies* [43] that enable a *resemantization* of the urban space, allowing play to “infiltrate several contexts and spaces, and to propose new meanings, new constraints, new strategies, and new motivations” [84]. We are inspired by how they invite people to spontaneously reframe cities into arenas for exploration, creativity, community-building, and ephemeral collective joy.

Despite their differences, those four types of playful and gameful urban technology share a focus on infusing aspects of people’s urban endeavors with an element of playfulness—or, as [84] puts it, a “desire to rewrite the city, to reshape it, to engrave oneself in it, to renew it by resorting to the energy and the ability to motivate people that emanates from play”. Insofar as they propose experiences that (in different ways and to different extents) intertwine with people’s ordinary urban activity, the playfulness they afford must be contextually meaningful. This paper argues for playable cities where play is smoothly and carefully integrated into people’s daily lives. We hope that our work inspires designers interested in strengthening the palette of design exemplars bridging play, technology, and urban design.

3 METHOD

To explore increasingly playful avenues for smart city innovation, in this project we followed a participatory [62] research through design [39] approach. In particular, we used the Situated Play Design (SPD) methodology [2], which proposes to explore playful things people already do and enjoy in a particular context—the so-called *play potentials* [2]—and use them as design material. Through SPD, we explored and empathized with people’s existing playful practices; developed early, speculative tech ideas that responded to them; and discussed those early design ideas with them to explore different views about the necessary qualities of playful urban technology. We began with contextual research, with the aim of identifying *play potentials* of urban spaces, i.e. playful things people already do within the public space and that might enrich the socio-emotional texture of their urban experiences (Section 4). Play potentials extend other play theory constructs, e.g. *modes of play* [29], as they focus on play forms observed in people’s in-the-wild, spontaneous activity within a targeted context—they represent contextual playful practices that carry situated design knowledge. We did two interventions to “chase play potentials”: First, we created and examined a collection of social media posts featuring people’s playful practices within the public, to identify recurrent forms of playful urban engagement (4.1). Second, we turned to culture and traditions: we conducted an online co-design workshop where we explored street games and rituals to identify recurrent forms of urban play that might have inspirational value (4.2). The combination of those two interventions surfaced a list of play potentials of urban spaces, i.e. playful things people already do and enjoy in the urban space, which could arguably be useful building bricks for contextually sensitive smart city innovation.

Building on these play potentials, we produced a catalog of speculative ideas to illustrate different ways in which the play potentials could give rise to increasingly playful urban tech (Section 5). We then used the catalog as a provocative conversation prop (Section 6): we did a series of online interviews where we invited people from diverse countries, age groups, and professional and socio-cultural backgrounds to comment on the catalog ideas and share their understandings of what a playable city should be (6.1). We also held an online co-design workshop where we brought together a range of practitioners with diverse expertise relevant to urban innovation to reflect on the catalog and generate new ideas (6.2). We report on the results of those co-design engagements as advice for designers interested in incorporating playful technology into the urban space (6.3). We hope our play potentials, speculative ideas, and co-design insights inspire urban tech designers to take an increasingly playful and socio-emotionally sensitive approach in their work.

4 CHASING PLAY POTENTIALS OF URBAN SPACES

Our study began with a contextual exploration of the playful potential of urban settings. Here we illustrate how we used two Situated Play Design methods to *chase play potentials* [2] of urban spaces, i.e. to seek forms of playful engagement that already take place in the urban space and articulate them as inspirational design material. We present these play potentials as our first contribution: they

bring forth *generative* [39] knowledge that can inspire the design of future playful urban tech that supports, rather than disrupts, the kinds of ludic engagements people long for in their cities.

The section begins with a description our process for chasing urban play potentials: First, we produced and examined a collection of social media posts featuring people’s ordinary ways of engaging playfully within the urban space. Then, we invited a socio-economically diverse group of citizens from a specific location, Catalonia (the region around the city of Barcelona) to a co-design workshop where we examined and discussed the playfulness embedded in urban rituals and traditions from their cultural background. Building on the results of these two interventions, we present a list of play potentials of urban spaces that build on examples of social media posts, traditions, and/or cultural rituals we explored in our interventions. We hope that our contribution provides interaction designers with interesting ideas about types of playful experiences people long for within the urban space. We also hope it serves as an actionable demonstration of how SPD methods can be used to uncover the inherent playful potential of our cities.

4.1 Intervention #1: Chasing Play on Social Media

In our first intervention, inspired by [5], we created a collection of social media posts (made by other users) and examined it to identify recurrent forms of playful engagement within the public space. Social media is rife with posts that display everyday ways of being playful. Many of the posts people produce every day could potentially be inspirational from a design perspective: they feature mundane playful situations that could be used as starting points for ideation. Because of that, we thought social media might be an interesting play-chasing tool—a particularly useful one in the context of urban technology design, since much of social media content features events that take place in public spaces. For 5 weeks, a team of 6 researchers spent 3–5 hours a week looking for posts that displayed playful urban behaviors. We focused on Instagram and TikTok due to their leisure-focused and visual nature. We collected posts on a shared Google spreadsheet, including: a link to the post, a short description, the publication date, and (if needed) a note indicating why it was inspirational (Figure 1). We collected 383 posts in total. Then, we used inductive thematic analysis [15] to find play potentials in our collection. After 2 rounds of refining our themes—we discussed and contested each other’s codes to ensure intercoder reliability—we settled on a final set of codes and analyzed all the data accordingly. The result was a list of play potentials—ways in which people already engage playfully within the city—each of them instantiated by several social media posts. We clustered the play potentials into 5 larger categories (Figure 2) based on affinity. Here we describe those categories, their play potentials, and a set of posts that exemplify them¹.

Out of the ordinary interactions with urban infrastructure (287 posts). A recurrent theme in our collection was interacting with public infrastructure in out-of-the-ordinary ways. We found five play potentials related to this category. First, we saw that sometimes people behave playfully when they (#1) “stop to interact

¹Spreadsheet including all the posts, the final analysis, the resulting play potentials, and the higher-level clusters: <https://bit.ly/3CDPxxc>

ID	Link	Date posted	Post description	Pose in urban spaces			Out of the ordinary interactions w/ urban infrastructure			Out of the ordinary interactions between people			Creative disruptions		Stream exciting urban events					
				#1: Pose in front of a relevant object/landmark	#2: Pose next to an out of place object	#3: Pose in strange ways	#4: Explorative	#5: Silly performance	#6: Embodied performance	#7: Overcome challenges	#8: Collaborate/coordinate	#9: Leave messages for other people to find	#10: Communicate at a distance	#11: Massive celebration moments	#12: Be nice to others	#13: Scare and/or prank	#14: Appropriate urban space artistically	#15: Customize how you appear in public	#16: Document fun things	#17: Find alternative beauty
1	https://www.instagram.com/p/B0yGZJhrc5G/	08/05/19	Someone's foot is covering the C on a label saying No						1						1					
2	https://www.instagram.com/p/B034MfchT-w/	08/07/19	Two boys hung up a poster of them at McDonald's						1						1					
3	https://www.instagram.com/p/B034V5yBvEX/	08/07/19	Friends took a picture of themselves and put it in frame	1											1					
4	https://www.instagram.com/p/B1Qdtn2Lff/	08/17/19	Oven left on a street											1						
5	https://www.instagram.com/p/B1nXcbln4T9/	08/27/19	Writing on the ground saying "lou lou was here"											1						
6	https://www.instagram.com/p/B1nXcbln4T9/	08/27/19	A book of funny public signs											1						
7	https://www.instagram.com/p/B1uPTTxaYm/	08/29/19	A machine that prints out short stories for people											1	1					
8	https://www.instagram.com/p/B1uJC_posd/	08/29/19	Person pointing at a landscape and creating a horse						1						1					
9	https://www.instagram.com/p/B2dmh7B8l7B/	09/15/19	Balloon looking objects that are punchable																1	
10	https://www.instagram.com/p/B3BkiozIRQm/	09/25/19	Cashier singing song with their machine																	
11	https://www.instagram.com/p/B3BLvUlsVZ/	09/29/19	Yellow house with a sign that says it is a honeycomb											1			1			
12	https://www.instagram.com/p/B3lxbXhQhQ/	10/02/19	Two people surfing and high fiving								1				1					
13	https://www.instagram.com/p/B3ELN5NlVK/	10/11/19	A building that lights up and lets people play tetris										1							
14	https://www.instagram.com/p/B3fUyB5HfG/	10/11/19	Dolphin that is splashing people who do not want to be																	
15	https://www.instagram.com/p/B4P4x5Si9G/	10/30/19	Group of kids counting down the time at a cross walk					1	1										1	
16	https://www.instagram.com/p/B4P4x5Si9G/	05/29/20	Man playing the drums at the back of a car (?) while vi											1	1					
17	https://www.instagram.com/p/B4Q0u0d8awZ/	05/30/20	Woman doing yoga barefooted at the bottom of a large																	
18	https://www.instagram.com/p/B4ZnS9Lj2k/	05/30/20	Woman doing handstand splits on the middle of a brid																	
19	https://www.instagram.com/p/B4Q0u0d8awZ/	05/30/20	Woman balancing on top of a rock structure at the top																	
20	https://www.instagram.com/p/B4M-56gquHUL/	05/26/20	Two kids lying on the ground where there are unicor														1			1
21	https://www.instagram.com/p/B4Q0u0d8awZ/	05/22/20	Kid laughing and hanging off a tree branch.			1														
22	https://www.instagram.com/p/B4ZnS9Lj2k/	01/16/20	Eyes are put on tree branches to make them look like														1			
23	https://www.instagram.com/p/B4VZX8hHyUJ/	11/01/19	Kid with leaves on his face leaving space for eyes and																	
24	https://www.instagram.com/p/B0-rn5n0Oba/	08/10/19	Little girl playing with sand and trying to make it into a						1											
25	https://www.instagram.com/p/B-NkGed4n5/	04/20/20	Little girl with cat ears playing with mud while laughi																	
26	https://www.instagram.com/p/B4ZnS9Lj2k/	06/09/19	Two kids looking surprised as a puddle sprays water a																	
27	https://www.instagram.com/p/B4ZnS9Lj2k/	06/13/20	Little kid holding a chicken in his overalls while laughi																	
28	https://www.instagram.com/p/B4ZnS9Lj2k/	06/12/20	Little kids posing in a suitcase looking at bubbles																	
29	https://www.instagram.com/p/B4ZnS9Lj2k/	06/13/20	Two kids standing on a fence looking at each other																	

Figure 1: Screenshot of the first 20 datapoints of our dataset of social media posts featuring playful urban behavior.



Figure 2: Examples of posts in our collection, representing the 5 themes we saw: (a) “Out of the ordinary behaviors within the urban space”: someone playing drums from the trunk of a car. (b) “Creative disruptions of the public space”: an ugly architectural element turned into a funny face. (c) “Posing in urban spaces”: a man mimicking a statue next to him. (d) “Streaming exciting things that take place in the urban space”: someone throwing their phone up into tree blossoms while it is recording to produce a slow-motion video. (e) “Out of the ordinary interactions between people”: an entire apartment complex gathering on their balconies to dance.

with public infrastructure” (58 posts), e.g. by admiring a piece of art projected on the façade of a building (<https://bit.ly/3l5by2U>). We also observed that some people like to (#2) “perform in public in silly, unusual, or creative ways” (73), e.g. playing drums from the trunk of a moving car (<https://bit.ly/36rwBIX>). Next, we saw instances of people (#3) “using their bodies in synchrony with elements of the urban space” (80) through dance or any other sort of planned movement, e.g. a street performer dancing inside a metro car using the car’s infrastructure as a support (<https://bit.ly/34lS9UC>). Another play potential we identified has to do with (#4) “overcoming improvised physical challenges” (54), using urban infrastructure as the

playground, e.g. people parkouring (<https://bit.ly/3l9fw10>) or kids climbing on a fence and hanging onto it (<https://bit.ly/3n8oaZ7>). Last, we also saw posts in which people (#5) “collaborate to better the state of something or someone in the public space” (22), e.g. engaging with an art installation that encourages people to volunteer to take care of plants (<https://bit.ly/3ne8mnq>).

Posing in urban spaces (127 posts). Another recurrent theme in our collection was the act of posing in or around relevant public objects or spaces. We identified three play potentials under this theme. First, we saw people (#6) “posing in accordance with relevant objects or landmarks” (61), e.g. a man interacting in silly ways

with a fountain as he is being recorded (<https://bit.ly/2ET02rV>) or a man mimicking a statue next to him (<https://bit.ly/2GdPi8q>). We also saw people (#7) “posing next to objects that are out of place” (20), e.g. people posing in front of objects that they sneakily placed (<https://bit.ly/3jqrCvM>). Finally, we saw people (#8) “posing in unconventional ways” (46), e.g. jumping off of a sculpture (<https://bit.ly/30sfGCe>) or risking falling from a tree by sitting on it for a photo (<https://bit.ly/2GjbcXK>).

Streaming exciting things that take place in public spaces (125 posts). Here the focus was not so much on urban activity itself, but on the act of sharing it with others. We saw that behavior manifest in different ways. First, we observed people (#9) “documenting exciting things they saw in the street” (74), e.g. through a TikTok compilation of street art (<https://bit.ly/3cQncMh>). We also saw people (#10) “documenting elements of a public space to find alternative beauty in them” (19), capturing ordinary urban spaces in ways that showed them in a different way, e.g. a post where the author throws her phone up into tree blossoms while it is recording to produce a slow-motion video (<https://bit.ly/3cSff99>). Finally, we observed people (#11) “streaming self-imposed challenges” (32) so other people could witness them, e.g. a girl challenging herself to move between two points without touching the floor (<https://bit.ly/34cJMKU>).

Creative disruptions of the public space (81 posts). Another theme in our collection had to do with creatively disrupting public settings. A play potential under that umbrella is (#12) “appropriating the urban space artistically” (57), which can be done both carefully (e.g. painting a face on a wall using a bush as the face’s hair, <https://bit.ly/2EUWKVh>), or spontaneously (e.g. turning an ugly architectural element into a funny face with a doodle, <https://bit.ly/2Gnzwrk>). Another play potential based on creative appropriation involves (#13) “customizing the self” (24): changing one’s public appearance to provoke others’ reactions. An example is a post where the authors customized their electric skateboards to look like a tiny police car or a dinosaur, thereby attracting other people’s attention (<https://bit.ly/33pSd6y>).

Out of the ordinary interactions between people (64 posts). The last recurrent form of playful interaction we saw in the data is the act of interacting with others in out of the ordinary ways. We found different kinds of interpersonal urban interactions with a playful potential. First, (#14) “leaving messages on public spaces” (21): finding creative ways of communicating with non-present others, whether that be through art (a doodle, a mural . . .) or text (a billboard with a joke, a name written somewhere . . .) for someone else to find. For example, a post that shows a message someone left on the pavement so that other pedestrians would read it (<https://bit.ly/33p0JTU>). Another form of out-of-the-ordinary interpersonal engagement is (#15) “communicating at a distance in somewhat silly ways” (17), e.g. a lady yelling a funny phrase out of her window and someone responding back (<https://bit.ly/3l6UeKN>) or people from a train waving at passersby they never met before (<https://bit.ly/3cWg68T>). Another play potential we identified had to do with (#16) “sharing celebratory moments” (4), e.g. an entire apartment complex gathering on their balconies to dance to music (<https://bit.ly/2Gb9Dv3>). We also saw playfulness emerge as a result of the act of (#17) “being nice to others” (8), e.g. a man saying good morning to strangers in the street (<https://bit.ly/34jlsHl>). Finally, another play potential resulted from quite the opposite: a fair share of posts

featured (#18) “harmless pranks and jokes between strangers” (14), e.g. scaring people by pretending to accidentally topple boxes on them, knowing that the boxes are attached (<https://bit.ly/3ipvDPN>).

4.2 Intervention #2: Play & Culture Workshop

In the second play-chasing intervention, we turned to culture and traditions to identify play potentials that were embedded in cultural rituals and games practiced in the urban space. Inspired by [4], we invited a diverse group of stakeholders to a 3-hour workshop where we discussed and examined a set of urban traditions to identify recurrent forms of urban playful engagement that were meaningful to them. Due to social distancing measures related to the COVID-19 pandemic, the workshop took place online over Zoom and Miro. 13 people participated, including two facilitators. Participants had professional careers relevant to the themes of play and smart city innovation: two gamification consultants, three experts on traditional games, a game developer, an interaction designer, an architect, a communication designer, a philosopher, and a journalist specialized in emergent technology. Before the workshop, we crafted a Miro collaboration environment to facilitate conversations (Figure 3); we populated it with playful urban traditions from our previous research and shared it with participants a week before the workshop, so they could familiarize themselves with the traditions. We also invited participants to add new traditions to the collection, in the form of street games, urban rituals, or fun personal experiences they had lived in their cities.

At the workshop, participants used Miro to visualize ideas. We began by examining the collection of urban games, rituals, and personal experiences to find interesting recurrent forms of playful engagement; we clustered our thoughts into a shared map of play potentials that might inspire playful smart city innovations. Next, participants brainstormed how futuristic urban infrastructure (e.g. a bench, a light pole . . .) might afford technology-mediated experiences inspired by one or more of these play potentials. To close, we built on the resulting speculative ideas to reflect on the relevance of the play potentials found during the workshop and, more broadly, of our playful approach to smart city innovation. After the workshop, we analysed both the Miro board annotations² and the workshop recordings to synthesize participants’ ideas. The result was a list of 9 play potentials inspired by culture and traditions, each instantiated by at least one urban game, ritual, or personal experience. Here we report on those play potentials, providing as a reference some of the traditions and participants’ experiences that motivated them.

Some of the play potentials we identified had an element of discovery and exploration. For example, (#1) “being surprised by something unexpected that happens in the street”. An example of this play potential is a Belgian tradition shared by one of our participants. One day, during a short stay he did in Belgium, the participant went out in the street and found that it was unusually crowded. People seemed more cheerful than usual. He eventually realized that it was the “Jenever Festeen”, a festivity where the city’s fountains temporarily pour gin instead of water. That brought about a great deal of surprise and excitement: our participant was able

²The Miro board, including all contributions by workshop participants: <https://bit.ly/3DRKwGg>

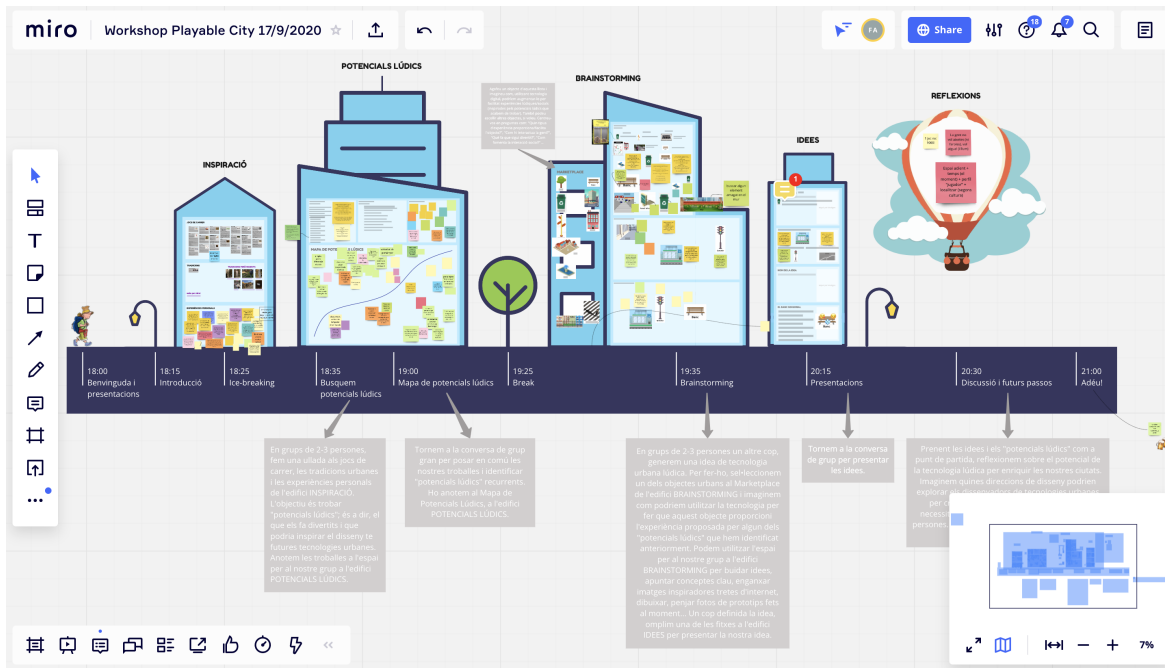


Figure 3: Miro used at the workshop, featuring participants' contributions in the form of post-its, notes, and mock-ups.

to momentarily experience the city in ways he never did before. Another play potential we found with a clear exploratory nature involves (#2) “discovering the invisible”—learning about those little, mundane things that constitute the cultural idiosyncrasy of a place, which are often not tangible and, as such, can be hard to identify. This play potential is exemplified by a playful activity one of our participants used to do when he was a child. When he, as a boy scout, went on a summer camp, the first thing they would do was a Gymkhana-like activity of exploring the town they visited. The activity involved getting familiar with the most popular parts of the town, meeting key members of the community (e.g. the baker or the mayor), or learning about the myths from that location. The same tradition was also used by participants to propose a slightly different play potential: (#3) “temporal decontextualization”, i.e. the idea of learning about what happened in a particular urban location in a different moment in time. In their conversations, participants realized there was something very interesting about being physically present in a location while learning about things that took place there in the past—both historically consequential events and mundane, ordinary stories of people who lived there. Finally, we identified a fourth play potential that had an element of exploration, in this case coupled with imagination and fantasy: (#4) “filling the gaps”. A participant shared a ritual their family used to practice anytime they visited an airport: guessing what the lives of others in the airport might be. Responding to that story, another participant talked about a similar ritual where their family played at guessing the life story of passersby in the street. We realized that there was something exciting about being surrounded by strangers and fantasizing about the intricate stories behind them.

A second theme we explored during the workshop was the idea of expressing oneself on, within, and through the public space. A play potential in this category involves (#5) “working on one’s socio-cultural belonging”, either by appropriating the urban space to turn it into a place that feels like home, or conversely adjusting one’s own appearance and behavior to adapt to the socio-cultural idiosyncrasy of a location. This play potential surfaced from a story shared by one of the participants: an urban hacking initiative he discovered during one of his trips where local citizens created several collaborative Spotify playlists and linked them to street sewers through QR codes, so people could collaboratively curate and enjoy the playlist of that neighborhood. Participants also discussed experiences and traditions that involved (#6) “hacking the street”: using the urban space as a blank canvas for creative expression, or a platform for creating interventions for other people (in particular, strangers) to experience. A clear example of this play potential is a contest that takes place in Gràcia, a neighborhood in Barcelona, every year: neighbors collaborate to decorate their streets in highly creative ways and compete with other streets to be recognized as the year’s best decoration.

The third set of urban play potentials we identified at the workshop was concerned with the social interactions that take place in urban spaces. First, we discussed the fun derived from (#7) “connecting with strangers”: looking at other people as exciting “treasures” that can be discovered and explored, as some sort of social mystery that can be a source of excitement. An example of a tradition embodying this play potential is another boy scout’s activity that is often practiced in Catalonia: when arriving to a new location, the adult leaders give children the challenge of finding key members of



#1 Admire the urban space

It can be fun to find unexpected, surprising, hilarious, visually stimulating things in the street. Designers should think about how their interventions could capture people's attention and provide an experience of wonder.

Source: scraping social media



#2 Stream exciting urban occurrences

People enjoy documenting interesting things they find around the city (e.g. beauty, action, surprises). Designers should think about how to allow people to document urban occurrences to share lived experiences and express themselves creatively.

Source: scraping social media



#4 Fill the gaps

Fantasizing about things we know very little about can be fascinating and mind-absorbing. Designers should think about how their playful urban designs might help people to imagine and fantasize with the backstories of others surrounding them.

Source: play & culture workshop



#6 Pose performatively

People enjoy posing in strange ways around landmarks, statues, or out-of-place objects. Designers should think about how to enable and encourage playful kinds of posing experiences that are fun for both those who pose and those around them.

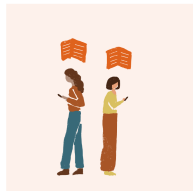
Source: scraping social media



#8 Customize the self

Some people also enjoy wearing attention-grabbing clothing, wearables, lights, and costumes. Designers should think about how to facilitate experiences where people can enrich their public appearance.

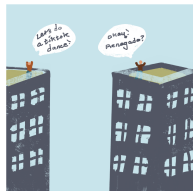
Source: scraping social media



#10 Connect with strangers

Urban spaces are social connection arenas. There is something playful about looking at other passers-by as treasures to discover. Designers should think about how to prompt people to accidentally meet strangers and initiate new connections.

Source: scraping social media + play & culture workshop



#12 Communicate at a distance

It is fun to connect with others who are visible but at a distance, knowing that it'll be a brief and light-weight interaction. Designers should think about how to afford distanced and time-bounded social experiences that are exciting and fun.

Source: scraping social media



#14 Prank strangers

If done safely, it can be fun to prank strangers. Designers should think about how to facilitate light-weight forms of urban pranking that are harmless (physically, emotionally, socially) and fun for both the pranker and the pranked.

Source: scraping social media

PLAY POTENTIALS OF URBAN SPACES



#3 Discover the invisible

It can be fun to explore the hidden cultural subtext that conforms the socio-cultural fabric of a city. Designers should think about how to enable and encourage people to discover tacit urban knowledge to become familiar with an environment.

Source: play & culture workshop



#5 Temporal decontextualization

There is something exciting about learning about the real or imagined history of an urban space while physically present. Designers should think about how to enable people to share and learn the stories that took place in a city.

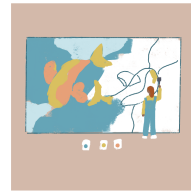
Source: play & culture workshop



#7 Performative behaviors

Some people enjoy doing things that are noticeable (e.g. silly, creative, or otherwise remarkable). Designers should think of ways to augment urban spaces in ways that people feel safe to be performative for their own enjoyment and to amuse others.

Source: scraping social media



#9 Hack the street

Streets can be a canvas for personal expression: to make art, share ideas, and communicate through messages. Designers should think about how to enable citizens to appropriate the urban space and use it to advance their creative/expressive agendas.

Source: scraping social media + and play & culture workshop



#11 Asynchronous communication

There is an element of fun, mystery, and excitement in leaving messages on public spaces for other people to find. Designers should think about how to augment the urban space with technology that enables people to communicate asynchronously.

Source: scraping social media



#13 Massive celebrations

There is something exhilarating in being part of a massive celebration. Designers should think about how to use technology to enable moments of collective celebration, bringing strangers momentarily together to cheer and share joy.

Source: scraping social media



#15 Urban challenges

Some people enjoy self-imposed urban challenges, e.g. jumping on certain tiles, or crossing the street in <n seconds. Designers should think about how to afford small, spontaneous challenges that add a bit of spice to people's ordinary urban movements.

Source: scraping social media + play & culture workshop

Figure 4: Our list of urban play potentials, identified through two interventions: scraping social media and a play & culture workshop. A plain text version of the list can be accessed at: <https://bit.ly/30VQS9d>

the local community and introducing the party to them. The challenge is that the leaders provide children with limited information about these individuals' location, appearance, or life story, which makes finding them a hard quest. Another play potential with a social component is the idea of daring people to (#8) “compete over (sometimes ridiculous) challenges”: proposing (or having proposed to one) quick, spontaneous challenges to complete in competition with someone else. This play potential was inspired by a family ritual where a participant and his son often engaged in a competitive challenge of being the first to identify a 4-digit car license plate that adds up to 21. The last play potential that surfaced in the workshop was the idea of (#9) “completing self-imposed physical challenges” using the urban space as a playground, e.g. a participant's story of stepping only on tiles of a specific color—an experience most of us shared.

4.3 Results: Play Potentials of Urban Spaces

After completing the two play-chasing activities above, we did a second round of analysis to combine the resulting sets of play potentials into a unified list. Our second-wave analysis was led by two premises: First, we wanted to synthesize the findings into a shorter list that was more actionable for designers—one that would not be too long or complex to be used as starting point for ideation. Second, we wanted to surface those aspects of our findings that had most inspirational potential from a design perspective, to hint at how those contextually meaningful forms of playful urban engagement could guide design. To do that, we clustered the play potentials by affinity, looking at the similarities between the play forms they highlighted, e.g. we combined play potential #12 from the social media-based intervention (“appropriating the urban space artistically”) with play potential #6 from the workshop (“hacking the street”) into “hack the street”, as they were almost identical; or we decided to omit “stop to interact with public infrastructure” (social media-based intervention, play potential #1) because we thought it may not be as inspirational as other items on the list. To ensure that the combined list represented the results from the two explorations accurately, we invited participants involved in both interventions to dispute it. The result is a list of 15 play potentials of urban spaces (featured in Figure 4): playful things people already do (and seem to enjoy) in the public space. We present them as contextually grounded starting points for ideating playful urban technology; we suggest they can inspire designers to envision technology-mediated playful urban experiences that intertwine well with and enrich the socio-emotional texture of our cities.

5 A CATALOG OF SPECULATIVE URBAN TECHNOLOGY

Building on our play potentials, we set out to speculate how urban tech could respond to them. We began with a first ideation round where 6 researchers worked independently to generate early ideas of urban tech that embraced at least one of the play potentials. We produced 25 ideas, collected them on a slideshow³, and expanded them at a subsequent brainstorming session. Next, two designers examined the collection of early ideas to identify themes.

³A slideshow featuring our 25 early ideas: <https://bit.ly/3xt6cWR>

The themes were discussed in another meeting, where we settled on 7 emerging design directions that (1) we found interesting and (2) resonated with the findings from our play-chasing work. Then, we took two weeks to concretize each design direction into 1-2 urban technology design concepts, taking the early ideas as a point of departure. We refined the resulting concepts at a final meeting where we discussed each other's work. Throughout, we kept track of how our ideas related to the play potentials (see Figure 13 in the Discussion for a mapping of those links). Finally, we mocked up our early concepts up into a *Catalog of Speculative Playful Urban Technology Ideas*. We frame it as an *annotated portfolio* [40] of speculative design ideas highlighting interesting and socio-emotionally desirable forms of technology-mediated urban play. Importantly, by speculative here we do not necessarily mean ideas that are technically unfeasible or extravagant; rather, inspired by [18] [52] [53] [59], we used speculation as a means of enabling co-design discussions around technology futures that are plausible from a technical perspective but not yet a commonplace part of people's imaginary. Here we present the 7 design directions in the catalog, as well as the speculative technology ideas that illustrate them. For an optimal representation of the design ideas, we refer the reader to the original catalog⁴.

“**Augmented infrastructure for authoring urban experiences**”, the first design direction, refers to urban infrastructure (e.g. light poles, a bench, a façade. . .) that is enhanced through digital technology (e.g. smart lighting, projectors, speakers. . .) and allows people to use a range of multimedia affordances to be creative and craft novel urban experiences—let it be for themselves or for others. The catalog features two design ideas that illustrate this design direction. One of them is *Share-a-song* (Figure 5A), an IoT device that adds “social sound system” to public benches. These benches allow people who sit on them to sync their phone, choose a song on Spotify, and either (a) send it to a nearby bench or (b) leave it stuck on their bench to be enjoyed by the next person who sits there. One way or another, citizens can use their bench to craft short, ephemeral musical experiences for others around them, engaging in a rather unusual (i.e. asynchronous or physically distanced) interaction with people with whom they share the urban space (likely strangers). The other idea related to this design direction is *Moody lights* (Figure 5B) a set of streetlight poles equipped with a projector and an ambient sound system that allow citizens to craft surprising and somewhat magical experiences for other passersby. Through a phone app featuring a range of somewhat ambiguous adjectives (e.g. magical, surprising, funny, or colorful), people can target nearby light poles and curate the kind of ambiance they want to create; then, the light poles will begin to deliver the corresponding multi-sensory experience for those under their reach.

“**Parallel (in)visible realities**”, the second design direction, are augmented reality systems that enable citizens to experience fantastic realities that take place in parallel to the ordinary flow of urban life—and, as a result, to bond with others who also decide to experience them. Those parallel realities are only visible to those who use the system; that is meant to create a sense of community

⁴The full catalog: <https://bit.ly/30TETZd>



Figure 5: Mockups of “Augmented infrastructure for authoring urban experiences”. A: “Share-a-song”, a bench that allows people to curate musical playlists for others around them. B: “Moody Lights”, city lights that allow crafting magic urban ambiances.

between users. An idea that aligns with this design direction is *A Mad Hatter’s world* (Figure 6), an “invisible” game that allows citizens to wear virtual hats that can only be seen through an AR app. People can create custom designs, choose from a set of pre-designed hats, or even steal someone else’s hat idea and keep it for themselves. At the core of this design is the idea of helping people to bond and feel connected with others, even with strangers, in a lightweight and non-invasive manner: by being part of a somewhat silly community of mad hatters accessible only through a dedicated app.



Figure 6: Mockup of “A Mad Hatter’s world”, an idea related to the design direction of “Parallel (in)visible realities”. Through a smartphone app, people can wear extravagant virtual hats and bond over that shared experience.

“Spontaneous instigators of strange(r) connections” are short, fast-paced invitations to social play placed in urban locations where people often wait or pass the time. They aim to create strange or silly situations that invite people to do unexpected things during the wait and to initiate new connections as a result—even if

ephemeral. The catalog features two ideas under this theme. One of them is *Dancing the light* (Figure 7A), a game augmenting pedestrians’ experience of waiting at a traffic light. When the light is red, a song plays on a speaker and a screen invites people to dance to the music. The more (and the better) people dance, the sooner the light will turn green. By providing people with that bait, this idea hopes to encourage them to let go and submit to a somewhat silly ephemeral activity that will likely contribute to shared laughter and fun. This idea was in part inspired by existing designs that playfully repurpose a city’s traffic light poles (e.g. *StreetPong* [31]); it extends them by enabling people to interact in a group, using their bodies and the physical space rather than through a screen embedded in the light pole. The second design idea under this design direction is *Ready, steady, cross!* (Figure 7B): a short and fast-paced game that invites pedestrians waiting at both sides of a traffic light to compete over who will get to the other side first. When the light turns green, the race starts: the first side all whose members finish crossing will be the winner. Upon arrival, the winning team will be received with applause and a victory tune; the losing team will be “booed” to signal their loss. This design is meant to instill a sense of fellowship in strangers who happen to be at the same side of a crosswalk, and to help them to momentarily bond over the celebration of a win (or to playfully mourn a loss) in a race against people on the other side of the street.

“Large scale urban toys”, the fourth design direction, are interactive installations without a purpose other than allowing people to experience lightweight, open-ended, momentary play. The catalog includes two design ideas under this theme. *Building art* (Figure 8A) equips a building’s facade with LEDs whose color can be changed by citizens through an app. Once a day, the facade opens for some minutes so people can create a new composition. They can gather in front of it and paint 20 pixels each. The resulting piece of ephemeral collective art will be displayed until the canvas resets the next day. The other design idea under this theme is *The Selfie Photoshoot* (Figure 8B), a hotspot for taking pictures in front of touristic landmarks. A screen, located in front of the landmark, suggests a random pose, and initiates a countdown. Then, people are challenged to rush in front of the landmark and make the suggested pose before the



Figure 7: Mockups of “Spontaneous instigators of stranger(s) connections”. A: “Dancing the light” is an augmented traffic light that invites pedestrians on both sides of a crosswalk to let go and dance to a shared tune and rewards them by shortening the wait time based on their performance. B: “Ready, steady, cross!” challenges people to cross the street first when the traffic light turns green.



Figure 8: Mockups of “Large scale urban toys”. A: “Building Art”, which turns a building’s facade into a giant canvas for collective artistic expression. B: “The Selfie Photoshoot”: a hotspot for taking challenging, hilarious photos in front of touristic landmarks.

countdown ends. At that point, the system will take a photo and measure the quality of people’s performance.

“**Portals of imagination**” are technologies that afford experiences of fantasy, imagination, and wonder. They provide citizens with an ambiguous and deliberately incomplete story to invite them to fantasize and fill the gaps. Two ideas in the catalog exemplify this design direction. One of them is *Silhouettes* (Figure 9A), an AR app that allows citizens to see the silhouettes of people who were in that same space before, along with the system’s guess of the silhouettes’ emotional state. *Silhouettes* allows citizens to fantasize about what happened earlier in the very space they are inhabiting and share their guesses as comments to gossip with others. The second idea under this theme is the *Sensorial Memory Bench* (Figure 9B), which invites people who sit on it to fantasize about the lives of others who sat there before. When someone sits on the bench, the mood and tone of the situation is recorded. That data is then

delivered to others who sit on the same bench through ambiguous multi-sensory stimuli (e.g. temperature, heartbeat-like haptics, ambient sounds...).

“**Local lore modules**” use technology to deliver local knowledge to visitors or newcomers—that is, information that is locally-produced and goes beyond the mainstream, e.g. stories about the locals, about the fauna and the flora, or tips about the idiosyncrasies of the place. Locals can appropriate the system and populate it with the content of their creation, which will be delivered to visitors to enable them to discover the place genuinely. The catalog features two design ideas under this theme. One of them is the *Scavenger Hunt Plaques* (Figure 10A), which can be placed anywhere within a city or neighborhood. Locals can populate the plaques with information relevant to their location: a thing they experienced in that place, a story that is not commonly known... Visitors can scan the plaques and discover those things that are only known by locals and learn stories they would not otherwise have access to. The other idea under this direction, *Local Whispers* (Figure 10B), follows

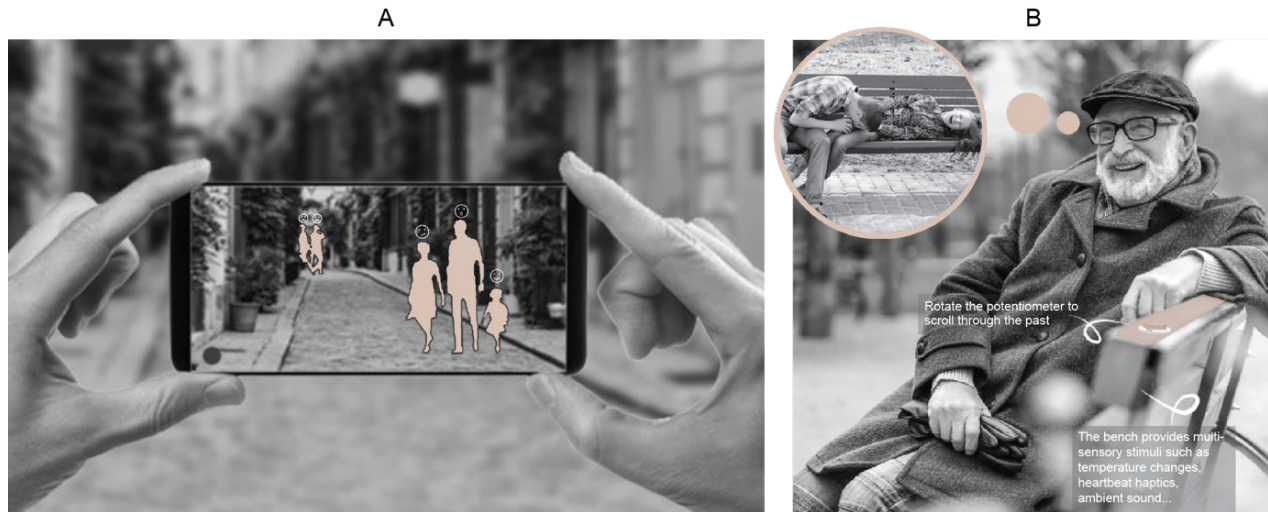


Figure 9: Mockups of “Portals of imagination”. A: “Silhouettes” displays the anonymous silhouettes of others who passed by where the user is, so they can fantasize with the silhouettes’ stories. B: the “Sensorial memory bench” stores unidentifiable data about the actions of people who sit there and communicates it to future users through ambiguous multi-sensory stimuli.



Figure 10: Mockups of “Local lore modules”. A: locals can fill the “Scavenger hunt plaques” with knowledge so that visitors can get to know a place beyond the surface. B: “Local whispers”, an app that allows locals of a city to store sound messages explaining stories about specific locations of the city, which visitors can then use to experience the city through the stories explained by locals.

a similar principle but instantiates it through a different modality. Through a phone app, locals can record audio messages and link them to a specific location within their city, e.g. to describe a place they love and why, tell stories that happened to them in that place, or share local knowledge they would like visitors to find. Then, the app allows visitors to enter a keyword (e.g. “romantic”) that will be used to create a sightseeing route for them: they will be guided, from audio message to audio message, to explore the city through the whispers of its citizens.

“Shared canvases for collective grandeur”, the last design direction, are interactive installations that reflect the socio-emotional state of a city as an emergent multimedia spectacle. The catalog includes two ideas under this theme. One of them is the *Fountain of whispers* (Figure 11A), a water fountain that reacts to the emotions of those surrounding it. Once a day, through a phone app, people

can record a voice memo about their mood, or about something that happened to them, and send it to the fountain. The fountain will use the data to reflect the city’s mood by changing the water flow dynamics: raising or lowering the temperature of the water, modifying the color of the lights illuminating the water, or playing ambient sounds. The last idea in our catalog is *VanGo* (Figure 11B), an artsy location tracking system that leaves a digital trail behind people as they move around an urban area. Everyone’s trails in that area can be seen through a phone, though there is no identifying information. Each participant can customize their own trail as they like. By moving within the area, citizens create a massive, constantly evolving, and ephemeral piece of art.



Figure 11: Mockups “Shared canvases for collective grandeur”. A: the “Fountain of whispers” creates a multi-sensory spectacle that reflects a city’s emotional state. B: “VanGo” is a piece of abstract art based on people’s movements within a specific part of a city.

6 PEOPLE’S RESPONSES TO OUR SPECULATIVE DESIGN IDEAS

Once the *Catalog of Speculative Playful Urban Technology Ideas* was ready, we set out to explore multi-stakeholder perspectives about it. While the ideas in the catalog responded to play potentials observed in the ordinary practices of different people in different parts of the world—which, hence, could be considered a reflection of diverse views on the idea of impregnating urban spaces with an element of playfulness—we wanted to further investigate how the designerly use we made of those play potentials resonated with the perspectives of diverse citizens. Inspired by [6], our initial plan was to conduct a series of co-design sessions in the wild, inviting people to playtest early, lo-fi prototypes of the early concepts at a range of urban locations, and using those experiences as starting points for further collective ideation. However, in this case it was not possible to conduct such kinds of in-the-wild engagements: the issues derived from the COVID-19 pandemic made it both unsafe and unethical to engage people in co-located play in the street. We considered the idea of conducting these co-design-oriented playtests in other, less naturalistic settings (e.g. in the lab, or at people’s homes), but discarded that because any relationship with context would be lost. After examining possible ways of moving forward, we decided to structure this phase of the project as a combination of two interventions, described below.

6.1 Method

First, we conducted a series of interviews where we invited people from diverse socio-economic, cultural, and age groups⁵ to have a close look at our catalog, comment on the ideas, and share their thoughts on whether cities should be more playful and why, and how technology might contribute to that agenda. To recruit participants, we shared some of our ideas on social media, inviting

people to see the full catalog and have a conversation about it. We conducted 12 interviews, ranging from 30 to 60 minutes long (depending on how much participants wanted to share); some were done individually, others in group, adding up to 21 participants. 17 additional people shared their thoughts through informal responses to our social media prompts, but did not want to be interviewed. We recorded interviews on audio and made anonymous transcripts; people’s social media responses were stored anonymously as well. We analyzed those data using inductive thematic analysis [15]: each researcher looked at the data from participants they had engaged, and the analysis was then validated by another researcher. Then, we performed a second round of analysis to bring the findings together.

The second intervention was a 2-hour multi-stakeholder co-design workshop where we invited 8 academics and practitioners with expertise relevant to smart city innovation (some of which had already attended our previous workshop) to explore their understandings of what a playful smart city should be. The workshop took place online over Miro and Zoom. Before the workshop, we asked participants to have a look at the catalog and familiarize themselves with our speculative ideas. At the workshop, we tried our best to resemble the affordances of an in-person workshop—where we would have ideally used printed copies of the catalog as ideation props—and invited participants to comment on our ideas and playfully signal which ones they liked the most and least by placing “heart” and “poop” tokens on a digital copy of the catalog pages (Figure 12). Then, in groups, participants created new ideas based on the play potentials from our play-chasing work. Finally, we reflected on the value of those play potentials, and discussed how they could be used to inspire increasingly socio-emotionally sensitive urban futures (Figure 13). To analyze the workshop outcomes, we used inductive thematic analysis [15] again, looking at both the transcription of participants’ conversations, the notes they left on the Miro board⁶, and the speculative design ideas they produced.

⁵A breakdown of participants’ origins, backgrounds and ages can be accessed here: <https://bit.ly/3xtrZNV>

⁶Miro board with all the contributions made by participants: <https://bit.ly/32t0kkT>



Figure 12: Section of the Miro board featuring participants' comments and votes to some of the catalog ideas.

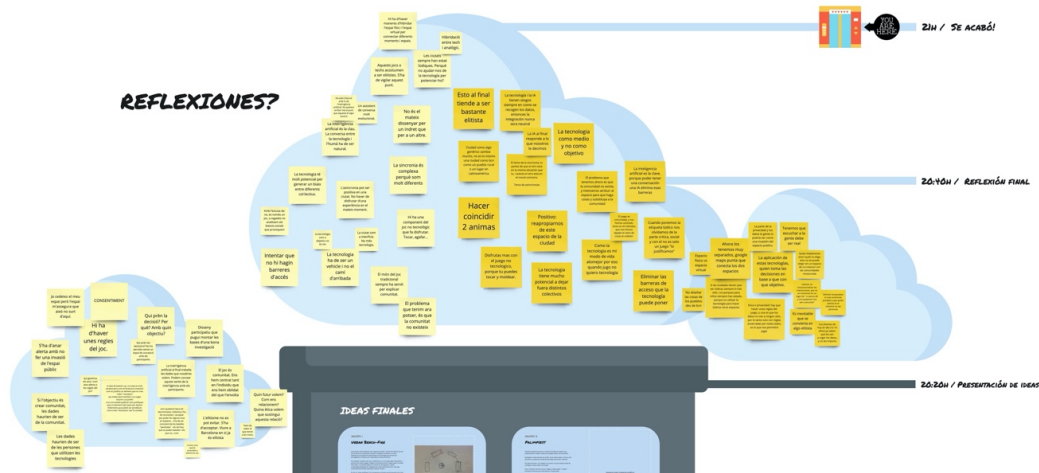


Figure 13: Section of the Miro board featuring the post-its participants used to store key insights from the final workshop discussion.

The combination of the interviews with average citizens and the workshop with expert practitioners allowed us to further explore the value of our early, speculative design ideas—and most importantly, their underlying design qualities and the play potentials that motivated them—from a broad range of perspectives. We could get a rich understanding of what both expert urban innovators and average citizens thought about the idea of using technology to afford playful engagement within the city, and what that configuration should look like to really turn cities into places where people can thrive socially and emotionally. After completing the two activities, we did one last round of analysis to bring together the outcomes of both interventions, with a focus on highlighting the findings that were most relevant from a design perspective. In the next paragraphs we present these results, which we frame as considerations urban innovators may want to make when designing playful smart city infrastructure that is meant to have a positive impact on people's socio-emotional wellbeing. We use the convention P to refer to participants in the study, e.g. P1 means participant 1.

6.2 Results

Designing playful technology can enrich our urban spaces.

Many participants saw the value of transcending utilitarianism in urban innovation and enriching the experiential texture of streets by adding social focal points of play citizens could gather around.

As described in Section 2, much of the technology currently being developed under the smart city archetype is fundamentally designed to improve productivity, not necessarily to improve the socio-emotional texture of people's engagement with the public space. Interviewees responded enthusiastically to the idea of alternative, increasingly playful urban technology configurations, arguing that “there is an absolutely huge amount of potential there” [P4] and that “I love the idea of making the cities more playful” [P20]. They also resonated with the concept of using technology as a way of achieving that; some argued that “technology is already embedded in our cities anyway, so it might as well make our cities more fun” [P20], while others highlighted specific affordances of digital technology that would be valuable to enable interesting forms of urban play: “[it] facilitates a lot of stuff and allows us to visualize things in easier and more interesting ways, in ways that change over time.” [P2]. Participants also noted that designing for urban play precedes technology design: “architecture always had these decorative elements to it, which changed over the years depending on styles and aesthetics. [...] Like, you don't just build it. It also has a symbolic meaning and an art meaning and whatever” [P4]. They also noted that “the way in which [those technologies are] executed might be quite important” [P8] and that we have to take the novelty effect into account: “Some things might have sort of a novelty effect. Once or twice, it would be cool, but constantly would probably be boring. Unless it changes. . .” [P4].

Playful urban technology can and should act as a social catalyst. Participants not only saw value in the catalog ideas as promoters of playful activity, but also as gathering places that connect people. According to them, the main potential of the kinds of technologies featured in the catalog is that they can create new relationships between people: “One of the things that I really like is how a lot of examples work with connecting strangers, or like working together and then that togetherness. . . That’s something that I find really valuable” [P29]. In particular, P4 sees the notion of the familiar stranger as an opportunity to explore through playful urban tech, to make strangers feel connected without necessarily having to interact directly or in a sustained manner: “There’s this notion of the familiar stranger: people you go on the same subway or whatever, so you recognize the guy because you’re always with him. . . Sometimes you just see them; sometimes you will actually see them, have little chats on the subway, and then they go their way [...]”.

Appropriation, collective creativity, and expression are important. Participants gravitated towards ideas that allowed people to have some creative input into their city as a way of forming bonds with each other. “Incorporating a kind of shared participation” [P21] and creating a space “where people can change and adapt things” [P7] were two key design choices that clearly struck chords with participants. With the rise of the modern city structure, people might have lost opportunities for modulating their environment to suit their needs. Customizable urban tech, if implemented, could help to reverse this trend. However, for those interventions to be playful, it would be important to avoid malicious uses: “With a few of these ideas, I felt like my initial reaction was: oh, malicious actors would love things like this” [P22].

There can be tensions between play and the city’s functioning. Though they generally appreciated the idea of introducing playful tech in the urban space, people were concerned with its potential negative side effects. Issues were raised in terms of privacy, malicious activity, and safety. According to participants, some of the catalog ideas might compromise instrumental uses of key city infrastructure, e.g. “if you start messing up with the traffic lights, you can really bring a city to disaster by creating havoc all over the place” [P4]. To avoid such tensions, participants proposed to design tech that does not affect sensitive urban activities, e.g. driving or crossing a street: “Things that are not directly affecting an individual, but a group . . . [to not be] distracting to people who are driving or something” [P21]. P29 argued it is inevitable that smart city innovation moves towards efficiency, and suggested we should embrace it: “The city is going to go towards efficiency, because that’s what the city council is going to pay for” [P29].

Consent is key to avoid a “dictatorship of playfulness”. Participants also talked extensively about the notion of consent; it is only natural that people often do not want to play and “something stops being fun when someone doesn’t want to [play]” [P29]. Much of the time a citizen is in the public sphere, they are pursuing a time-constrained task, and they may not want to engage in leisurely activities. Their right to not engage should be respected: “Imagine that I have to go from point A to B, and that I have to cross some of those traffic lights. . . and that I just don’t feel like dancing. Or I’m reading my book on the metro, and around me there are playful things happening that I don’t feel like engaging in. How can we avoid this?” [P2]. According to participants, playful

tech should be an invitation, not an imposition: “You need to be able to have this freedom of play, you need to be invited and accept the invitation” [P29]. People highlighted some specific qualities playful urban tech should always have: First, it should be voluntary and opt-in, as opposed to opt-out: “I think that I’m more inclined towards the designs that incorporate something where, like a group of friends walk up and say, hey, let’s try this, as opposed to just involving strangers that might not consent to it. Because if they want to, that’s fine. But also, you don’t want those other people to feel ostracized for not participating” [24]. Second, people should have a clear mechanism for signaling if they want to play or not: “You need to have a way to signal that I want to participate in this. [...] Something I think applies to all the ideas is that you need to be able to initiate it if you want to play” [P29]. A participant noted that giving explicit consent might be at odds with the idea of playful tech that surprises people. They proposed exploring mechanisms for surprising passersby in ways that are playful but not too disruptive, as an invitation to decide to engage in a playful experience or not: “You have surprise as a concept that you’re trying to occasionally elicit. And that is a nice thing to elicit, but it’s difficult to consent to being surprised” [P21]. People also noted that those who do not want to play may affect the experience of those who do: “What if I don’t want to play and, by not playing, I’m actually influencing the experience of the people who want to? We should avoid this” [P29]. Conversely, those people might feel socially pressured to play, just because others are: “What if someone around them doesn’t want to dance, and those who do push them to try? It could be uncomfortable”. Space for both playing and not playing, and clear ways of signaling one’s position, should be included, “because the fact that some people love dancing doesn’t mean everyone wants to dance all the time. No one should feel forced to participate” [P2].

Privacy: “I’ll let you play with my data only if I want to”. Privacy was also discussed extensively by participants. Many felt that some of the catalog ideas may compromise people’s right to privacy: “I have issues with some [of the ideas], concerns about freedom” [P29]. Several participants opposed automatic data collection even in cases where it was non-identifiable, as it could potentially be traced back to people by mapping it with other data. When asked about the possibility of designing playful infrastructure people should only use if they accept the “pact to play”, a participant raised concerns in terms of inclusivity. They noted it would not be ethical to deny the use of critical urban infrastructure to those who do not want to share their data, e.g. people not being able to use a bench because they know it tracks data to deliver a playful experience: “That’s problematic in terms of policy, because you are excluding [a significant] population” [P29]. A minority of participants were not too concerned with data privacy, as they saw it like a day-to-day part of city life. They thought it would be OK to play with people’s data as long as it is done ethically, and that efforts should be put to educating people about what data sharing involves: “The whole notion of privacy is a modern concept. A lot of the big concerns people have with cities is that these ingrained notions that they’ve been fixing... ‘Oh, this is part of city life. And the part that I like about the city is nobody knows me, and I can disappear’, and all of this stuff” [P4].

Inclusiveness is paramount. Inclusiveness was also considered an important design quality in any technology that inhabits urban spaces: “A lot of things need to be taken into account, like

accessibility, for example, for populations with disabilities. Also, languages, though in the case of [embodied activities like] dancing it may not be that important” [P1].

Format: existing infrastructure, phones, or new developments? Participants also discussed the different formats and interfaces playful urban technology could have, and generally gravitated towards tangible and embodied interactions with interfaces embedded in existing urban infrastructure: “There’s obviously lots of existing infrastructure that one can harness like lamps and stuff, and then all the phones. . .” [P4]. Many also suggested to transcend interactions based on small individual-use screens like phones: “With phones, it’s like, I’m interacting with whomever is right next to me [...] But with larger screens it’s like, ‘this thing exists and if we want to cross we have to dance, dude, so let’s do it’. This is great, I thought it’s fantastic” [P2]. A lot of them agreed that the problem with individual screens might be when they focus people’s attention on the screen, rather than on the urban space and/or the other citizens: “For example, in this one [refers to *Building art*], there’s a screen; but it focuses your attention on something bigger and very visual, something that’s shared among everyone. Instead, with *Silhouettes*, my attention is purely focused on my screen” [P1].

7 DISCUSSION

This paper illustrates how speculative co-design methods (and, in particular, the Situated Play Design approach [2]) can help to envision playful tech that enriches people’s urban experiences in ways that create space *meaningful inefficacies* [43] that enable a *resemantization* [84] of the urban space. It builds on and extends a rich body of existing work in the space of playable cities by paying close attention to contextual playful practices people already enjoy in the public space. As such, it provides powerful bottom-up inspiration for designers & researchers whose agenda is to use playful tech to enrich our cities socio-emotionally. Our work sheds

light on playful things people already enjoy doing within the city—ones that are likely meaningful to them and that, as such, may have inspirational value. By chasing play potentials in urban spaces, we can uncover play forms people find meaningful and enjoyable in public settings. Those play potentials can then be used as starting points to inspire urban technology design, leading to ideas that align with playful practices citizens feel excited about. Such an approach can help designers craft playful experiences that resonate with a city’s socio-cultural fabric, and thereby contribute to realizing (rather than disrupting) the city’s inherent playful potential.

The work done in this project contributes to an ongoing shift in values behind smart city innovation—arguably, a necessary one. We present it as inspiration for designers interested in developing urban technology that contributes to shaping public spaces where individuals and communities can flourish—productively, yes, but also socially, emotionally, and culturally. That inspirational provocation comes in the form of a three-fold contribution: First, the play-chasing phase of the project allowed us to uncover a series of playful practices people already do and enjoy in urban spaces. We frame them as *play potentials* that can inspire the design of technologies that afford contextually meaningful forms of urban play; they can help designers to ground and/or examine their ideas and reflect on whether they respond to playful and social practices citizens long for. Second, the *Catalog of Speculative Playful Urban Technology Ideas* provides a set of half-baked design concepts that illustrate how the above play potentials can be used to guide technology design—see Figure 14 for a synthesis of the relationship between the ideas and the play potentials. As such, it can inspire designers at the early stages of their work, focusing them on affording types of urban experiences that are socially, emotionally, and culturally stimulating. Finally, the outcomes of our discussions with different stakeholders about the catalog serve as critical, reflexive annotations to the play potentials and speculative ideas. They suggest how these kinds of interventions should and should not be built to support and mediate rich forms of emergent urban play.

Design directions	Design ideas	Play potentials														
		#1 - Adorn the urban space	#2 - Stream exciting urban occurrences	#3 - Discover the invisible	#4 - Fill the gaps	#5 - Temporal decontextualization	#6 - Pose performative behaviors	#7 - Performative behaviors	#8 - Customize the self	#9 - Hack the street	#10 - Connect with strangers	#11 - Asynchronous communication	#12 - Communicate a distance	#13 - Massive celebrations	#14 - Prank strangers	#15 - Urban challenges
Augmented infrastructure for authoring urban experiences	Share-a-song															
	Moody lights															
Parallel (in)visible realities	A Mad Hatter’s world															
	Ready, steady, cross!															
Spontaneous instigators of strange(r) connections	Dancing the lights															
	Building art															
Large-scale urban toys	The selfie photoshoot															
	Sensorial memory bench															
Portals of imagination	Silhouettes															
	Scavenger hunt plaques															
Local lore modules	Local whispers															
	VanGo															
Shared canvases for collective grandeur	Fountain of whispers															

Figure 14: Summary of ideas (and underlying design directions) included in the Catalog of Speculative Playful Urban Technology Ideas, linked to the play potentials they respond to. An accessible version of the table, including the 13 catalog ideas and the early collection of 25 ideas, can be accessed at: <https://bit.ly/3nFPQqq>

We hope these contributions give rise to smart city innovations that transcend techno-solutionism. The ideas we foreground respond to urban experiences people seem to long for, though they are hardly embraced in commercial smart city implementations. However speculative, the combination of these ideas and the multi-stakeholder reflections about them can help designers to be mindful of playful and social practices people already enjoy within their city—in ways that they are prepared to support (rather than disrupt) the playful potential inherent in an urban space. Importantly, these insights are: *bottom-up* (i.e. they respond to views and existing urban practices of average citizens) and *socio-emotionally focused* (i.e. they center on supporting rich, delightful urban experiences). As such, they challenge approaches to smart city innovation that, as [21] notes, are often top-down, utilitarian, and techno-centric.

We acknowledge that some ideas in the catalog may raise tensions and even be problematic from a societal perspective—e.g. *Silhouettes* may be at odds with the privacy of passersby, or *Dancing the light* may enforce a playful attitude to those who are not in the mood for it. Our aim with the catalog was not to avoid those tensions, but rather to surface and tackle them through the lens of a variety of people's sensitivities. By engaging diverse people to comment on, criticize, and further develop the catalog ideas we were able to augment those ideas with a bottom-up layer of critical thinking, which we argue can help designers to think more carefully about the playful interventions they design for the urban space. Many of the learnings from our co-design process can provide useful insights for designers to avoid contributing to *ludic capitalism* [16], i.e. designing for play as a quick-access, short-span, shallow commodity, and better focus on the aforementioned *meaningful inefficacies* [43] instead, i.e. play that is carefully interweaved within, and contributes to the richness of, a city's socio-cultural fabric.

We also acknowledge that previous research and artistic work has produced technologies that align with some of the ideas in the catalog, e.g. *SelfieCafe* [70], *spread.gun* [34], *Urbanimals* [54], or *Hello Lamp Post* [66], all described in Section 2. Other designs hold resemblances with some of our speculative ideas, e.g. the façade of the *Hotel WZ Jardins* in São Paulo [33] has similarities with *Building Art*, as it changes color and can be interacted with via smartphone; or *Shadowing* [24] is an interactive installation that, like *Silhouettes*, allows citizens to play with shadows from the past. Our work adds value despite its similarities with existing works in the space of playable cities design and research: rather than claiming exclusivity over the idea of designing tech that playfully augments the city, we show our situated process of identifying playful practices people already do in the public space and building on them to speculate about how tech could respond to that playful potential. Our approach can help designers to create technology that is grounded in people's playful cravings rather than on the designer's creative intuition or expertise—and that, as a result, is more likely to afford experiences that are contextually sound. Further, while exceptionally playful urban technologies exist in research and artistic domains, the reality is that they remain uncommon in commercial smart city implementations, where utilitarian approaches dominate [21]. We hope that the ideas from this project, combined with other people's efforts described in Section 2, contribute to challenging this trend. For example, some of our ideas rethink the functionality of urban navigation tools like *Google Maps*: rather than trying to optimize people's movements, they support unproductive agendas such as

highlighting the richness of the city and its citizens (see *Scavenger Hunt Plaques*) or producing pieces of ephemeral art (see *VanGo*). Other ideas hint at how emerging technology could extend existing, pre-smart city urban infrastructure in ways that put people's well-being before urban efficiency, e.g. *Dancing the light* augments traffic lights by (1) turning them into opportunities for social connection and (2) giving people a chance to (playfully) determine the length of their wait—aligning with recent moves towards privileging pedestrians over cars such as [65]. Other ideas show how urban play can be smoothly integrated into (rather than detached from, as many location based-games) the ordinary flow of urban life in ways that enrich the socio-cultural fabric of a city, e.g. *Silhouettes* extends games like *Pokémon Go* by centering the player's attention towards their environment and the other citizens with whom they share it, instead of inviting them to a fantastic virtual reality that has little to do with the ordinary flow of the city life.

In addition to its inspirational potential, our speculative catalog proved to be a valuable tool to engage diverse stakeholders to co-imagine the playful future of their city. The early ideas featured in it illustrate a breadth of possible design directions within a design space most average citizens are unfamiliar with. By making those design directions tangible and relatable, we were able to empower non-experts and experts alike to collectively imagine desirable ways of shaping the foundations of smart city innovation, in ways that both their pragmatic needs, their values, and their playful desires were taken into consideration. That is a relevant move: as our findings indicate that the ideal of a playable city brings about implicit tensions. While making the urban space more playful and enjoyable for some, we may create accessibility constraints for others, or invade the privacy of citizens who would rather not be a part of the digital sphere. Using the catalog as a tool to facilitate multi-stakeholder conversations and engage average citizens, experts, and policymakers alike, allowed us to investigate how the ideas in my catalog (and other similar technologies) should and should not be implemented. We thus see the catalog not as a set of finalized design proposals but rather as a starting point to imagine what the playful future of our cities could and should be. Coupled with the reflections from our multi-stakeholder engagements, it can inspire future technologies that are both critical and fun.

A limitation of this project is that the findings might not necessarily be universally applicable. The play potentials we identified in the play-chasing phase of the project—and, as such, the resulting speculative design ideas—are grounded in existing practices we observed in specific urban settings. Some might not apply beyond the contexts where they were found, and there could be many more play potentials on our list had we explored other urban settings. To use the list of play potentials, design directions, and speculative ideas presented in this paper, designers should explore if and how they apply to the local contexts targeted by their projects, e.g. engaging local citizens in situated conversations about speculative catalogs similar to ours. As noted by [13], there is a lot of value in designing for the particular, as it “enable[s] us to capture the richer and more complex nuances of a particular situation or user, hence also directly challenging the assumptions we make as researchers”. Taking our work as a point of departure, designers can use Situated Play Design and other participatory techniques to further understand what kinds of urban experiences their target citizens long for. That will support the design of urban tech that realizes the

playful potential of the targeted contexts. This paper provides some guidance for how to do that: it shows how we leveraged two SPD methods to chase play potentials of urban spaces and use them to drive design, and how we further investigated the outcomes of our process in conversation with diverse relevant stakeholders. We hope that these strategies empower designers to identify design opportunities for urban play in their targeted design context, adapt our proposed play potentials and design directions, and find new ones that better respond to the specific idiosyncrasies of the cities they design for.

8 CONCLUSION

In this paper, we presented a Situated Play Design study investigating the playful potential of smart cities. Through a series of speculative co-design engagements, we explored how playful technology might add socio-emotional value to our public spaces and experimented with design qualities that might support that move. The outcomes of our study are three-fold: First, we identified and made design use of a series of playful practices people already seem to engage in and enjoy in urban spaces, which we present as *play potentials* that can inspire the design of playful urban technology that affords contextually meaningful experiences. Second, we developed a *Catalog of Speculative Playful Urban Technology Ideas* to experiment with how different kinds of technology might help to realize that playful potential, and to create a diverse set of future imaginaries around this space. Building on our catalog, we facilitated a series of multi-stakeholder conversations (with both expert urban innovators and average citizens with diverse socio-cultural backgrounds) about the idea of incorporating playful technology into our cities, from which we distilled a series of considerations designers may want to make when designing new interventions in this space. Our work contributes to ongoing efforts at playfully reconfiguring urban spaces, in the domain of technology design and beyond, and extends them by putting the focus on commonplace playful urban practices that can be used as contextually grounded starting points for design. We hope this will inspire and empower designers and researchers to continue to strengthen the palette of existing playful smart city interventions, in ways that are more contextually sensitive and socio-emotionally rich.

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