Re-Enchanting Spaces: Location-Based Media, Participatory Documentary, and Augmented Reality

by

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ABSTRACT

Location-based media have always played a key role in defining both spaces and publics. Due to the proliferation of sophisticated locative technologies, location-based media are increasingly ubiquitous in areas including art, gaming, urban planning, marketing, and tourism. While location-based approaches have enormous potential, however, rapid technological change and widely dispersed communities of practice have limited critical discourse. This thesis explores how we can better theorize and create innovative and compelling location-based media.

I situate location-based media within the broad category of spatial narrative, identifying key concepts and approaches through historical and contemporary examples. In showing that location-based media have always been a form of augmenting our physical environments, I argue that augmented reality as a concept is far broader than current industry discourse indicates, and suggest location-based media as a lens through which to rethink AR's affordances and potentials.

In keeping with an emphasis on new forms of storytelling, I propose a taxonomy for location-based media that distinguishes three different levels of participation and user agency: Consumption, Interaction, and Participation. Participatory works that allow users to shape the narrative—becoming deeply invested as co-creators—challenge traditional notions of authorship, consumption, linearity, and temporality. They embrace the affordances of networked locative technologies, provide a platform for a multitude of voices, and draw on the profound power of both community and place. Three case studies—Roundware, *Yellow Arrow*, and the 96 Acres Project—highlight the affordances and challenges of participatory location-based approaches. Throughout this thesis, I endeavor to show that participatory location-based media offer vast creative, social, and political potential. Drawing on the rich tradition of spatial narrative, as well as the affordances of locative technologies, they invite us to reexamine our conceptions of narrative, documentary, and space itself.

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Introduction

Humans have long attempted to narrativize not only their lives, but also the spaces around them. We can see this in pilgrimage practices in many of the world's religions, as well as centuries of flamboyant maps identifying spaces of danger and adventure. Location-based media—physically or digitally linked to physical locations, conceptually connected to these locations, and designed to be experienced at these locations—are a central part of this ongoing endeavor. In recent decades, the proliferation of ubiquitous computing, mobile technologies, and digital media has facilitated an explosion of creative experimentation with location-based media, in areas from art to gaming to tourism. Location-based approaches appeal to creators for many reasons, including the opportunity to tell stories embedded in the physical world, engage with audiences in new ways, and build robust communities of discourse. These projects offer the potential to reach audiences outside of white cube galleries and industry spaces; location-based media are in energetic conversation with the world, inviting participants out into dynamic public spaces. In the documentary domain, location-based media present the possibility of a deeper and more complex understanding of place, history, and community, while also problematizing ideas of authorship, linearity, and documentation. Location-based media can activate spaces and communities by tapping into peoples' deep sense of attachment to place, and illuminate the richly detailed primary documents that are embedded all around us.

While location-based approaches have enormous potential, rapid technological change and widely dispersed communities of practice have created a challenging landscape for creators and limited critical discourse. We can find location-based narratives in museums, mobile games, and marketing campaigns, while mobile technologies are studied across a vast spectrum of disciplines, from urban planning to engineering to media studies. The narrative aspect of

location-based experiences is under-examined in many of these fields, and discourse around

notions of authorship, user experience, and public space are scattered across disciplines.

Although the development of new location-based technologies has provoked a rush to produce

content for new platforms and devices, many projects hew to conventional approaches, not fully

embracing the affordances of location-based media. My research focuses on how we can better

theorize and create innovative and compelling location-based narratives.

Place and Space, Secondary Worlds, and Re-Enchantment

My research on location-based media focuses on innovative approaches to narrative,

collective authorship, embodied interaction, and interventions in public space. This critical lens

is informed by a number of theorists: Michel de Certeau on place and space, J.R.R. Tolkien on

secondary worlds, and Max Weber on disenchantment and re-enchantment. In his 1984 treatise

The Practice of Everyday Life, French theorist Michel de Certeau differentiates the concepts of

place ("lieu") and space ("espace"): a place is static and defined, simply consisting of a series of

positional relationships. A space, in contrast, is dynamic, heterogeneous, and polysemous:

> [Space] is in a sense actuated by the ensemble of movements deployed within it. Space occurs as the effect produced by the operations that orient it, situate it, temporalize it, and make it function in a polyvalent unity of conflictual programs or contractual proximities.[1]

For Certeau, "space is a practiced place," brought into being by the people and activities that

move through it.[2] Places are akin to maps, while spaces are akin to tours: seeing versus going, a

fixed scene versus a series of movements.[3] Moreover, Certeau identifies narrative as a

fundamental mechanism for transforming places into spaces: the stories we create serve to

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[1] Michel de Certeau, *The Practice of Everyday Life*, (Berkeley: University of California Press, 1984), 117.
[2] Ibid.
[3] Ibid., 119.

organize, connect, and imbue places with meaning.[4] I find Certeau's formulations of place,

space, and narrative to be a valuable framework for location-based media: how can creators use

narrative to turn inert places into dynamic spaces?

I will also incorporate the concept of worldbuilding in my approach to location-based

media. Worldbuilding is a fairly modern term, usually referring to the practice of creating

expansive, detailed fictional universes for science fiction or fantasy works. However,

worldbuilding as a framework for creating immersive narrative universes—possessing their own

internal logic, value systems, and interconnected components—is almost as old as storytelling

itself. *The Odyssey* and the Egyptian *Book of the Dead* are early examples of worldbuilding. *The

Lord of the Rings* author J. R. R. Tolkien was one of the first literary scholars to critically

examine worldbuilding as a practice. In his influential 1947 essay "On Fairy Stories," Tolkien

distinguishes the "Primary World," the world we live in, from "Secondary Worlds" created by

authors. He stresses the importance of establishing "the inner consistency of reality" in

Secondary Worlds: when a reader enters an effective Secondary World, the characters, events,

and settings are "true" because they follow the rules of the world.[5] A reader's "Secondary

Belief" in successfully constructed worlds is substantively different from an intentional

suspension of disbelief activated "when condescending to games or make-believe, or when

trying […] to find what virtue we can in the work of an art that has for us failed."[6]

Tolkien's analysis of Primary and Secondary Worlds is useful for any storyteller, but I

draw on it here in relation to the specific affordances and concerns of location-based media.

Location-based media can be read as an unseen Secondary World—whether fantastical,

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[4] Michel de Certeau, *The Practice of Everyday Life*, 122.
[5] J. R. R. Tolkien, "On Fairy-Stories," in *The Monsters and the Critics and Other Essays*, ed. Christopher Tolkien (London: George Allen and Unwin, 1983), 140.
[6] Ibid., 132.

historical, or social—overlaid on the physical Primary World, and coherent internal logic is crucial when the narrative exists in the fluid and hybrid space between the two. Moreover, Tolkien describes immersion in a Secondary World as "enchantment," an idea I will discuss further in subsequent paragraphs:

> Enchantment produces a Secondary World into which both designer and spectator can enter, to the satisfaction of their senses while they are inside […] it does not seek delusion nor bewitchment and domination; it seeks shared enrichment, partners in making and delight, not slaves.[7]

The notion of immersion is complex when speaking about technologically mediated location-based media, since participants are at all times in between worlds (as with mobile AR games). However, Tolkien's emphasis on designers and spectators sharing a constructed world and acting as "partners in making" is deeply resonant for me, as I explore modes of storytelling that incorporate co-creative and participatory approaches.

German sociologist and political economist Max Weber produced an expansive body of work that helped shape 20th-century conceptions of modernity; what I have found relevant to my project is his notion of disenchantment ("Entzauberung") stemming from the rationalization of the modern world. Weber's rationalization thesis describes an impetus pushing the world toward a state of affairs in which "one can, in principle, master all things by calculation."[8] This drive occurs in every facet of human life, from industry to religion to education. The search for quantifiable processes is most obviously seen in the development of industrial capitalism—greater discipline of workers on the factory floor, separation of workers from the means of production, etc.—but also pervades everyday social life through increasing mechanisms of control like bureaucratic administration. Science and technology grow in importance, while

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[7] J. R. R. Tolkien, "On Fairy-Stories,"143.

[8] Max Weber, *The Protestant Ethic and the Spirit of Capitalism with Other Writings on the Rise of the West*, Fourth Edition, trans. Stephen Kalberg (New York: Oxford University Press, 2009), 223.

former arenas of intellectual exploration like religion and philosophy are slowly devalued.[9] Broadly speaking, rationalization is a process of increasing knowledge, growing impersonality, and enhanced control.[10] In the constant push for efficiency and discipline, our world is disenchanted of magic and mystery. Weber's rationalization thesis has been profoundly influential in many different fields, but has also been roundly critiqued for its Eurocentrism and its ostensible inevitability. My summary of it here is admittedly simplistic; his thesis spans a number of writings and has been subject to many varied readings and responses. However, the notion of disenchantment—and the possibility of re-enchantment—is one that intrigues me.

Many (though certainly not all) of the ways in which we use technology in our everyday lives certainly seem rationalized and disenchanted: counting the number of steps we take each day, recording our expenditures, purchasing goods in impersonal transactions, being surveilled in countless ways that cause us to accept or self-impose regimes of control and discipline. Meanwhile, the collection of user data on a massive scale transforms us all into quantified capitalist subjects. Space, in many ways, has been disenchanted as well. A number of theorists have pointed out the ways in which modern culture and spatial practices, as well as the "placelessness" of the internet and ubiquity of mobile technology, have eroded our sense of place.[11] Anthropologist Marc Augé contends that our world increasingly consists of anonymous spaces, or "non-places," stripped of identity and history, like hotel chains, airports, and malls.[12] Many modern spaces are also designed to reinforce projects of surveillance and bodily

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[9] Max Weber, *The Protestant Ethic and the Spirit of Capitalism with Other Writings on the Rise of the West*, 215-216.

[10] Kim, Sung Ho, "Max Weber," *The Stanford Encyclopedia of Philosophy* (Fall 2012 Edition), ed. Edward N. Zalta, https://plato.stanford.edu/archives/fall2012/entries/weber.

[11] Mark Poster, "Digitally Local Communications: Technologies and Space" (paper presented at The Global and the Local in Mobile Communication: Places, Images, People, Connections, Budapest, June 10-12, 2004).

[12] Marc Augé, *Non-Places: Introduction to an Anthropology of Supermodernity* (London: Verso, 1995), 78-79.

regulation, and as we move through space, we often focus on getting efficiently from one place to another, or complying with authorized uses and delineations of space.

What might constitute modern enchantment, or re-enchantment? In *The Re-Enchantment of the World: Secular Magic in a Rational Age*, Joshua Landy and Michael Saler describe many registers of re-enchantment: mystery, wonder, order, purpose, significance, redemption, the infinite, the sacred, miracles, and epiphanies.[13] They point to varied examples of re-enchantment, including fantastical fictional worlds, science, music, architecture, philosophy, and even spectator sports.[14] I am primarily interested in re-enchantment in the sense of playful discovery, collective creativity, and polysemous multiplicity. Location-based media are powerful tools for investing spaces with these qualities. They bring people into new spaces—or through familiar spaces in new ways—inviting chance encounters, discoveries, and new understandings of space. Their disruption of normative notions of movement also invites dynamic and spontaneous interactions. Location-based media inscribe playful and creative layers on the physical landscape, countering utilitarian and regimented approaches to space. Meanwhile, participatory and collaborative approaches allow people to complicate singular, official narratives of public space, while the creative act of contributing to these works can establish more intimate and meaningful personal and communal relationships to space. Throughout my thesis, I attempt to draw out the (still largely untapped) potential of participatory location-based media for playful discovery, collaborative creation, and pluralistic narratives.

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[13] Joshua Landy and Michael Saler, "Introduction: The Varieties of Modern Enchantment," in *The Re-Enchantment of the World: Secular Magic in a Rational Age*, ed. Joshua Landy and Michael Saler (Stanford: Stanford University Press, 2009), 2.

[14] Ibid., 7-12.

Overview of Chapters

In my first chapter, I define location-based media and situate them within the broad field of spatial narrative, identifying key concepts and approaches through historical and contemporary examples. In keeping with an emphasis on new forms of storytelling, I propose a taxonomy for location-based media that distinguishes three different levels of participation and user agency: Consumption, Interaction, and Participation. Within the Participatory category, I further differentiate Contributory, Connective, and Co-creative approaches. In my second chapter, I discuss augmented reality's inherent connection to place. In showing that location-based media have always been a form of augmenting our physical environments, I argue that AR as a concept is far broader than current industry discourse indicates, and suggest location-based media as a lens through which to rethink AR, its affordances, and its future. The subsequent three chapters—Roundware, *Yellow Arrow*, and the 96 Acres Project—each present a case study highlighting specific affordances and challenges of participatory location-based approaches. Throughout, I endeavor to show that participatory location-based media offer vast narrative, creative, social, and political potential. Drawing on the rich tradition of spatial narrative, as well as the affordances of locative technologies, they invite us to reexamine our conceptions of narrative, documentary, and space itself.

Chapter One: Mapping Location-Based Documentary

Spatial Narrative

Space and narrative are inherently connected. We say that stories "take place;" Michel de Certeau writes that stories "traverse and organize places; they select and link them together; they make sentences and itineraries out of them. They are spatial trajectories. Every story is a travel story—a spatial practice."[1] Spatial narrative—narrative situated in physical space—is an immense topic, such that an exhaustive review is impossible here, or indeed in any one text. Keeping this in mind, I will limit my discussion to a brief overview of several broad categories of spatial narrative: architecture, attractions, annotation, tours, public art, and situated forms of play. I will use these categories, and historical examples of each, to situate my discussion of location-based media and illustrate key concepts and affordances.

Throughout this thesis, I describe a wide variety of physical and virtual media—from street signs to digital soundscapes—as narrative. While narrative is commonly understood as, generally speaking, "the telling of a story or communication of a chain of events, fictive or real,"[2] I invoke a more expansive understanding of narrative as something co-created between author and reader, more experiential than textual. In keeping with an understanding of narrative comprehension and interpretation as themselves acts of production,[3] I focus on participants and users, rather than readers and audiences. In this I draw on interactive and participatory documentary's exploration of both co-authored and database-driven narratives, as well as game studies scholars' treatment of narrative as more processual and environmental. In "Game Design

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[1] Michel de Certeau, *The Practice of Everyday Life*, (Berkeley: University of California Press, 1984), 115.
[2] "Narrative," International Society for the Study of Narrative, accessed May 2, 2017, http://narrative.georgetown.edu/wiki/index.php/Narrative.
[3] De Certeau, *The Practice of Everyday Life*, xxi.

as Narrative Architecture," Henry Jenkins contends, "a story is less a temporal structure than a body of information," carefully distributed across space and revealed through spatial exploration.[4] Thus, designing physical or virtual environments—literal worldbuilding—is a key mode of shaping narrative, just as narrative in turn can shape our understanding of these environments. Of course, subsequent examples will also illustrate that narrative is far from the only way of enchanting spaces or imbuing them with meaning.

Architecture: Malleability

Architecture is one of the oldest and most universal modes of spatial narrative. Victor Hugo described architecture as "the great book of humanity," adding:

> Architecture began like all writing. It was first an alphabet. Men planted a stone upright, it was a letter, and each letter was a hieroglyph, and upon each hieroglyph rested a group of ideas, like the capital on the column. This is what the earliest races did everywhere, at the same moment, on the surface of the entire world.[5]

France's Chartres Cathedral and its famous labyrinth, constructed in the early 13th century, demonstrate the multiple levels on which architecture functions as embodied spatial narrative. The Gothic architecture of the cathedral—its cruciform layout, vibrant stained glass windows illustrating Biblical scenes, and soaring vaulted ceilings—emphatically shapes a narrative of the glory of God. It has also long been a major pilgrimage destination, playing an important role in people's personal narratives of devotion, as enacted through space.[6]

The labyrinth, meanwhile, is a series of concentric circles inlaid in the floor, connected together in one densely looping path. Over the years, it has been referred to by several different

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[4] Henry Jenkins, "Game Design as Narrative Architecture," in *First Person: New Media as Story, Performance, and Game*, ed. Noah Wardrip-Fruin and Pat Harrigan (Cambridge, MA: MIT Press, 2005), 126.

[5] Victor Hugo, *The Hunchback of Notre Dame*, trans. Isabel F. Hapgood (New York: Thomas Y. Crowell & Co., 1888), 196.

[6] Rebecca Valette, "The Labyrinth of the Cathedral of Chartres," Boston College, accessed December 10, 2016, http://www.bc.edu/sites/labyrinth/history.html.

names, which taken together illustrate the labyrinth's diverse collection of narrative and physical referents. *Le dédale* ("maze"), after the architect Daedalus, connects the labyrinth with ancient Greek myth: the hero Theseus's battle against the Minotaur parallels man's struggle against evil. *La Lieue* ("league," an antiquated unit of measurement) reflects the physical distance pilgrims covered on their journeys. Some worshippers at the cathedral would "walk" the entire labyrinth path on their knees, as a substitute for a pilgrimage to a holy site. *Le chemin de Jérusalem* ("road to Jerusalem") specifically positions the labyrinth as a substitute pilgrimage to the Holy Land for those financially or physically unable to actually travel to Jerusalem. Finally, *le chemin du paradis* ("road to paradise") conveys how walking the labyrinth parallels the journey of life, from birth to death to salvation;[7] it can also be read as the journey of Christ through hell to resurrection.[8] Thus, the Chartres Cathedral labyrinth is a spatial narrative connected both symbolically and indexically to ancient and Biblical stories as well as physical journeys of devotion. Its different names also illustrate the varied understandings of religious devotion—as a struggle, a journey through sin, a path from which the pious cannot deviate—that have been overlaid onto the physical labyrinth. Today, different readings of the labyrinth still abound, including various occult or conspiracy theories. Like many forms of spatial narrative, architecture is a malleable text that invites multiple interpretations.

Attractions: Immersion

Designed attractions and themed spaces such as haunted houses, museums, and amusement parks are also inherently spatial narratives, combining architecture with material culture, design, performance, and written and audio-visual media. For example, Colonial

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[7] Rebecca Valette, "The Labyrinth of the Cathedral of Chartres."
[8] Gilles Fresson, "Que signifie le labyrinthe? Pourquoi a-t-il été construit?" Cathédrale de Chartres, accessed December 10, 2016, http://www.cathedrale-chartres.org/fichiers/pdf/pelerinages/labyrinthe-cath.pdf.

Williamsburg is a historical site that was restored and turned into one of the world's largest living history museums.[9] Its website invites visitors to "Travel back in time and immerse yourself in an 18th century city," further adding, "This isn't just a place where things once happened. They're happening, right now, here in the 18th century."[10] Colonial Williamsburg conveys information about everyday colonial life, and offers visitors compelling and memorable experiences, by immersing them in an expansive and detailed historical environment. Families can assist brickmakers and gardeners using 18th-century techniques, drink historic beers at a restaurant once frequented by George Washington, or even enlist in the local militia and participate in drill practice. Walking down one of the restored main avenues, visitors might encounter energetic military music performed by the Fifes and Drums, or actors in period costumes discussing recent developments in the struggle for American independence. Themed spaces and designed attractions—physical manifestations of worldbuilding—envelop visitors in multiple registers of spatial narrative, from architectural to theatrical, material to textual.

Annotation: Inscription

Annotation is perhaps the most prosaic form of spatial narrative. While annotation is a relevant concept and practice in many areas, from computer programming to literature, here it describes when existing locations, buildings, and objects are identified, described, or contextualized using markers that are physically or digitally proximate to their subjects. Spatial annotation includes street signs and commemorative plaques—as well as newer digitally enabled forms like geotagged social media posts. Even the most basic forms of annotation present some

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[9] "The history of Colonial Williamsburg," Colonial Williamsburg, accessed December 10, 2016, http://www.history.org/Foundation/cwhistory.cfm.
[10] "Explore Colonial Williamsburg," Colonial Williamsburg, accessed May 3, 2017, https://www.colonialwilliamsburg.com/explore.

form of narrative about a space, such as who occupies the space, or what kinds of activities occur there. Annotation can identify a location as a site of gathering, historical importance, or mourning. Less literal modes of annotation can complicate or counter dominant spatial narratives. Graffiti, for example, has long been a way for marginalized groups to inscribe the city with unofficial narratives. Joe Austin describes how graffiti, particularly on subway cars, allowed artists and youth to assert spatial claims in New York City from the late 1960s to the early 1990s. By appropriating pre-existing institutional spaces and networks—namely the subway trains, stations, and storage yards of America's largest public transportation system—graffiti writers were able to broadcast their voices throughout the city and engage in conversation with both each other and the urban community at large. "The trains were transformed into a mass communications network […] an alternative "screen" where the writing community could make itself visible to the city and to itself."[11] This exemplifies inscription's active, social, and generative properties.

Tours: Narrativization

Tours and heritage trails, guided and self-guided, are another mode of spatial narrative. Participants experience a narrative that is both spatial and about a space. Guides—museum docents, actors, audio guides, signage, and printed maps—provide information about the space that participants move through. In some tours this information is limited to historical facts, while others provide more interpretation and context, such as recorded interviews, excerpts from archival documents, or musical accompaniment. Boston's Freedom Trail, a 2.5-mile-long path marked in brick through the downtown area, brings participants to historically notable locations

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[11] Joe Austin, *Taking the Train: How Graffiti Art Became an Urban Crisis in New York City* (New York: Columbia University Press, 2001), 77.

including graveyards, churches, and government buildings. Visitors can walk the trail

independently, rent an audio guide, or participate in an official tour with a costumed guide in

character as an 18th-century resident of Boston. The Freedom Trail clearly seeks to present

participants with not only information, but also an exciting narrative of early American history.

Its official website identifies Boston as a place "where every step tells a story," and promises

visitors "tales of high treason, mob agitations, revolutionary actions, and partisan fights of the

American Revolution."[12]

Public Art: Intervention

Public art is a robust category of spatial narrative, broadly consisting of "art that is in the

public realm, regardless of whether it is situated on public or private property […]. Usually, but

not always, public art is commissioned specifically for the site in which it is situated."[13] Of

course, the notions of "public" and "site" (and "art" itself, certainly) are continually contested

and redefined.[14] The history of public art spans millennia: from statues of ancient Mayan deities,

to the nationalist political monuments commissioned by the Communist leaders of the USSR, to

street art and murals in most urban centers today. Public art is not limited to physical, permanent

works—it can also include temporary installations or various forms of performance. While it

often serves to beautify spaces, memorialize people or events, and emphasize community or

national identity, now more than ever public art frequently functions in critical and

interventionist ways, posing questions about political power, consumerism, and environmental

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[12] "The Freedom Trail," The Freedom Trail Foundation, accessed December 10, 2016, https://www.thefreedomtrail.org/freedom-trail.

[13] "Public art," Tate, accessed December 11, 2016, http://www.tate.org.uk/learn/online-resources/glossary/p/public-art.

[14] Cher Krause Knight and Harriet F. Senie, introduction to A Companion to Public Art, ed. Cher Krause Knight and Harriet F. Senie (New Jersey: Wiley-Blackwell, 2016).

issues, among other topics. Richard Serra's controversial *Tilted Arc* (1981-89) in Manhattan's Federal Plaza, for example, critiqued the very notion of a unified public space and the expectation that public art projects signify and enact this space. The 120-foot long, 12-foot tall steel sculpture neatly bisected the plaza, blocking the views and routes of those who routinely traversed the space.[15] Regardless of its physical form, duration, or goal, public art is framed (literally and figuratively) by its surroundings, and the intersection of art, site, and audience generates a narrative firmly ensconced in space.

Situated Play: Collective Authoring

Situated forms of play are also spatial narratives. For example, in live action role-playing (LARPing) and alternate reality games (ARGs), fictional settings or attributes are superimposed on an area via physical markers or digital interfaces. For players, a public park may become Tolkien's Middle Earth, a private residence may become a vampire den, or an entire city may become a site of extraterrestrial invasion. LARPing and ARGs are open-ended (for the most part) narratives in which players re-inscribe physical environments as fantasy worlds. Gameplay takes place in a hybrid space where the real world and the game world overlap, and the imagined geography established by the players plays an important role in shaping the game narrative. Various forms of site-specific and participatory theater—in which a production is staged in a location similar to the setting of a play, and/or both performers and audience members stand and move around the performance space—also reflect collectively created spatial narratives.

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[15] Jennifer Mundy, "Lost Art: Richard Serra," Tate, October 25, 2012, http://www.tate.org.uk/context-comment/articles/gallery-lost-art-richard-serra.

Definitions

Spatial narratives are all around us, in many different forms—in fact much of our lived environment constitutes some degree of spatial narrative. Across the many fields in which spatial narratives are created, these works are variously referred to as location-based, place-based, situated, site-specific, locative, and location-aware, among other terms. These descriptors remain highly malleable, largely due to the dispersed communities and stakeholders involved. Amber Case, an industry anthropologist as well as an early location-based technology entrepreneur, says:

> It's really your demographic. If you're in corporate, you're going to get one term. If you're in academia, you're going to get another term. It's also a geological layer because when people did things in the 90s they called it one thing and it's different from what they called it in the 80s and what they called it in the 2000s.[16]

While terminology has not yet coalesced, and frequent conflation of terms occurs, it is possible to identify a few broad distinctions and axes. Location-aware is more likely to be used in technological and engineering discussions, describing devices that can determine their physical location. Location-aware and site-specific also represent something of a spectrum: when media are location-aware, they respond dynamically to the granular detail of a user's movement and position. Site-specific work, on the other hand, is about or in response to a more broadly understood physical location. Location-based and place-based can be understood along this spectrum as well, with location-based projects more cognizant of specific locations and the user's movement through or around them, and place-based works engaging a broader notion of place, such as a community, neighborhood, or geographic region. It is also entirely possible for a work to be both location-aware and site-specific, or location-based and place-based.

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[16] Amber Case (Author, Anthropologist, and User Experience Designer), interviewed by author, February 3, 2017.

The term "locative media" is a more specific case. While the term itself simply refers to media connected to a location or multiple locations, it is closely associated with a field of art practice and corresponding scholarship that emerged in the early 2000s as use of location-aware devices became more widespread.[17] These artworks responded to the spread of ubiquitous computing and new communications and mapping technologies; Drew Hemmett described locative art as "the art of mobile and wireless systems."[18] Locative media include works intended to be experienced at specific locations, as well as projects that are oriented towards location-related content, rather than location-specific display. For example, many locative artworks draw on GIS (geographic information system) data to create visualizations, but are presented in web browsers or two-dimensional museum displays.

In an attempt to both delimit and clarify this expansive field of practice, I have focused my research on location-based media. A work of location-based media as I define the term must fulfill three requirements: 1) it consists of media content that is physically and/or digitally connected to an existing physical location or locations, 2) its content is also conceptually connected to these locations, and 3) it is designed for people to experience onsite. This definition leaves quite a bit of space for interpretation and debate, and that is intentional. Both my definition and the taxonomy that follows are intended as a critical lens, rather than a prescriptive closed system.

So what are location-based media? They include many of the historical, low-tech or no-tech examples mentioned above, as well as digital media projects as diverse as interactive tourism guides, literary geocaching, history-themed audio walks, guerilla marketing campaigns, and espionage-themed alternate reality games. Documentary location-based media are also

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[17] Jonah Brucker-Cohen, "Locative Media Revisited," Rhizome, March 26, 2014, http://rhizome.org/editorial/2014/mar/26/locative-media-revisited.
[18] Drew Hemment, "Locative Arts," *LEONARDO* 39, no. 4 (2006): 349.

varied in form and content. One non-technologically mediated example is Max Neuhaus's

LISTEN. As a percussionist, Neuhaus participated in "the gradual insertion of everyday sound

into the concert hall, from Russolo through Varese and finally to Cage who brought live street

sounds directly into the hall."[19] He wondered if the opposite approach—bringing the concert

audience outside—might be more effective in communicating the aesthetic value of these sounds

and introducing people to a new type of listening. Beginning in 1966, he led non-verbal

soundwalks (a later term—he refers to them as "performances" or "lecture demonstrations"[20])

through New York City, silently inviting participants to appreciate ambient sounds from power

plants, car washes, people in the street, and finally his own percussion pieces. The project

continued to evolve through multiple iterations, including field trips to inaccessible but aurally

intriguing locations, and a do-it-yourself version in the form of a *LISTEN* postcard that recipients

could place in locations of their own choosing.[21]

On the other end of the technological spectrum, *Cinemacity*[22] is an interactive mobile app

showcasing the rich cinematic history of Paris. It uses GPS technology to geolocate movie clips

in the places where they were filmed. When users find a filmed location using the app, they can

watch a movie clip in which it is featured: from the Montmartre treasure hunt in *Amélie* to a

boy's discovery of *The Red Balloon* in a Belleville garden. The app can be used to find locations

from famous films, or to simply discover scenes filmed nearby, bringing the filmed history of

Paris to life for visitors. Produced in partnership with the Mayor of Paris and the Forum des

Images (a cultural institution working on film programming and preservation), *Cinemacity* also

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[19] Max Neuhaus, "LISTEN," last modified 2004, http://www.max-neuhaus.info/soundworks/vectors/walks/LISTEN.
[20] Ibid.
[21] Ibid.
[22] "Cinemacity," Arte.tv, accessed December 12, 2016, http://cinemacity.arte.tv.

highlights the appeal of location-based media for touristic and heritage organizations.[23] *Chicago 00*, a similar project, is a mobile AR app that overlays photographs from the Chicago History Museum's archives onto their corresponding physical locations, creating striking side-by-side comparisons of past and present.[24]

Taxonomies

As discussed in the previous section, location-based media represent a widely dispersed field of creation spanning many disparate disciplines, from new media art to tourism to gaming. In some of these fields, location-based practice is developed to the point that categorization schema have been proposed. For mobile games, Nikolaos Avouris and Nikoleta Yiannoutsou identify three categories of research and practice: the ludic (entertainment and pleasure), the pedagogic, and a hybrid category combining play and informational purposes.[25] For locative artworks, Drew Hemment also posits three categories: mapping, geo-annotation, and ambulant (having to do with walking).[26] And for location-based services, Kostas Gratsias, Elias Frentzos, Vasilis Delis, and Yannis Theodoridis propose a taxonomy based on the mobility of the user and the data, resulting in four categories: "Find me," "Get together," "Guide me," and "What is around/Routing/Find the nearest."[27] However, there is no universally recognized—or even universally applicable—general taxonomy for location-based works, which is a significant limiting factor for field-wide critical discourse.

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[23] "Cinemacity," *Docubase*, November 11, 2013, http://docubase.mit.edu/project/cinematicity.

[24] "Chicago00," The Chicago00 Project, accessed October 29, 2016, http://chicago00.org.

[25] Nikolaos Avouris and Nikoleta Yiannoutsou, "A Review of Mobile Location-based Games for Learning across Physical and Virtual Spaces," Journal of Universal Computer Science, vol. 18, no. 15 (2012): 2124.

[26] Hemment, "Locative Arts," 349.

[27] Kostas Gratsias, Elias Frentzos, Vasilis Delis, and Yannis Theodoridis, "Towards a Taxonomy of Location Based Services," In *Web and Wireless Geographical Information Systems*, W2GIS 2005, *LNCS* vol. 3833, ed. Ki-Joune Li and Christelle Vangenot (Berlin, Heidelberg: Springer, 2005), http://link.springer.com/chapter/10.1007/11599289_3.

This is not due to a dearth of options; there are many possible ways to categorize location-based works. Two of the simplest approaches are scale and duration. A scale-based schema could distinguish 1) works limited to a single building or site, 2) experiences situated in a particular neighborhood or city, and 3) projects that are accessible and active on a more or less global scale, like certain pervasive games. Meanwhile, a duration-based taxonomy might separate works with 1) one piece of content with a semi-fixed duration, to be consumed only once (like a looping projected video), 2) several pieces of content which can be consumed in multiple sessions (like a series of audio recordings situated around a neighborhood), and 3) no limit on duration (like some spatial annotation projects). Another approach to categorizing location-based projects could focus on different modes of consumption: 1) individual consumption (listening to an audio tour), 2) collective consumption (viewing a community mural), and 3) networked consumption via mobile or other devices (mobile games). Potential organizational schema could also separate works that alter the physical environment (adding trail markers) from those that create a digitally mapped layer over a physical space (interactive city guides); divide projects with static or linear content from those with dynamic, nonlinear content; distinguish pre-structured works from those that emerge from users' actions in an environment; and differentiate top-down, singly-authored texts from co-creative, collectively authored works.

Because of my focus on new forms of storytelling, particularly those using emerging technologies, I will base my research on a taxonomy that distinguishes three different levels of participation and user agency in location-based experiences. The first level, Consumption, simply involves consuming content that is purposefully situated in space: listening to a museum audio guide, or attending a neighborhood tour. The second level, Interaction, incorporates interactivity via gamification or personalization: a history-themed scavenger hunt where

participants compete for the highest score, or an interactive city tour app that filters recommendations based on interests entered by the user. The third level, Participation, offers the greatest degree of user agency: works are highly collaborative and dynamic. Spatial annotation and community-based projects, for example, encourage users to become co-authors, contributing their own stories, data, and context.

Consumption and Interaction-based projects can certainly be engaging, but do not stray far from the conventional author-reader binary and one-to-many model of consumption; they do not fully embrace the affordances of networked locative technology. Once the novelty wears off, their limitations may highlight the many advantages of traditional one-to-many media forms like books: lack of clunky technological interfaces, ease of use, and fuller immersion, among other things. Furthermore, because of media saturation and the relatively specific conditions of use for location-based media, most people will not repeat experiences in which the content is fixed and delimited (for example, repeating an audio tour multiple times). For device-based projects, the problems of saturation and seamlessness also loom large. How many separate apps will users actually be motivated to download and use regularly, and how much time are they willing to spend in device-mediated experiences of the world? For these reasons, Consumption and Interaction-based works are perhaps best suited for one-off experiences, or convenience-based applications: for example, an audio walk around a historic area, or the augmented reality Google Translate app.

Participatory Location-Based Media

I am interested in participatory forms of location-based media because I believe they represent transformative and largely untapped storytelling potential—particularly in the use of

new locative technologies. They challenge traditional modes of authorship and consumption, and embrace and experiment with the affordances of networked location-based technologies. The higher degree of user agency and participation they offer may be an important differentiating factor in an increasingly competitive attention economy. A co-creative, collaborative notion of storytelling is also closely aligned with our current media landscape, in which "the people formerly known as the audience,"[28] empowered by accessible digital tools and platforms, are increasingly creating and publishing their own media. Collective storytelling not only allows more—and more diverse—voices to be heard, but it can also be deeply resonant, drawing on communal and creative practices from an era of oral storytelling. In fact, today's culture of networked and remixed media in many ways marks a return to the way in which oral storytelling carried culture across vast spaces through community connections, and invited local and personal reimaginings.

Participatory location-based media make up only a small part of the overall location-based corpus; these projects are often more demanding on a conceptual, technological, and logistical level. There are still many strong examples, however, that demonstrate the narrative and documentary affordances of this category. One low-tech example is the use of chalk to stencil the outlines of bodies on sidewalks and streets. Besides its low cost, chalk tagging is also easy, fast, and unlikely to be seen as illegal. For decades, activists have used this approach in order to remind us of violent acts that state institutions often attempt to quickly usher out of sight, and thus out of mind. #ChalkedUnarmed[29] began in 2014 as an accessible way for people to raise and maintain awareness of police brutality, and spread rapidly via Twitter. Participants

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[28] Jay Rosen, "The People Formerly Known as the Audience," *PressThink*, June 27, 2006, http://archive.pressthink.org/2006/06/27/ppl_frmr.html.

[29] "#ChalkedUnarmed," Twitter, accessed December 15, 2016, https://twitter.com/hashtag/chalkedunarmed?src=hash.

use chalk to draw outlines of bodies along with the names and dates of death of unarmed black men killed by the police.[30] The chalk outlines serve as a visible reminder of frequently ignored or hidden oppression, as well as communities' commitment to remember and combat acts of violence; they annotate spaces as sites of both loss and resistance.

Many participatory projects also draw on newer geolocative technologies. Blast Theory's *Rider Spoke* invites participants to ride bicycles and explore cities by night, discovering recordings by their fellow riders and selecting meaningful locations to record their own personal stories for future players.[31] *The Silent History* is a serialized novel released on iPhones and iPads, chronicling a future epidemic. Readers can go to the real-life locations described in the book to read and write "field reports," site-specific stories only available at the locations they describe.[32] The Fearless Collective creates murals together with communities across the globe; in Cambridge's Central Square, NuVu school students painted a mural and used the Vojo platform to create a phone line for it, inviting people to call the mural and respond to the prompt, "What makes you feel like you belong?"[33] These examples show how participatory forms of location-based media draw on existing infrastructure, collective storytelling, and unconventional approaches to narrative.

In this thesis I will discuss three case studies in depth, all of which are highly participatory—none would exist without user contributions. However, within this category, they represent yet another tripartite schematic, illustrating different levels of participation. The first, Roundware, can be described as contributory—an artist creates an environment in which

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[30] Nadine Bloch, "The Art of #BlackLivesMatter," *Waging Nonviolence*, January 8, 2015, http://wagingnonviolence.org/feature/art-blacklivesmatter.
[31] "Rider Spoke," Blast Theory, accessed October 2, 2016, http://www.blasttheory.co.uk/projects/rider-spoke.
[32] "The Silent History," The Silent History, accessed October 14, 2016, http://thesilenthistory.com.
[33] Saba Ghole, "Belonging Mural," NuVu, accessed January 15, 2017, https://cambridge.nuvustudio.com/studios/fearless/belonging-mural.

participants can contribute their own content. The second, *Yellow Arrow*, is connective—it gives users a rule set and tools that allow them to create their own content, communicate amongst each other, and establish sub-projects within the larger work. And the third, 96 Acres, is co-creative—collectively conceptualized and authored by a wide array of collaborators. These three case studies also offer the opportunity to explore a diverse range of location-based modalities, including location-aware audio, mobile apps, spatial annotation, texting, community-based practices, and projection.

Participatory works that allow users the agency to shape the narrative—becoming deeply invested as co-creators and co-authors—reimagine conventional forms of storytelling. They complicate our existing notions of both narrative and documentary, reframing questions of linearity, temporality, reflexivity, and spatial storytelling. They embrace the affordances of networked locative technologies, provide a platform for a multitude of voices, and draw on the profound power of both community and place. With the emergence of new technologies that enable more seamless, sophisticated, and widespread uses of location-based media, it is crucial to consider the affordances, creative potential, and logistical and ethical challenges of these approaches. In situating location-based media within the broad category of spatial narrative, identifying important concepts and approaches through historical examples, and proposing a participation-based taxonomy, I hope to begin my inquiry with a robust understanding of the breadth and historical depth of this field, as well as a critical lens through which to approach a diverse array of location-based works.

Chapter Two: Augmented Reality and Location-Based Media

Augmented Futures

In Vernor Vinge's Hugo-award winning 2006 book *Rainbows End*, humans regularly interact with the real world via virtual overlays. This is accomplished through contact lenses with embedded displays, "smart clothing" enabling gesture recognition, and an enormous infrastructure of "smart motes" that blanket the earth and provide tracking data. Together, these devices allow wearers to access Belief Circles: themed virtual worlds superimposed on real physical locations. Two people who subscribe to different Belief Circles, walking down the same street, see entirely different landscapes. One might be in a medieval world where surrounding buildings become castles and passerby are transformed into knights, while the other might see the same buildings and people as dilapidated houses and Lovecraftian monsters.[1] Widely cited as an inspiration by AR developers, the novel presents a vision of the future in which ubiquitous, networked, and highly sophisticated wearable computing systems allow everyday people to live in shared fantasy worlds.[2]

Fiction also offers more cautionary representations of AR technology. In the *Black Mirror* episode "Men Against Fire," soldiers fighting horrifying mutants known as "roaches" are outfitted with brain implants that permit their commanding officers to instantaneously send them visual information. Unbeknownst to the soldiers, however, the devices also have a far more nefarious purpose. There are in fact no such things as roaches: there are only peaceful civilians begging for their lives, targeted in a government eugenics campaign to eliminate certain genetic traits. The brain implants, which cause the soldiers to see these people as violent monsters, are

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[1] Vernor Vinge, *Rainbows End*, (New York: Tor Science Fiction, 2006).
[2] Kevin Kelly, "The Untold Story of Magic Leap," *Wired*, April 2016, https://www.wired.com/2016/04/magic-leap-vr.

the military's effort to bypass human empathy and circumvent the psychological repercussions of murdering innocent people.[3] In the *Futurama* episode "Attack of the Killer App," people rush to buy MomCorp's eyePhone, a parody of the iPhone that is, per its name, inserted directly into the eye. While the main characters are distracted as they compete to gain social media followers, MomCorp's titular CEO is busy tailoring direct marketing based on users' social media posts, and releasing a "twit worm" that infects users' brains and turns them into mindless consumerist zombies.[4] These episodes, as well as other portrayals of AR, highlight the technology's potential for manipulation, surveillance, and dehumanization.

Of course, current industry buzz focuses not on the dystopian, but rather the techno-utopian potentials of AR. At a recent AR conference at MIT's Media Lab, presenter after presenter confidently described a future in which ubiquitous AR has changed social interactions, work, and creativity for the better. AR glasses will be widely adopted and socially invisible. Children growing up with AR will create a new language for creative play, living in a magical world of "Harry Potter meets Harold and the Purple Crayon." No one will ever have to prepare a presentation in advance again—all meetings will become collaborative real-time iteration sessions, participants fiddling with 3D diagrams invisible to the naked eye. At concerts and sports events, tens of thousands of fans will wear headsets in order to receive bonus contextual information and enthralling special effects. AR applications for immersive language instruction, accessibility for the blind, and memory assistance for the elderly will turn us all into "augmented people."[5]

Industry projections reflect this optimism. A widely cited August 2016 IDC report proclaimed, "Worldwide Revenues for Augmented and Virtual Reality Forecast to Reach $162

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[3] *Black Mirror*, "Men Against Fire," October 21, 2016.
[4] *Futurama*, "Attack of the Killer App," July 1, 2010.
[5] AR in Action, Cambridge, MA, January 17-18, 2017.

Billion in 2020."[6] The report predicts that AR revenues will soon eclipse those of VR, largely

due to potential AR integration into healthcare, product design, and management functions.[7] A

May 2016 report by Grand View Research estimated that the AR market alone would reach

$100.24 billion by 2024.[8] It cited AR's "increasing scope of applications across the military,

medicine, scientific visualization, manufacturing, education, training, navigation, and

entertainment," and noted that this expected growth would primarily be based on user adoption

of head-mounted displays and smart glasses.[9] Established companies as well as start-ups are also

eagerly eyeing AR applications for retail and advertising, including product placement and

personalized retail experiences—IKEA already has an app allowing customers to see how

furniture will look in their homes.[10] And in *Wired*, Kevin Kelly contends that once AR headsets

provide improved resolution, brightness, dynamic range, and color, they could replace all other

virtual screens: users will be able to read a book, attend a video conference, and watch a theater-

size movie screen, all with the same device. Kelly concludes, "This is a technology that can

simultaneously upend desktop PCs, laptops, and phones."[11] It's clear that AR has enormous

potential. Despite its impressive predictions for the future, however, the AR industry suffers

from severe tunnel vision and faces a host of creative, practical, and ethical obstacles. While AR

remains in a state of interpretive flexibility, we have an important opportunity to clarify, expand,

and complicate our notion of what AR is, and how it can and should function. The older and

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[6] "Worldwide Revenues for Augmented and Virtual Reality Forecast to Reach $162 Billion in 2020, According to IDC," IDC, August 15, 2016, http://www.idc.com/getdoc.jsp?containerId=prUS41676216.
[7] Ibid.
[8] "Augmented Reality Market Worth $100.24 Billion By 2024," Grand View Research, May 2016, http://www.grandviewresearch.com/press-release/global-augmented-reality-market.
[9] Ibid.
[10] Deborah Weinswig, "Virtual And Augmented Reality Become Realistic Revenue Generators," *Forbes*, October 26, 2016, https://www.forbes.com/sites/deborahweinswig/2016/10/26/virtual-and-augmented-reality-become-realistic-revenue-generators/#7e890f2a6fc5.
[11] Kelly, "The Untold Story of Magic Leap."

broader field of location-based media offers abundant examples, scholarship, and praxis to help us in this endeavor.

Imagining a More Expansive AR

AR as a concept is far broader than current industry discourse indicates. While AR evangelists rhapsodize about its seemingly infinite uses, their conception of AR is quite narrowly focused on a few specific visual display modalities and technologies—namely, head mounted displays and mobile phones. Investors, technologists, and creators all seem fixated on a version of the future in which head-mounted displays are deployed as part of massive, globally distributed AR environments (e.g. *Rainbow's End*). It is certainly a captivating vision, but it is also, perhaps counterintuitively, an incredibly limited one. The conviction that head-mounted displays are the only viable mode of AR—that they will soon become ubiquitous, socially invisible, and indispensable—elides many other potentially fruitful directions for AR. Mobile AR is a rapidly growing area of development, although zealous futurists see it only as a stopgap until better technology is developed for AR glasses, contacts, and even brain implants. Spurred by the popularity of *Pokémon Go* and other mobile AR games, as well as Snapchat's success with playful facial mapping filters, interest in mobile AR is growing. Facebook is now racing to catch up with Snapchat, and scaling its aspirations accordingly: photo and video filters, digital notes attached to physical spaces, and developer toolkits for Facebook's in-app camera to entice developers and partner companies to create compelling content.[12] Still, Mark Zuckerberg says

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[12] Adrienne LaFrance, "Facebook Chases Snapchat Into Augmented Reality," *The Atlantic*, April 18, 2017, https://www.theatlantic.com/technology/archive/2017/04/facebook-chases-snapchat-into-augmented-reality/523422.

the eventual goal is "glasses or contact lenses where you can mix digital or physical objects in the digital world."[13]

I propose a more expansive conception of AR, one that includes many different forms of augmenting the physical environment. This approach suggests new ways of thinking about AR, interrogating entrenched industry assumptions and modalities. We can trace AR as a broader enabling concept through the history of spatial narrative. Long before print and other mass media, for example, the design and ornamentation of buildings augmented physical landscapes with information and symbolic meaning. Other forms of spatial narrative, like annotation and public art, also convey information, tell us how to move through spaces, and overlay new social, political, and creative layers on the physical environment. AR also does not necessarily need to be visual: We encounter many non-visual forms of augmentation in our everyday environments, including audio crosswalk signals for the visually impaired, GPS navigation voice instructions, and smart homes. This expanded notion of AR is not new, nor is it entirely foreign to industry discourse. As early as 1994, Paul Milgram and Fumio Kishino discussed non-visual display modalities for mixed reality, including auditory, haptic (relating to touch), and vestibular (relating to balance and spatial orientation) AR.[14] And at industry conferences, speakers make occasional references to projection, non-visual, and other alternative forms of AR. While this acknowledgement of other modalities does not seem to exert much influence on industry

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[13] Mike Isaac, "Mark Zuckerberg Sees Augmented Reality Ecosystem in Facebook," *New York Times*, April 18, 2017, https://www.nytimes.com/2017/04/18/technology/mark-zuckerberg-sees-augmented-reality-ecosystem-in-facebook.html.

[14] Paul Milgram and Fumio Kishino, "Taxonomy of mixed reality visual displays," *IEICE Transactions on Information and Systems* E77-D, no. 12 (1994): 1323. Milgram and Kishino also noted the particular suitability of AR for haptic and vestibular applications: "Since synthetically produced haptic information must in any case necessarily be superimposed on any existing haptic sensations otherwise produced by an actual physical manipulator or glove, haptic AR can almost be considered the natural mode of operation in this sense. Vestibular AR can similarly be considered a natural mode of operation, since any attempt to synthesise information about acceleration of the participant's body in an otherwise virtual environment, as is commonly performed in commercial and military flight simulators for example, must necessarily have to contend with existing ambient gravitational forces."

discourse at present, I believe a more expansive conception of AR is a vital part of addressing the industry's biggest creative, logistical, conceptual, and ethical obstacles.

AR and Place

Location-based media are a key precedent for AR, and are in fact themselves inherently a form of AR. Location-based media have always been a form of augmenting our physical environments, whether with social prompts, historical information, artistic interventions, or fantastical worlds overlaid on our own. Both historical and current location-based media provoke essential questions, and offer potential pathways, for the field of AR. AR is also fundamentally linked to place: its historical development has largely been tied to navigational purposes, such as augmented aircraft instrumentation displays for pilots.[15] Filmmaker and MIT research scientist Glorianna Davenport notes, "The idea of augmented reality developed in parallel with the digital mimicking of real places."[16] Davenport cites the influence of *The Aspen Project*, a 1978 interactive computing experiment that—while itself not an example of AR—modeled examples of visual navigation overlays.[17]

The connection between AR and place is not only historical. Today, frequently mentioned benefits of AR include the capacity to add on to peoples' existing surroundings (particularly in spaces already engaging the public in social, place-based activities, like museums or historical city centers), as well as the ability to use AR while outside in the real world. Travel and tourism represent a major area of AR content development; municipalities, heritage

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[15] Rus Gant (Director of Harvard's Visualization Research and Teaching Laboratory), interviewed by author, February 6, 2017.
[16] Glorianna Davenport, "When Place Becomes Character: A Critical Framing of Place for Mobile and Situated Narratives," MIT Media Lab, accessed February 1, 2017, http://mf.media.mit.edu/pubs/other/CharacterPlace.pdf.
[17] Ibid.

organizations, and tech startups are all investing in AR experiences created to capitalize on

public plazas, historical buildings, and urban or regional branding. Most AR content is also

location-based media, as I have defined the term.[18] Ronald Azuma, who produced an influential

early survey of AR, situates AR storytelling within "a much broader area of location-based

experiences that include ARGs (alternate reality games), puzzle hunts, cross-media and trans-

media experiences, pervasive games, and performance art."[19] Furthermore, AR and location-

based media both must contend with dynamic variables in the physical world, while VR and

browser-based experiences are much more self-contained. The older, larger, and more varied

category of location-based media presents a productive lens through which to both examine the

current state of AR and formulate questions about the future of the field.

Terminological Confusion

Before proceeding further, it is necessary to elaborate on what, precisely, we mean by

AR. A brief history of the term: while technological predecessors for AR can be traced

throughout the latter half of the 20th century, and conceptual predecessors can be identified far

earlier, the first use of the term is widely attributed to Thomas P. Caudell in 1990. A Boeing

researcher at the time, Caudell coined the term to describe a system he developed to assist in

manufacturing processes: a head-mounted display that superimposed diagrams on users'

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[18] It is important to note that not all AR is location-based in the sense that I am using the term; however, all AR *is* localized in the sense that it is context-aware. For example, Google's mobile AR app for translation, or certain AR projects designed to add supplementary material to books or posters, are not necessarily tied to the user's geographical coordinates. Although these applications do not depend on the user's absolute location, they do depend on the device's relative location to the object it is augmenting.

[19] Ronald Azuma, "Location-Based Mixed and Augmented Reality Storytelling," in *2nd Edition of Fundamentals of Wearable Computers and Augmented Reality*, ed. Woodrow Barfield (Boca Raton, FL: CRC Press, 2015), 261.

workspaces in real time, based on positional tracking.[20] In their seminal 1994 paper "Taxonomy of Mixed Reality Visual Displays," Paul Milgram and Fumio Kishino defined mixed reality (MR) as "VR related technologies that involve the merging of real and virtual worlds," and situated AR within this category as "any case in which an otherwise real environment is 'augmented' by means of virtual (computer graphic) objects."[21] Ronald Azuma's 1997 "A Survey of Augmented Reality" proposed a now widely recognized definition of AR as consisting of three characteristics: combining the real and the virtual, interactive in real time, and registered in 3D (he also specifically mentioned that this definition was intended to allow for modalities other than head-mounted displays).[22] While Milgram, Kishino, and Azuma's definitions have been highly influential, many other technologists and scholars have also played key roles in shaping our current conception of AR.

Despite a growing body of scholarly research, journalistic coverage, and industry documentation, however, AR—like location-based media—is plagued with terminological confusion. On the most basic level, many industry prognosticators seem to confuse AR's affordances with those of VR (put simply, VR immerses users in an entirely virtual world, while AR overlays virtual content onto the physical world). This is further complicated by the gradual convergence of the two, as with headsets that offer both AR and VR settings (or even a spectrum of options in between the two).[23] Already in 1994, Milgram and Kishino identified the pressing need for a taxonomy to distinguish different types of experiences combining the virtual and the physical:

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[20] Brian X. Chen, "If You're Not Seeing Data, You're Not Seeing," *Wired*, August 25, 2009, https://www.wired.com/2009/08/augmented-reality.
[21] Milgram and Kishino, "Taxonomy of mixed reality visual displays," 1321.
[22] Ronald Azuma, "A Survey of Augmented Reality," *Presence* vol. 6, no. 4 (1997): 356.
[23] Jamie Feltham, "Monitorless Is A Samsung AR Headset That Lets You Use PCs Without A Screen," UploadVR, February 21, 2017, https://uploadvr.com/monitorless-is-samsungs-ar-headset-that-lets-you-use-pcs-without-a-screen.

> […] An attempt to distinguish these classes on the basis of whether they are primarily video or computer graphics based, whether the real world is viewed directly or via some electronic display medium, whether the viewer is intended to feel part of the world or on the outside looking in, and whether or not the scale of the display is intended to map orthoscopically onto the real world leads to quite different groupings […][24]

However, there remains both a profusion and a profound lack of sufficient vocabulary to describe the spectrum of AR-related experiences.

Regarding the latter problem, Rus Gant, Director of Harvard's Visualization Research and Teaching Laboratory, believes that "The biggest problem with AR right now is that it doesn't have enough language to differentiate the different types of AR experiences. […] It is much more complex than, currently, the language allows for."[25] Currently, AR is used to describe a wide range of activities and potential uses: primarily, viewing/interacting with digitally augmented scenes via a mobile phone, viewing/interacting with virtually overlaid scenes via a head-mounted display, and viewing/interacting with holograms or other projected imagery that does not require a mediating screen-based display. While all fall under the rubric of AR, these experiences have very different hardware requirements, user interfaces, and experiential and representational concerns. Current terminology also fails to differentiate between AR that is location-based, in the sense that it is designed for specific spaces and responds to specific physical features in those spaces, and AR that is not. Rus Gant notes, "The basic definition of AR is location-based, but in fact most of the demos they're developing are not actually location-based."[26] He points to the difference between virtual objects that can be viewed in any space—for example, an interactive anatomical model that floats in front of viewers—and virtual objects that are situated in a specific location within a specific space—for example, a digital urn that is viewed on a physical plinth in a museum.

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[24] Milgram and Kishino, "Taxonomy of mixed reality visual displays," 1321.
[25] Gant, interviewed by author.
[26] Ibid.

Although there is a clear need for more specific and robust terminology, we are instead confronted with an abundance of new vocabulary that further confuses things. AR is in a state of profound interpretive flexibility, made even more confusing by the variety of different stakeholders involved—consumers, academics, entrepreneurs, journalists, technologists, publicists, traditional media companies, and more. To begin with, the terms AR and MR have started to bleed into each other. *Wired* specifies that in AR "the visible natural world is overlaid with a layer of digital content," while in MR "virtual objects are integrated into—and responsive to—the natural world."[27] However, as AR projects introduce greater levels of interactivity and technical sophistication, it seems that most new AR is aiming to be MR to some degree. Rus Gant notes that the move toward MR is also driven by marketing and PR considerations: "Nobody in the marketing world wants to use augmented reality. They think from a marketing/PR point of view people don't know what augmented means […] so MR is gradually being used to replace AR."[28] Other contenders in the field, each with their own—albeit fluid—definitions, include hybrid reality, shared reality, and heightened reality (infrared, sonar, and other sensory data overlaid on the physical world).

The profusion of companies attempting to establish themselves in this space also contributes to the problem. AngelList, an online platform for startups to raise money and recruit employees, lists nearly 1,000 AR and AR-related startups.[29] Every company brings its pre-existing language along with it, whether that of computer manufacturing, entertainment media, image processing, video games, mobile phones, or any number of other industries. In addition to these clashing and intermingling vocabularies, each player in the field is attempting to distinguish itself from the rest, often by branding itself or its proprietary technology with new or

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[27] Kelly, "The Untold Story of Magic Leap."
[28] Gant, interviewed by author.
[29] "Augmented Reality Startups," AngelList, accessed April 28, 2017, https://angel.co/augmented-reality.

repurposed words. Rus Gant points out that Microsoft's HoloLens, for example, is an inaccurate

appropriation of the term "hologram," and a "marketing misuse of the English language." He

further describes the broader industry situation with regards to terminology:

> [These new startups] all had to come up with a name with something that was different about what they were doing, they had to come up with a logo, a catchphrase, etc. So everybody's trying to generate new language to tag themselves individually, which is making it worse and worse. They're almost always picking basic English words and attaching a new meaning to them. […] Historically, it's been a long time since we've had this multiplicity of voices saying and using different words for the same thing.[30]

This interpretive flexibility is standard for the birth of a new medium. For example,

media historian William Uricchio chronicles how, contrary to our current conception of

television, it was initially understood as an audiovisual medium that connected distant locations

in real time—like the telescope, telephone, and telegraph.[31] With VR, some distinguishing terms

like 360 video, room-scale, and real-time have emerged, but anthropologist Amber Case

contends that the existing body of AR content is not sufficient to begin this process:

> The terms are all blurred because it's hard to get people to have a wide vocabulary when the industry isn't here yet. If the industry were here, like mobile, we don't just say mobile. We say mobile analytics, mobile gaming, mobile ads. AR isn't a real industry, so there's not a big vocabulary yet.[32]

Thus, creating more meaningful and accurate terminology may require having a larger body of

work to compare, describe, and differentiate.

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[30] Gant, interviewed by author.

[31] William Uricchio, "Television's First Seventy-Five Years: The Interpretive Flexibility of a Medium in Transition," in *The Oxford Handbook of Film and Media Studies*, ed. Robert Kolker (Oxford: Oxford University Press, 2008), 287.

[32] Amber Case (Author, Anthropologist, and User Experience Designer), interviewed by author, February 3, 2017.

Limitations of Current Industry Discourse

Lexical confusion is far from the only obstacle in developing AR. The technology's roots are in industrial uses, primarily navigation and training; this was partly due to prohibitive costs in the initial development stages.[33] Today, a great deal of AR investment and research is still geared toward industry and professional uses like navigation, manufacturing, and healthcare. Creative applications of AR have been less prioritized—and because there is so much industry hype around AR, even consumer-oriented arts and entertainment AR projects are often driven by business considerations and business executives, rather than artists. Current industry discourse and most of the content it has produced fail on two levels: understanding the creative affordances of AR as a medium, and envisioning how AR will function as an embodied technology.

On the level of creative content, the industry has thus far failed to make a compelling and sustained argument for why AR is so groundbreaking, or even why it is necessary at all. As with VR, we must ask ourselves what, exactly, AR is *for*. Often, demos are gimmicky: enjoyable for a few minutes, but failing to capitalize on the user's initial excitement to build a more lasting, meaningful experience. Many in the industry highlight shared social experiences as one of AR's key advantages, yet few demos involve multiple users or social interaction. Most are ultimately quite passive: while the user is able to move around the space and perhaps pick up and move around a few random objects, these experiences fail to engage the user in any kind of larger narrative, and generate no incentive to return. AR creator Ronald Azuma hypothesizes that the key to AR storytelling is in meaningfully combining the real and the virtual, where both are essential to the experience, but notes that many projects fail to do so:

> […] If the core of the experience comes solely from virtual content, then the augmentation part is only a novelty and it will not be a viable new form of media. Many

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[33] Azuma, "Location-Based Mixed and Augmented Reality Storytelling," 259.

> AR experiences fall into the latter case. […] Reality then becomes a backdrop that forms the context of the experience, and perhaps part of the user interface, but reality is not a core part of the content.[34]

Of course, the lack of creative AR is also closely tied to AR's current technical

limitations. At the moment, AR systems are highly unpredictable, and changes in lighting,

surface texture, and other environmental factors can quickly interrupt the technical execution of

an experience; they also often fail to recognize darker skin tones and clothing. For this reason,

headset-mediated AR cannot currently function well outdoors, which is a significant drawback in

creating pervasive experiences. Rus Gant notes that many artists interested in exploring new

technologies may be drawn to VR instead, in which it is easier to generate a reliable, uniform

final product for viewers—akin to creating a sculpture or photograph. In AR, "it's much more

difficult to carry the clean artistic vision from the artist into the final viewing stage."[35] Artists

working in AR must be willing to accept a degree of uncertainty and changeability—although

these may also be the very factors that attract them to AR in the first place.

Industry discourse is also disappointing on the level of hardware and user interface. The

concept of ubiquitous headsets presents a host of obstacles with regards to practical use,

obstacles which mainstream discourse often glosses over. AR is touted as having an advantage

over VR because it doesn't isolate users from the world, but popular conceptions of AR still put

a screen between users and their surroundings. One industry blog predicts that AR "marks the

next step in the evolution of the graphical interface, turning everything our eyes see into a

screen."[36] The suggested content for these screens is often gaudy, superfluous, and distracting:

pop up ads, unnecessarily large notifications, and flashy graphics. This presents a serious safety

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[34] Azuma, "Location-Based Mixed and Augmented Reality Storytelling," 261.
[35] Gant, interviewed by author.
[36] Jared Crowe, "Augmented Reality is the answer to Virtual Reality's fatal flaw," *Virtual Reality Pop*, July 12, 2016, https://virtualrealitypop.com/augmented-reality-is-the-answer-to-virtual-realitys-fatal-flaw-b0f9ee96c95d#.w8njjl5l8.

issue: if pedestrians and drivers are already suffering fatalities caused by their mobile phones, how much more distracted will they be if their mobile interface is their eyeglasses? This type of content is also a barrier to everyday usage: people need unobtrusive signals to indicate important information, not ostentatious and extraneous content that will distract them from their immediate tasks and physical navigation. As Amber Case notes, "The issue is that people try to make these really beautiful interfaces, and all you need is some numbers and some lights, or a haptic buzz."[37]

Other technical impediments include narrow field of view, inadequate battery life, and the aforementioned difficulty of making AR work outdoors. AR is still in its infancy, and every technology initially faces seemingly impossible hurdles. However, industry insistence on head-mounted displays (and conception of what these displays can accomplish) is holding back AR's development as a medium. We might instead direct more of our focus to creating elegant and effective user interfaces, AR with a more limited scope (for example, room-scale or building-scale AR), and other forms of AR, including audio, haptic, and projected AR.

AR Ethics and Public Space

AR presents a host of ethical concerns, which are far too numerous and complex to treat with any depth here. However, I will note that as with location-based media, AR provokes critical questions about the nature of both physical and virtual public space. Many of the ethical issues related to AR can thus be viewed through the lens of their implications for public space. Surveillance and privacy are perhaps the primary such concerns. Kevin Kelly describes the breadth of information that virtual environments can capture, and how that data might be used:

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[37] Case, interviewed by author.

[…] Every virtual world is potentially a total surveillance state. By definition, everything inside a VR or MR world is tracked. After all, the more precisely and comprehensively your body and your behavior are tracked, the better your experience will be. […] This comprehensive tracking of your behavior inside these worlds could be used to sell you things, to redirect your attention, to compile a history of your interests, to persuade you subliminally, to quantify your actions for self-improvement, to personalize the next scene, and so on. If a smartphone is a surveillance device we voluntarily carry in our pocket, then VR will be a total surveillance state we voluntarily enter.[38]

Who will have access to this wealth of data? Who will be responsible for ensuring its security? How will microscopically targeted content influence political discourse? AR and other virtual worlds could profoundly influence civic and social interactions, as well as our conception of what is public and what is private.

AR development has also prompted questions about ownership and property, both physical and virtual. The runaway success of *Pokémon Go* in summer 2016 rapidly provided concrete case studies for what were until then largely speculative questions. The placement of virtual objects in the real world, and the ability to designate certain locations as gyms or Pokéstops, thus attracting large numbers of players to these locations, immediately led to complaints. Some people were upset that players were flocking to their backyards at late hours of the night to capture Pokémon. Certain retail outlets were unhappy that their neighbors, having been designated Pokéstops, had an advantage in attracting customers—or that *Pokémon Go* players were crowding stores, but not making any purchases. Legal writer Keith Lee neatly outlines some of the questions these situations have provoked regarding property rights:

- Does placing an AR object on a person's property, without their permission, affect their interest in exclusive possession of property?
- Does owning property in "the real world" extend property rights to any geo-locative, intellectual property elements that may be placed on it?
- Is placing an AR object on a person's private property, without their permission, a creation of an attractive nuisance?[39]

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[38] Kelly, "The Untold Story of Magic Leap."

[39] Keith Lee, "Is PokémonGo Illegal?," *Associate's Mind*, July 11, 2016, http://associatesmind.com/2016/07/11/is-pokemongo-illegal.

Beyond property rights, if distributed virtual worlds are on the horizon, how will intellectual property function in environments in which millions of people work, play, and create? Who will have the authority to identify and remove offensive content? Perhaps most fundamentally, when more than half the world's population still lacks internet access,[40] and more than 2.5 billion people do not have mobile subscriptions,[41] who will be excluded from these new public spaces?

AR's Documentary Potential

AR could potentially change the way we socialize, learn, produce goods, shop, play, work, create and consume media, and experience the world around us. However, many proposed uses of AR fit neatly into Max Weber's rationalization thesis, driving towards ever-greater efficiency and generation of capital; some are frankly dystopian-sounding. Current discourse around AR desperately calls for alternative viewpoints, creative intervention, and critical analysis. How can we theorize enchanted uses of AR instead—creating compelling and surprising experiences, generating new forms of social interaction and collective storytelling, and intervening in conventional understandings of public space? More specifically, how can AR serve the documentary project of exploring and representing the world, bringing diverse constituencies together in discourse, and critically engaging with the dialectics of reality and representation?

Pokémon Go's predecessor *Ingress* in many ways exemplifies some of AR's potentials for documentary. Like *Pokémon Go*, *Ingress* is a location-based mobile AR game created by

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[40] Emma Luxton, "4 billion people still don't have internet access. Here's how to connect them," World Economic Forum, May 11, 2016, https://www.weforum.org/agenda/2016/05/4-billion-people-still-don-t-have-internet-access-here-s-how-to-connect-them.
[41] "The Mobile Economy 2017," GSMA, accessed April 2, 2017, http://www.gsma.com/mobileeconomy.

Niantic (the company began as an internal startup within Google). *Ingress*, however, is based on factions of players competing against each other to capture "portals" that are located at specific locations, and connecting these portals to establish control over geographic areas.[42] While *Ingress* is a purely fictional game funded by advertising, it is also a persuasive example of many affordances of both AR and location-based media. By structuring the game around the physical layout of the city, and situating portals at locations of cultural importance (landmarks, works of public art, etc.), *Ingress* shows how narrative can be effectively overlaid on physical spaces. The gameplay offers users new perspectives on familiar surroundings, and the involvement of players in selecting portal locations enables them to participate in collectively shaping narratives of public space. The game's open narrative structure also encourages collaborative storytelling and new modes of social interaction, encouraging players to form local alliances and pool resources. Its science fiction premise pits factions against each other, but players often disregard this backstory in service of gameplay and camaraderie. Factions have cooperated in order to train new players, memorialize tragic real-world events,[43] and simply socialize with each other.[44]

Ingress, and even the more worrisome image of a city street virtually obscured with advertisements and distracting information overlays, present scenarios that can easily be re-imagined for more explicitly documentary purposes. Narrativizing information in physical environments, and annotating physical locations with virtual content, are key affordances of AR and location-based media. Creators would do well to draw on these affordances to imagine new

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[42] Andrew McMillen, "Ingress: The friendliest turf war on Earth," *CNET*, February 17, 2015, https://www.cnet.com/news/ingress-the-friendliest-turf-war-on-earth.
[43] Scott Kirsner, "In Google's Ingress augmented reality game, a ceasefire at MIT and a memorial to slain officer Sean Collier," *Boston.com*, April 24, 2013, http://archive.boston.com/business/technology/innoeco/2013/04/in_googles_ingress_augmented_r.html.
[44] "Ingress Events," Ingress, accessed May 3, 2017, https://www.ingress.com/events.

documentary projects that explore the powerful potential of collective authoring, embodied

interaction, and communal and individual relationships to space.

Chapter Three: Roundware

On a damp January day, I stand in front of one of Harvard Yard's ornate wrought-iron gates. In the yard, snowdrifts are beginning to melt around the pathways, creating treacherous puddles of slush. Students and professors in peacoats and fleece jackets—and in one case, basketball shorts—stride purposefully between stately brick buildings. A large tour group, an omnipresent sight here, moves at a more leisurely pace. I take out my iPhone, put on my headphones, and open up the app that I've downloaded for this occasion. The start screen only has two buttons: "listen" and "speak." I press "listen," and begin to meander across the yard.

Slow, atmospheric music immediately begins to play. The soothing tones create a slight sense of distance—I feel like I have entered a separate, parallel Harvard Yard, a space of whispered intimacy at a remove from the bustle of campus life. As I pass an intersection, a man's voice begins to speak in my ears. "I have eaten the plums that were in the icebox," reads William Carlos Williams from his famous poem "This Is Just To Say." His words drift off as I walk forward. A few moments later, I hear a man pensively speaking, as if to himself, in Arabic. After wandering for some time, I pause to explore the "speak" option, which invites me to record my own voice to add to this unruly collection and provides some prompts, like "Read some verses," "Talk about a nearby gate," and "Ask a question based on something you heard." Back in "listen" mode, I find that I can also filter what I hear, based on these same prompts. Voices run together, overlapping, scattering, sometimes harmonizing serendipitously with the omnipresent music. The sensation of the soundscape responding to my bodily movement is an interesting one; I experiment a bit, pacing back and forth and feeling a bit self-conscious as I lean first one way and then the other. The responsiveness, minimal interface, and seamlessly blended sound combine to create a profoundly embodied and immersive experience.

This is *re~verse*, a participatory, location-based installation by sound artist Halsey Burgund, based on his platform Roundware. Created in collaboration with Harvard's metaLAB and Woodberry Poetry Room, it features more than a thousand audio clips from Harvard's collection of recorded poetry.[1] This rich archive spans nearly a century and includes the first recordings of T.S. Eliot and Sylvia Plath, as well as readings by luminaries such as W. H. Auden, Anaïs Nin, Amiri Baraka, Ezra Pound, and Audre Lorde.[2] *re~verse* brings these recordings out into the physical space of the campus, and invites students, poetry lovers, and passers-by to participate in an embodied exploration of poetry, space, and history, as well as to contribute their own voices to a murmuring, intricate, and constantly evolving tapestry.
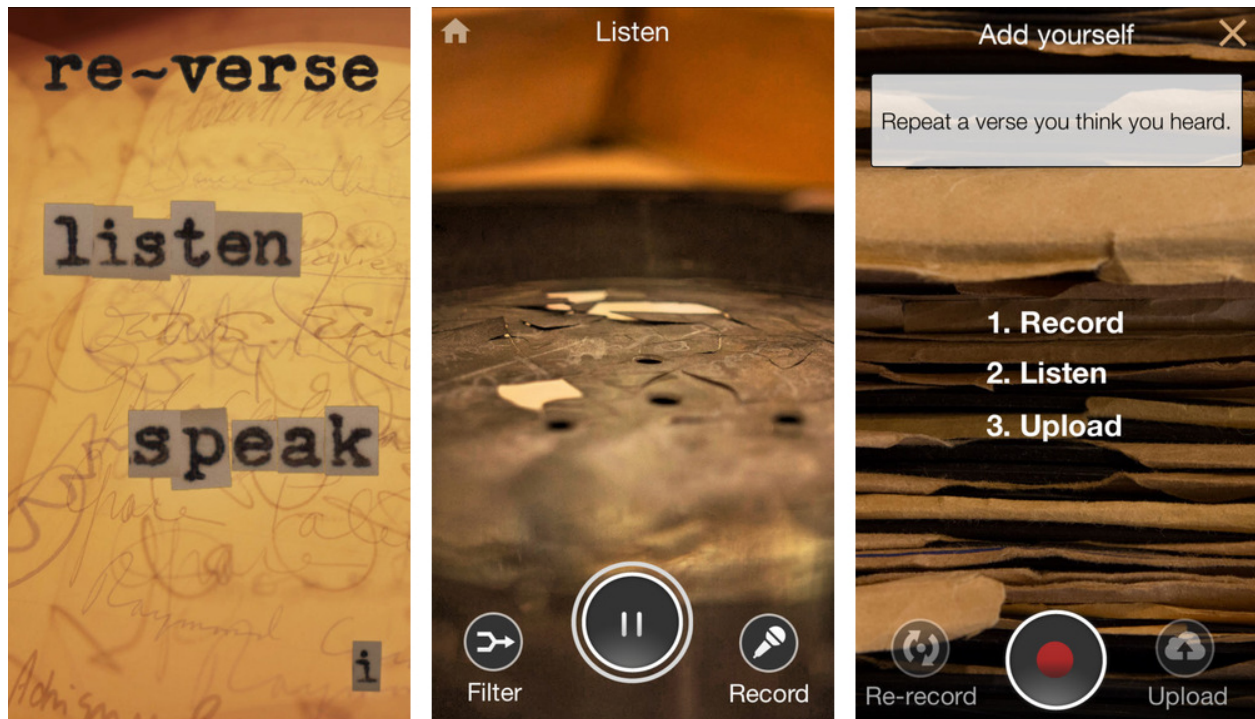

Fig. 1: *re~verse* interface. From: *re~verse*.

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[1] Matthew Battles, "The ghosts of poets' voices walk the yard," metaLAB (at) Harvard, April 26, 2015, https://tagteam.harvard.edu/hub_feeds/53/feed_items/2097490.

[2] "About The Woodberry Poetry Room," Woodberry Poetry Room, accessed February 12, 2017, http://hcl.harvard.edu/poetryroom/about.

Sound, Location-Based Media, and Documentary

Sound has long been a key tool for documentary undertakings, for reasons both practical and conceptual. On the practical side, sound recording technology is generally cheaper, more portable, and less obtrusive than photography, film, and video equipment; both analog and digital audio recordings are also smaller and therefore easier to store. Conceptually, sound is a powerfully visceral, intimate, and immersive medium for capturing and representing the human experience. Sound presents unique creative affordances, especially in the absence of corresponding visuals, as Rudolf Arnheim noted in his writing on radio: "The sensory preponderance of the visual over the aural in our life is so great that it is very difficult to get used to considering the aural world as more than just a transition to the visual world."[3] To understand the importance of documentary sound, we need only look to the vital role of oral history projects and instantly recognizable voice recordings from Neil Armstrong to Martin Luther King, Jr.

Sound has also played a key role in the development of location-based documentary media, due largely to the accessibility and portability of sound technology. There is a long tradition of touristic and artistic soundwalks, including Max Neuhaus's *LISTEN*, beginning in 1966,[4] and Janet Cardiff's soundwalks, beginning in 1991.[5] Today, with the rapid development and spread of locative mobile technology, audio walking tours are a thriving industry. Much-hyped startups like Detour provide themed audio tours for cities around the world, and are building out tools for users to create their own tours.[6] Sound artists like Soundwalk Collective perform shows and exhibit in museums, while also partnering with brands and civic

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[3] Rudolf Arnheim, *Radio*, trans. Margaret Ludwig and Herbert Read (London: Faber and Faber, 1936), 136.
[4] Max Neuhaus, "LISTEN," last modified 2004, http://www.max-neuhaus.info/soundworks/vectors/walks/LISTEN.
[5] Janet Cardiff and George Bures Miller, "WALKS," accessed April 13, 2017, http://www.cardiffmiller.com/artworks/walks/index.html.
[6] "About Detour," Detour, accessed October 10, 2016, https://www.detour.com.

organizations for immersive sound experiences.[7] In New York City alone, visitors can listen to Jim Jarmusch narrate a walk through literary landmarks in the East Village,[8] hear South Williamsburg residents share local stories,[9] wander Times Square while experiencing sound recordings of the Amazon jungle,[10] and go on a self-guided audio tour of Central Park narrated by the likes of Yoko Ono, Jerry Seinfeld, and Martha Stewart.[11] There are also more gamified applications of location-based sound: Blast Theory's *Ulrike and Eamon Compliant* invited participants to play the role of a spy and called their mobile phones with instructions as they traveled through the city,[12] while *Zombies, Run!* is a mobile running game and audio drama in which players go on missions to rescue survivors, escape zombies, and of course, burn calories.[13]

Location-based sound projects and platforms that are fully participatory as I define the term, however, are more rare; many have failed due to poor user interface functionality and an emphasis on niche applications rather than broad use cases.[14] Roundware is thus a fairly unique example of participatory location-based sound. Furthermore, Roundware installations are particularly responsive experiences, because of the relatively dense distribution of audio files and the real-time addition of user contributions; this offers a unique lens through which to understand the affordances and challenges of audio augmented reality. Roundware is also an exemplary case

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[7] "Exhibitions - Soundwalk Collective," Soundwalk Collective, accessed October 15, 2016, http://www.soundwalk.com.

[8] Pejk Malinovski, "Passing Stranger: The East Village Poetry Walk," accessed January 11, 2017, http://eastvillagepoetrywalk.org.

[9] "Southside Stories," accessed April 3, 2017, http://www.southsidewalk.com.

[10] Soundwalk Collective and David de Rothschild, "Jungleized," accessed January 9, 2017, http://www.jungle-ized.com.

[11] "Celebrity Audio Guide," Central Park Conservancy, accessed February 21, 2017, http://www.centralparknyc.org/tours/self-guided/audio-guide.html.

[12] "Ulrike And Eamon Compliant," Blast Theory, accessed October 9, 2016, http://www.blasttheory.co.uk/projects/ulrike-and-eamon-compliant.

[13] "Zombies, Run!" Six to Start & Naomi Alderman, accessed April 24, 2017, https://zombiesrungame.com.

[14] Tim Haynes, "Hearing Voices: An Overview of Augmented Reality Audio," December 16, 2016, https://www.slideshare.net/TimHaynes14/hearing-voices-an-overview-of-augmented-reality-audio.

of location-based sound because of its diverse range of applications, and its evolution in a

changing industry and technological landscape over the last ten years.

Contributory Location-Based Audio

Developed by Burgund to facilitate his sound installations, Roundware is a contributory

audio platform that allows creators to augment the physical landscape with location-aware layers

of music and recorded voices. Using a mobile app and headphones, participants are immersed in

a soundscape that responds dynamically to their location and movement. They can listen and

wander, filter their audio stream in a number of ways, or record their own commentary to add to

the project. Contributions are tagged with location information as well as project-specific

metadata—for example, in *re~verse*, participants can self-identify as poetry lovers or neophytes.

Gradually, user contributions build up across the landscape, documenting a multiplicity of voices

and subjective experiences over time.

Burgund has used Roundware to create installations across the globe, from a cranberry

bog in Massachusetts[15] to World War I sites in northeast England[16] to downtown Christchurch,

New Zealand.[17] He has also developed Roundware-based educational audio projects for the

Smithsonian, UNESCO, and other cultural institutions, including projects focused on

accessibility for the blind. The works range in their thematic focus, sometimes simply inviting

participants to share a thought or experience, sometimes emphasizing topics like political

discourse, local history, or poetry, as in *re~verse*. And while Roundware's functionality supports

the creation of contributory, location-based experiences, Burgund has also used it for browser-

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[15] Halsey Burgund, "Bog People," accessed January 16, 2016, http://halseyburgund.com/projects/bog.html.
[16] Halsey Burgund, "Tributaries," accessed January 18, 2016, http://tributaries.org.uk.
[17] Halsey Burgund, "Sound Sky," accessed January 16, 2016, http://soundsky.org.

based audio projects and site-specific sound installations that are neither contributory nor location-aware. The platform lends itself to a host of different applications, and because it is open-source, even Burgund himself isn't privy to all the different instances and modes in which it has been employed.

Roundware began in 2007, as technical platform for Burgund's *ROUND* installation[18] at the Aldrich Contemporary Art Museum. As a sound artist, Burgund has long been drawn to the human voice—its musical qualities, shades of emotion, and intimate reflection of the diversity of human experience. For *ROUND*, Burgund developed a tablet-based system (smart phones had not yet become mainstream, although they were poised to do so later that year) that invited museum visitors to contribute their thoughts about various works of art. While standing in front of a painting, viewers could listen to commentary by a curator, hear observations from previous visitors, and add their own opinions. "It all came out of my dislike of museum audio tours," says Burgund.[19] He wanted to democratize conversations about art, and disapproved of authoritative audio tours telling visitors what they were "supposed" to think.

This emphasis on openness and plurality is embedded deeply in the platform itself. Roundware's website emphatically states, "Roundware is not audio tour software! In some ways, Roundware is the anti-audio tour platform."[20] It further explains the distinction:

- Audio tours are traditionally about a single authoritative voice whereas Roundware is about a multitude of voices, opinions and ideas mixed together.
- Audio tours tend to be linear experiences; Roundware is based on a non-linear, flexible, participant-driven, immersive experience.
- Roundware is designed for sculpting an aesthetic experience, not for explicitly delivering educational or interpretive information.[21]

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[18] Halsey Burgund, "Round," accessed January 18, 2016, http://halseyburgund.com/projects/round.html.
[19] Halsey Burgund (Sound Artist and Roundware Creator), interviewed by author, November 1, 2016 and February 7, 2017.
[20] Halsey Burgund, "Why Roundware?," accessed January 13, 2016, http://www.roundware.org/docs/why-roundware/index.html.
[21] Ibid.

ROUND established both the platform's core functionality—the ability to record audio, add recordings to a database, and play them back in a stream with specific parameters—and its core affordance, building contributory, location-based installations. Since 2007, Burgund has continued to develop Roundware in a heavily iterative process, regularly expanding its functionality in order to fulfill his own creative needs as well as specific requests from clients.

Shaping an Ocean of Sound

Roundware is a client-server system; clients for iOS, Android, and HTML5 browsers communicate with the Roundware server, which runs on Django, Apache, and Ubuntu Linux. Within this system, two basic categories of audio content are supported. A base layer of continuous audio, comprised of site-specific music composed by Burgund, is placed over the entire area of the project. Different tracks are each assigned to a relatively large geographic area—essentially, a polygon that he draws on a map. As a participant moves across these invisible shapes, they will hear their corresponding musical pieces, which collectively form the overall composition. The second layer of sound, the momentary layer, consists of intermittent audio clips—typically in Burgund's work, these are voices, although any kind of audio can be used—that are shorter, non-looping, and assigned to a smaller area. Burgund adds some of this momentary audio to the initial soundscape, and over the course of the project, participants contribute additional snippets using the mobile app. As listeners wander around the project area, their physical location, as well as any filters they have selected, triggers nearby audio clips that play for a brief moment. It's possible to simply have a silent base layer, but Halsey sees the music as an essential component of creating an overall environment, an ambience within which

all the content lives. He says, "I think of the continuous layer as the ocean that the intermittent audio is swimming in."[22]

Beyond this basic two-layer structure, each installation is also shaped by an array of aesthetic and experiential considerations. For the momentary audio, each clip has a circular area of distribution, with a center point and a radius. Creators can control the size of the radius—for example, choosing a larger radius for larger geographic areas, so that participants are more likely to trigger the files. Once someone triggers a clip, it plays for a predetermined length of time, even if the user moves outside the file's radius. This is an important part of the experience design: if clips stopped playing as soon as users exited their radius, the experience would largely consist of two- or three-second clips, which would be unsatisfying and would not allow users to substantively engage with the content. How long the clips play once participants move outside their radius can be tailored to the needs of specific projects. An algorithm also ensures that visitors don't hear the same clips repeated during their experience. Burgund makes the case that these details are crucial to both Roundware and the type of work that it supports:

> Roundware has a whole lot of parameters that would not be there if somebody designed it for advertising. I think that its artistic roots are very clear in that sense. […] This is all the aesthetic stuff. This is how long the recordings are, or how long this dead space air is between. This is how it fades out. This is how it pans back and forth. Those things are really important.[23]

This careful attention to participatory aesthetics is crucial to the success of both participatory documentary and location-based works: conceptually, in the sense of worldbuilding to create coherent and immersive universes, and practically, in making content easily accessible through pleasant and straightforward user interfaces and functionality.

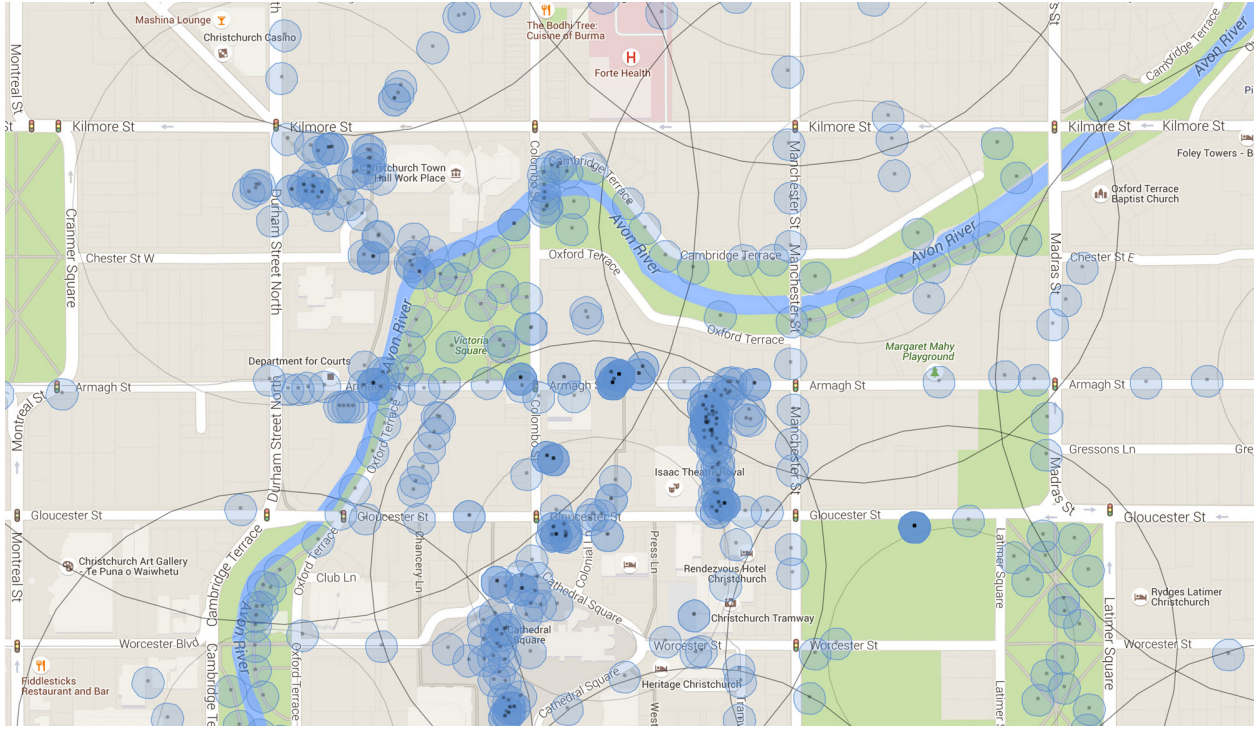
[22] Burgund, interviewed by author.
[23] Ibid.

Fig. 2: Roundware recording map for *Sound Sky* installation, Christchurch, New Zealand. From: Halsey Burgund.
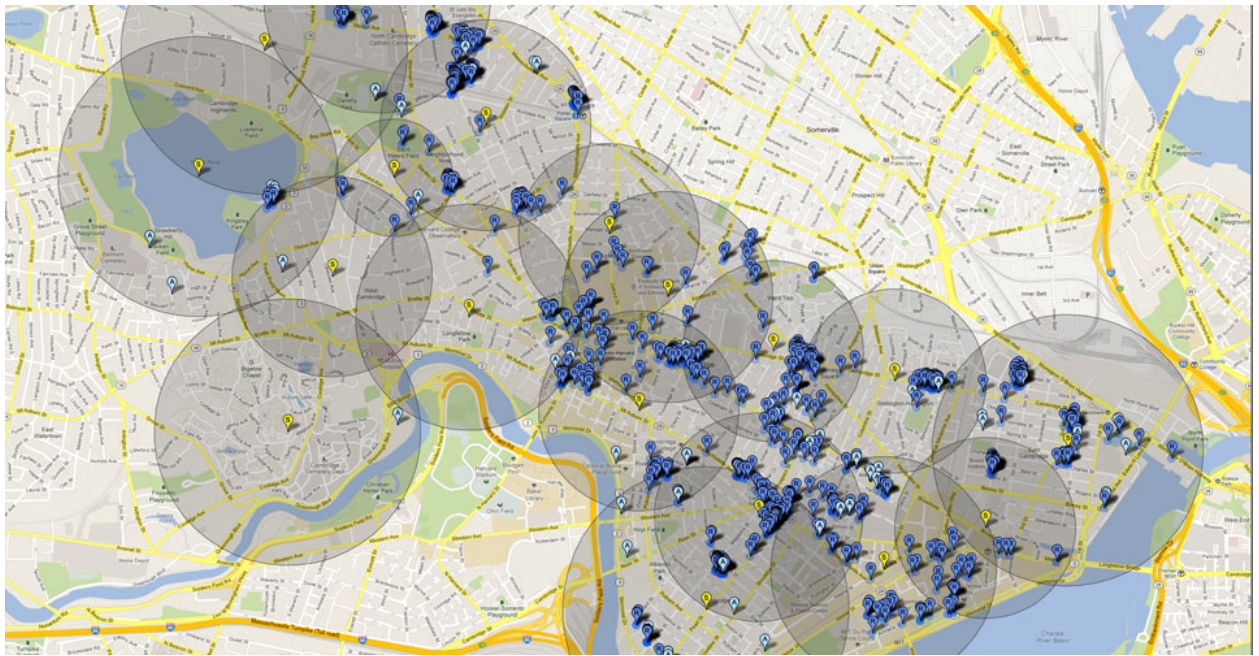

Fig. 3: Roundware recording map for *ROUND: Cambridge* installation, Cambridge, MA. From: Halsey Burgund.
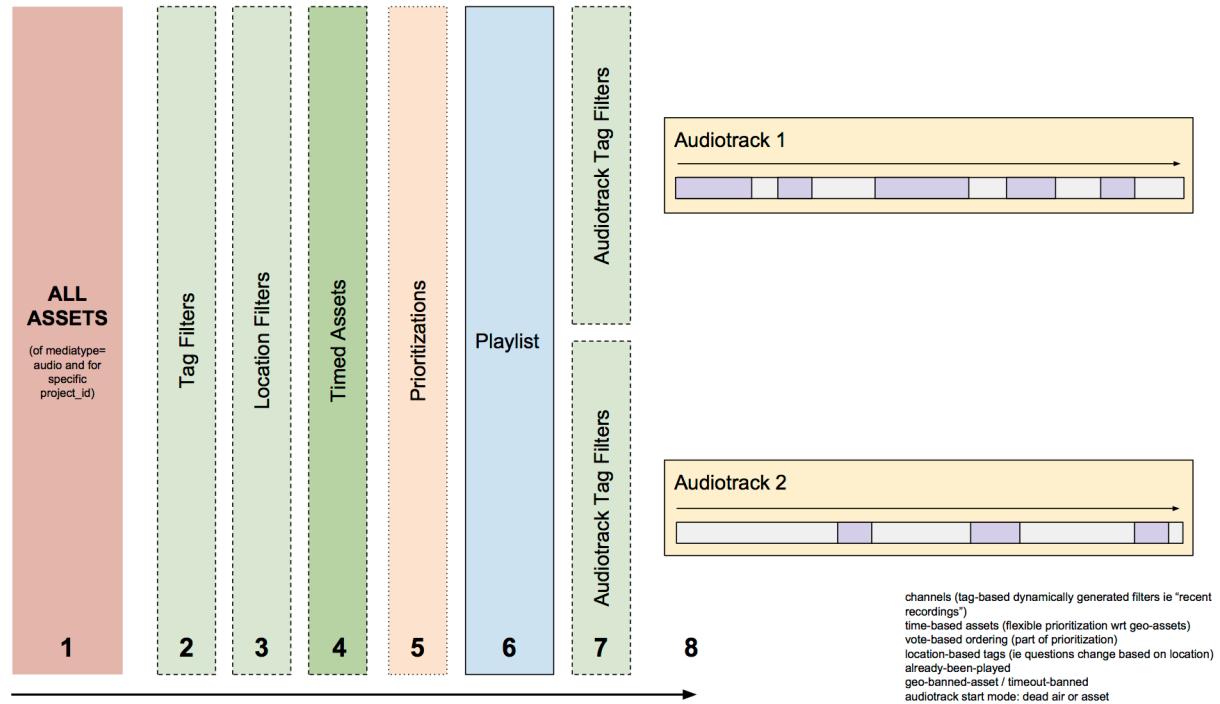
Fig. 4: Roundware audio playback methodology (including proposed). From: Halsey Burgund.

While Roundware provides creators with a great deal of specificity, projects created on the platform also inherently include elements of chance and randomization. Participants walking the same route in an installation will not hear precisely the same things; Burgund says, "It would be almost impossible to recreate the exact same experience."[24] In each installation there are areas of high density, where many audio clips have been added—perhaps near a bench where people can pause for a moment, or a landmark that invites exploration. In these areas, creators can limit how many files will play at once—Burgund usually limits it to two at a time—so that the overlaid clips do not simply become incomprehensible noise. Within that restriction, the length of each clip is different, and the ordering of the clips is randomized. Moreover, there are what Burgund calls "systemic randomizations,"[25] small variations due to GPS's imperfect accuracy, or

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[24] Burgund, interviewed by author.
[25] Ibid.

the fluctuating strength of a wi-fi signal. And of course, most visitors' paths will be unique in some way: how fast they walk, where they decide to pause, whether they choose to retrace their steps. Thus, Roundware offers an experience that is at all times a dialogue between creators, participants, and the dynamic conditions of the physical and virtual environment around them.

Collective Storytelling

Roundware was conceived from the very beginning as a contributory platform—the capacity for users to add their own content was central to its functionality and ethos from the start. Burgund stresses the distinction between contributory and interactive projects: regarding the latter, he feels they often seek solely to create an ephemeral individual experience, one whose novelty fades quickly away and which has no effect on other participants. In contrast, in a contributory project, "You're contributing to a larger whole, leaving something of yourself for others, co-creating something such that future participants are affected by past contributions."[26] (He finds "participatory" to be a more nebulous umbrella term, used to describe both interactive and contributory works.) Roundware contributions are uploaded automatically and immediately added to the piece, with no approval period. Burgund believes this is crucial to encouraging constructive and thoughtful discourse, saying:

> If you tell your participants you don't trust them, then they're going to do stupid things. If you tell them you trust them, you give them good examples, you encourage them in the right way, then generally they'll do something that's respectful and consistent with the ethos of the piece.[27]

He does listen to the recordings after they have been uploaded, primarily because he is interested in hearing what people have contributed. Out of thousands of contributions, he says he has only

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[26] Burgund, interviewed by author.
[27] Ibid.

had to remove offensive content—what he describes as hate speech—once or twice. The only other oversight he exercises is modulating the volume of loud screams so that they do not cause physical discomfort to listeners. This openness and immediacy produces an environment that encourages participants to playfully experiment with creative modes of collective storytelling.

One day in 2010, Burgund checked on the new additions to his *Scapes* installation at the deCordova Sculpture Park. A teenager had recorded a frantic, whispered message: "I'm behind this sculpture. I'm trying to hide from these zombies that are walking around. Wish me luck." Amused, he thought nothing more of it. Then, a few days later, a new recording showed up in the same area of the park: "I was just by that rock over there, and there was a dead body and a zombie was eating its brains." From there, the story continued to unfold over the next four months, with the beleaguered survivors finally being airlifted out by helicopter. Beyond its creativity and the entertaining arc of its narrative, what was extraordinary about this zombie epic was the fact that so many different people—most of them children—had contributed to this story, all visiting the installation independently at different times. With no prompting beyond hearing a snippet of the story during their visit to the park, they enthusiastically joined in this collective storytelling effort. Roundware's dynamic soundscapes augment the physical landscape with a new layer of collaborative creativity and social interaction; Burgund also points to other examples in which people left spatially oriented instructions for future visitors, creating treasure hunt-like experiences.

Burgund conceptualizes his authorship in these works as "framework building […] I create this framework, which is technical and conceptual and aesthetic, and then I just open it up for people to come in."[28] He views his work as a collaboration between the participants and himself, and enjoys that the results are not fully under his control: between the algorithmic

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[28] Burgund, interviewed by author.

randomization of Roundware and the systems supporting it, the ever-changing conditions of the physical space of the work, and the diverse ways in which participants engage with and contribute to the experience, the results of this collaboration often surprise Burgund and inspire new directions for artistic and technological exploration.

At the same time, he shapes users' experiences and contributions, "nudging" them to participate in the piece, via his decisions about spatial layout and user interface.[29] And while users certainly play an essential role in each project, authoring much of the content, their agency is ultimately quite restricted. For example, they do not have the ability to select a particular item and play it when they want to hear it, and the user interface provides no information about what content is located where. Both artist and participants must accept a lack of total control over the experience. Burgund says that the limited user agency is on purpose: "I don't want people to have to make a decision that they're not equipped to make."[30] He feels that viewers, when presented with a selection of media content without much context, often choose arbitrarily. By taking this choice away, he hopes to simplify the user experience as well as counter subconscious biases and behavioral patterns. Burgund uses the open-source software term BDFL, or "Benevolent Dictator for Life," to describe his role managing the Roundware code: while it is open-source, he decides what is ultimately added to the core code, guides its overall development, and enforces aesthetic standards. Arguably, BDFL also applies to Burgund's stewardship of the overall Roundware experience. Although Roundware installations are collectively created via user contributions, Burgund remains the singular artist gathering and shaping these inputs into a work that represents his artistic vision.

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[29] Burgund, interviewed by author.
[30] Ibid.

Non-linear Layers

In contrast to linear spatial narratives that physically and figuratively bring participants

from one point to another, like audio tours with a set of specific stops (often linearly arranged),

Burgund says, "Roundware is just an area that's been activated, where you're tuning in to this

evolving audio stream. It's like a radio."[31] There is no explicit narrative structure that guides

viewers from place to place.[32] Their path is determined by their own whims and curiosity, as well

as each space's unique and dynamic characteristics—from landmarks to weather to the flow of

people through a location. This nonlinear mode of exploration evokes the dérive (taken literally,

"drift" or "drifting"), a concept formulated by French theorist Guy Debord. Debord was a

founding member of the Situationists, an avant-garde collective of activist artists who envisioned

subversively playful practices to counter the alienation, rationalization, and predictable hierarchy

of modern cities. Debord described the dérive thusly:

> […] A technique of rapid passage through varied ambiences. Dérives involve playful-
> constructive behavior and awareness of psychogeographical effects, and are thus quite
> different from the classic notions of journey or stroll. In a dérive one or more persons
> during a certain period drop their relations, their work and leisure activities, and all their
> other usual motives for movement and action, and let themselves be drawn by the
> attractions of the terrain and the encounters they find there.[33]

The notions of fluid movement, immersion in ambience, and attentive participation in an

environment are all reflected in the Roundware experience. Each installation's multiplicity of

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[31] Burgund, interviewed by author.

[32] Recently, Burgund introduced the capacity to add time-based assets to Roundware installations. This functionality
came out of a project that was spread over a large geographical area; to prevent participants from wandering for
extended periods of time without encountering any media, Burgund added recordings that would be unlocked
regularly as time progressed. This new feature introduces the possibility of introducing a structured narrative arc into
the experience—time-based assets could be given priority so that uniformly distributed and scheduled story
elements, or contextual information, unfold over the duration of the experience. Burgund sees the combination of
linear and nonlinear elements as an intriguing direction for future exploration.

[33] Guy Debord, "Theory of the Dérive," in *Situationist International Anthology*, ed. and trans. Ken Knabb (Berkeley,
CA: Bureau of Public Secrets, 2006), 62.

voices, running together and speaking over each other, also resonates with the Situationist project of destabilizing singular, authoritative narratives of public space.

Beyond the digital layering of the voices themselves, Roundware also exists as an invisible virtual layer on top of a physical place, inviting participants to consider a pluralized sense of place and the complex relationships between location, the physical, and the virtual. Each installation itself is composed of a multitude of temporal layers. Often, the initial content is already temporally layered—as with projects like *re~verse* in which Burgund juxtaposes historical recordings from different periods with contemporary music. Regardless, over time, all Roundware experiences build up intricate layers of media content, as participants add to each installation throughout the duration of its existence. These recordings remain tethered to the specific spot in which they were made, so participants in any one location encounter a dynamic mixture of all of the thoughts and experiences that previous visitors shared at that spot. The often densely layered fragments, sometimes spanning centuries, become compressed into the present experience of each participant. At the same time, user recordings join a documentary archive, but one with almost no curation, moderation, or requirements for inclusion. Rather than looking backward to collect documents of importance, Roundware creates an archive of the present that is both virtual and, through its geolocation, profoundly physical. In doing so, it offers a conception of space as a temporal process, and asks participants to reexamine commonly held notions of history, memory, and documentation.

Archaeologist Michael Shanks' writing on the deep map (a term coined by William Least Heat-Moon in his 1991 book *PrairyErth*) is helpful in understanding the ways in which past, present, and future spatialities can intersect:

> […] The deep map attempts to record and represent the grain and patina of place through juxtapositions and interpenetrations of the historical and the contemporary, the political

and the poetic, the discursive and the sensual, the conflation of oral testimony, anthology, memoir, biography, natural history and everything you might ever want to say about a place.[34]

Deep mapping counters simplistic binaries between past and present, public and private, objective and subjective. It defamiliarizes our everyday surroundings in order to highlight overlooked features and interconnections, reflecting "the palimpsest that is landscape – the percolating time that folds together the many fragmentary traces of pasts present in any one place."[35]

Audio Augmented Reality

Burgund conceptualizes Roundware as audio augmented reality: "I've always thought of it that way. It augments the physical landscape with a layer of audio. But I've only recently taken to describing it that way, because people now know a little more about what that is."[36] Audio AR is not a new concept: in "Taxonomy of Mixed Reality Visual Displays," their influential 1994 paper defining AR, Paul Milgram and Fumio Kishino specifically mention non-visual forms of AR, including audio. They point out that in auditory displays, "computer generated signals can […] be mixed with natural sounds from the immediate real environment."[37] The roots of audio AR extend back much further, of course—arguably including practices like the indigenous Australians' songlines, which function as navigational guides when sung, and much more recently, the classic museum audio guide. Audio AR is inherently location-based, with audio files triggered based on a user's location. It is already being used for a plethora of applications,

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[34] Michael Shanks and Mike Pearson, *Theatre/Archaeology* (New York: Routledge, 2001): 64-65.
[35] Jeffrey Schnapp, Michael Shanks, and Matthew Tiews, "Archaeology, Modernism, Modernity," *Modernism/Modernity* vol. 11, no. 1 (2004): 11.
[36] Burgund, interviewed by author.
[37] Paul Milgram and Fumio Kishino, "Taxonomy of mixed reality visual displays," *IEICE Transactions on Information and Systems* E77-D, no. 12 (1994): 1323.

including gaming, immersive theater, navigation, tourism, and accessibility for the visually

impaired. However, mainstream industry discourse around AR remains overwhelmingly focused

on head-mounted displays.

Audio AR's lack of visibility (pardon the pun) is partially due to the same terminological

confusion that plagues both location-based media and augmented reality. The concept of audio

that augments the physical world through location-based content has been variously described as

dynamic spatial audio, ambient spatial audio, location-based audio, location-aware audio, and

geotagged audio, among other terms.[38] Despite this lexical difficulty, audio AR has unique

affordances that underscore some of the limitations of visual AR. Burgund argues that visual AR

puts a camera between users and the world, "reducing the world to the part that fits into the

margins of your screen."[39] By pulling users' attention to a screen rather than the world around

them, visual AR often prioritizes the augmentation itself, rather than the reality it augments.

Many AR demos, for example, emphasize a scientific model or whimsical character, rather than

the space users are in, or their interactions with surrounding people. A key affordance of both

location-based media and AR is that they are able to build on, and interact with, the most

engaging characteristics of the physical environment they are situated in: from historical details

to natural scenery to electronic displays. This potential, also deeply relevant for documentary

purposes, risks being diminished in camera- and headset-mediated experiences. Burgund says, "I

think it is crucial for the people designing these systems to think about this and do what they can

to really *augment* rather than *mask* reality."[40]

Roundware also invites reflection on embodied interaction and user interface in AR.

Roundware installations require relatively little interaction via the mobile app, with the exception

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[38] Tim Haynes, "Hearing Voices."
[39] Burgund, interviewed by author.
[40] Halsey Burgund, e-mail message to author, November 7, 2016.

of recording audio contributions. For the most part, bodily movement is the primary user interface. "My motto has always been, 'Press play and put it in your pocket.' Then you're just walking," says Burgund.[41] For AR, it is neither feasible nor desirable to have bulky, elaborate interfaces—in terms of both simplifying user experience and not distracting users from the environment around them. Most manufacturers of head-mounted displays are already working with gestural interfaces, in which users interact with computing systems through hand motions (or other bodily motions). Ideally, this creates a more intuitive and immersive experience by seamlessly linking digital devices with the physical world. Rus Gant, Director of Harvard's Visualization Research and Teaching Laboratory, notes that audio AR represents an underexplored but crucial aspect of conceptualizing how AR can and will function on a material level. Speaking about Apple's new Bluetooth earbuds, he says:

> [People] think they're just headphones. No, this is much more specific. This knows where your head is looking, knows where your head is in geographic space. The headphones can check with the phone: 'Where are we? Now we're over here.' And then they can check with the cloud: 'Did we do this last week at the same time and the same place?'[42]

Gant argues that these earbuds, in combination with a smartphone and other linked devices like smart watches (and eventually, head-mounted displays), constitute a "body-centric ecosystem"[43] that will redefine approaches to AR.

Access and Activism in Roundware's Future

Roundware was designed with access as a key principle. Burgund is passionate about creating art outside of traditional white cube art spaces: as an artist, he draws on the inspiration

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[41] Burgund, interviewed by author.
[42] Rus Gant (Director of Harvard's Visualization Research and Teaching Laboratory), interviewed by author, February 6, 2017.
[43] Ibid.

of being in everyday spaces where people live, work, and play. He also wants his work to be

accessible to a broader, more diverse audience, rather than "behind the gates of some art museum

where there's either a pay wall, or a class wall, or a socioeconomic wall, purposeful or not."[44]

Roundware is also open source, for two primary reasons. Firstly, Roundware depends on open

source software to operate (including Apache, Ubuntu, and Django), so Burgund feels it is

important to give back to the community. Secondly and perhaps most importantly, he says:

> The whole philosophy behind Roundware of collectively creating something greater than any single contributor over time, piece by piece, is shared with the open source, social coding community. It feels wrong to have a platform that enables work that depends on community contributions be itself closed off and proprietary.[45]

Although Roundware is open source, Burgund acknowledges that it would be difficult for

someone without prior programming experience to set up their own installation. And of course,

most of his projects require a mobile phone, another barrier to entry. One of his main goals for

the platform going forward is to make it more user-friendly and accessible—this includes

bringing Roundware into schools as a learning tool, as well as developing better methods for

publicizing installations that are otherwise invisible.

One of Roundware's most intriguing potential applications is for activist-oriented

projects. The platform's onsite documentation and archival capabilities could serve as important

tools for activist movements, which are often oriented around specific events and locations. In

2015, Burgund and Egyptian-Lebanese artist Lara Baladi created the Roundware installation

Invisible Monument,[46] located in Boston's Dewey Square—the main site of Occupy Boston.

Although onsite documentation wasn't possible in this case (the protests took place in fall 2011),

Baladi and Burgund gathered recordings made during that time period, and used them to recreate

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[44] Burgund, interviewed by author.
[45] Halsey Burgund, e-mail message to author, February 13, 2017.
[46] Halsey Burgund, "Invisible Monument," accessed January 16, 2016, http://invisiblemonument.com.

a soundscape of the protest. In the future, demonstrations and other events could be both recorded and preserved on-site, creating a ground-level archive of participants' experiences. This possibility suggests important questions about physical and virtual public space: when protests are shut down and activists are forcibly removed from parks and streets, what does it mean that a virtual record of the protesters could live on in that same space? By geolocating digital media, how can location-based projects intervene in our understanding of free speech and public space? Burgund points out that, since Roundware requires no hardware onsite, "I can do a Roundware installation without any permission. I could put a Roundware installation inside of the Pentagon and nobody would listen to it, but it would be there."[47]

Roundware is already an incredibly versatile and conceptually rich platform: an artistic and documentary tool for realizing site-specific soundscapes; an asynchronous, location-based social network for collective storytelling; a narrative platform supporting experimentation with linearity and temporality; and an example of audio AR that invites us to re-think AR content and user interfaces. Users are immersed in enchanted landscapes that invite spontaneous interactions, playful discovery, and creative contribution. Roundware's adaptability for civic interventions, and the potential for it to be more widely accessible for both participation and creation, are only two of many exciting avenues for future technological and artistic experimentation.

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[47] Burgund, interviewed by author.

Chapter Four: *Yellow Arrow*

In 2004, yellow arrow stickers began appearing in cities around the world. In Berlin, they pointed to shuttered but not forgotten nightclubs. In Washington, D.C., they invited people to tour landmarks from the 80s punk rock scene. At Art Basel in Miami, the arrows presented a "counter exhibition" democratically curating the city, and alongside the Copenhagen harbor, they hosted conversations between mayoral candidates and their constituents. In Tokyo, they recommended ramen spots; in Mexico City, they described architectural history and highlights. In nearly 40 countries around the world, the arrows shared personal stories, encouraged lively discussions, and offered new perspectives on urban environments.[1]

The geo-annotation project *Yellow Arrow*, by Christopher Allen, Brian House, and Jesse Shapins, ran from 2004 to 2006, beginning in Manhattan's Lower East Side and spreading across the globe. It was conceptualized as "fundamentally a new way of exploring cities […] a frame and platform to see the world in a new way."[2] Participants posted *Yellow Arrow* stickers in order to point out or comment on specific locations and objects. Each sticker featured a unique alphanumeric code, and by texting the *Yellow Arrow* phone number using this code, users were able to attach a short message to the location where they had posted the sticker. Subsequent passers-by could text the *Yellow Arrow* number with this same code and receive the saved message in response. They could also reply via text message to the original author.[3] Over the course of the project, participants posted more than 50,000 arrows and messages.[4] *Yellow Arrow*

[1] Brian House, "Yellow Arrow," accessed November 9, 2016, http://brianhouse.net/works/yellow_arrow.

[2] "Yellow Arrow," Flickr, accessed September 20, 2016, https://www.flickr.com/people/yellowarrow/?rb=1.

[3] House, "Yellow Arrow."

[4] Ethan Todras-Whitehall, "Making Connections, Here and Now," *The New York Times,* January 25, 2006, http://www.nytimes.com/2006/01/25/technology/techspecial2/making-connections-here-and-now.html.

was both fundamentally participatory and profoundly location-based: "We called it a MAAP, a

Massively Authored Artistic Publication, and then obviously also made it in a form of a map,"

says co-creator Christopher Allen.[5] This early example of mobile location-based media illustrates

how collaborative approaches can enable a more complex understanding of place. It also

highlights the importance of annotation as a modality of spatial narrative, the creative potential

of more open models of authorship, and the capability of location-based media to support

alternative uses and narratives of space.

Fig. 5: ***Yellow Arrow*** **sticker in San Francisco, CA. From: https://www.flickr.com/photos/yellowarrow/2396820546.**

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[5] Christopher Allen (Co-Creator of Yellow Arrow, Founder and Executive Artistic Director of UnionDocs), interviewed by author, March 16, 2017.

Fig. 6: *Yellow Arrow* **sticker in Cambridge, MA. From: https://www.flickr.com/photos/yellowarrow/2397205550.**

Project Implementation

Yellow Arrow was designed to be as accessible as possible. To begin with, it was based on the "lowest common denominator" technologies of text messages and stickers (spray paint, chalk, and permanent marker are even more affordable modes of annotation, of course, but lack the networked interaction capabilities of text messaging).[6] The stickers were distributed for free at specific venues and events, or you could purchase them for 50 cents. All the messages were also available on the project website, searchable by location or by username.[7] In this way, the

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[6] Todras-Whitehall, "Making Connections, Here and Now."
[7] Allen, interviewed by author.

creators hoped to democratize the mapping of the city, allowing anyone to map their subjective

experiences onto the physical environment.

People used the platform in many different ways, from sharing political views to posting

poetry fragments, and many local projects focused on specific topics like architecture or

environmental issues. Other people used the stickers simply for decoration, or attempted to

employ them for marketing and promotional purposes. Many participants only authored one

arrow, likely treating the process as a novelty, while other individuals became "super users,"

posting arrows daily and "almost treating it like they were photographers and were looking for

their next shot."[8] While this intensive usage was often a more individual practice, the platform

also facilitated interactions between users. Many arrows took the form of prompts, instructions

or questions that invited, and received, direct responses. People could respond via texting, or

through the project website. Participant phone numbers were not published, but messages

included their author's *Yellow Arrow* username, or "tag name." It was thus possible to directly

respond to authors through the *Yellow Arrow* phone number, using either their tag name or the

code on the arrow they had posted.[9] All posts and responses were logged as entries in the *Yellow*

Arrow database, along with location, username, and arrow code metadata.

Partly due to favorable early press from a few high profile outlets, the project rapidly

spread out geographically from its origins in New York City, with usage most concentrated in a

few major cities. The creators found that organizing events, or collaborating with people and

groups interested in hosting their own events, was the most effective way to reach potential

users. Working with existing organizations and groups provided built-in distribution and

communication channels, and event-specific instantiations of the project could appeal to

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[8] Allen, interviewed by author.
[9] Ibid.

participants by focusing on topics and themes of interest. Furthermore, word of mouth spread easily with people occupying the same venues, and the geographic concentration of people led to relatively dense (and therefore conspicuous) posting of stickers. Co-creator Christopher Allen notes, though, that the project rarely achieved a level of density where someone would be able to follow arrows from block to block consistently. The project's wide (and rapid) geographic dispersal precluded that kind of density, whereas limiting *Yellow Arrow* to one neighborhood in one city would have led to very different results. For participatory location-based works, choices about scale and (desired) density are both difficult and critical; these decisions influence the embodied experience of the work, as well as modes of participation.

Yellow Arrow also prefigured other challenges involved with producing digital location-based works, including the archiving of projects. The *Yellow Arrow* website is now defunct, although much of the content is archived on Flickr (4,500 photos of arrows, and their corresponding messages and comments). While the Flickr archive is sizeable, it offers a clumsy interface for viewing the arrows, and it is subject to Flickr's shifting policies and ownership. Of course, the alternative—maintaining the original *Yellow Arrow* website—might present problems of its own, including cost and the necessity of updating code from 2006. *Yellow Arrow* also occupied an uneasy space between the conceptual art world and the tech world. Christopher Allen recalls:

> We were trying to do a piece of conceptual art. At the same time, it was obviously engaged with new technologies and it represented, for a lot of people, potential business models or practical possibilities. We got pulled in a lot of ways towards start-up culture, so we were in between these worlds […] there were some mixed messages for the project as a whole, and we were trying to satisfy a lot of different viewpoints.[10]

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[10] Allen, interviewed by author.

This struggle was in many ways a harbinger of the current landscape for location-based media, and the difficulty creators face in navigating disparate industries, disciplines, and communities of practice.
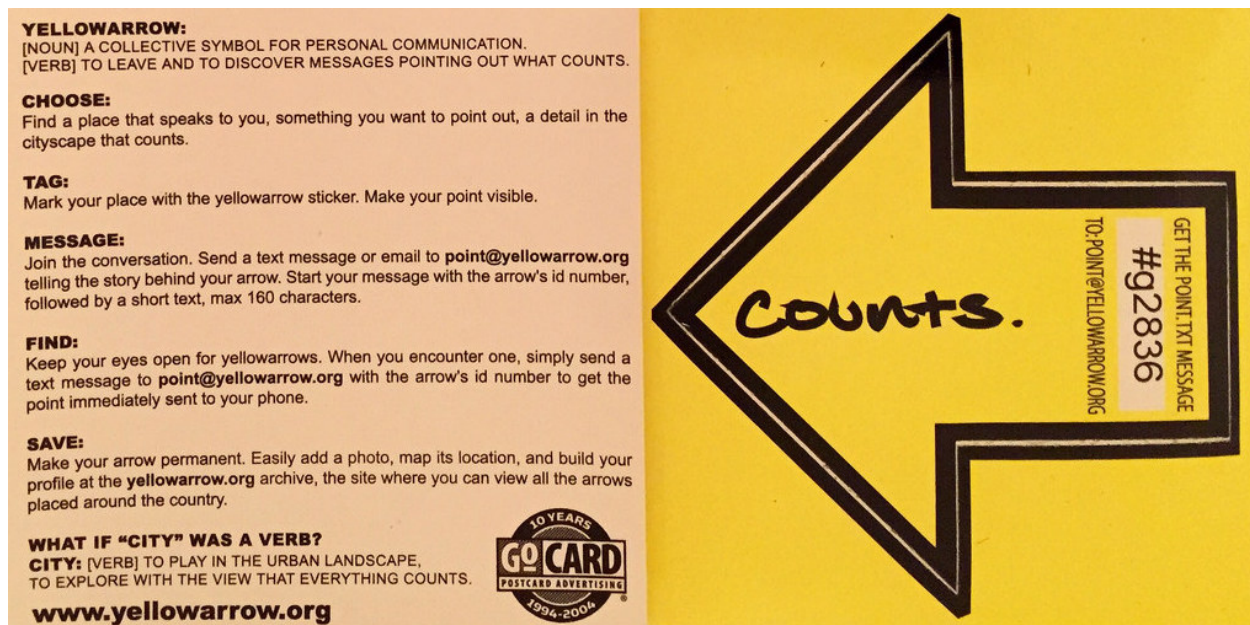

Fig. 7: *Yellow Arrow* instructions and sticker. From: https://www.flickr.com/photos/fliqkr/25094766196.

Annotation, Spatial Hypertext, and Augmentation

Yellow Arrow exemplifies one of the major categories of location-based media, that of annotation. To annotate is "to make or furnish critical or explanatory notes or comment."[11] While annotation is an important concept in many domains, what is relevant for location-based media is spatial annotation, or geo-annotation. Geo-annotation involves assigning media to specific physical locations, to be consumed at these same locations. Buildings, streets, and cities have long been surfaces inscribed with information, memories, and meaning. Graffiti, marble plinths,

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[11] "Annotate," Merriam-Webster, accessed April 13, 2017, https://www.merriam-webster.com/dictionary/annotate.

government notices, promotional posters, and commemorative plaques both provide information about, and help to shape, their environments and the activities that occur within them. Annotation is an essential mechanism for spatial narrative, documentation, and augmentation.

Annotation is also a powerful tool for shaping discourse, based on what is annotated in the first place, who the annotation is intended for, and how the content of the annotation is conceptualized. Even something as seemingly neutral as street signs can be symbolically weighted. Priscilla Parkhurst Ferguson, chronicling the history of the city as text, noted, "For centuries, most villages and towns felt no need to name their streets, and even today a major urban center like Tokyo manages to do without them."[12] She writes that the naming and labeling of streets is a key mode of reinforcing and contesting control, shaping identity and culture, and mediating between individuals, institutions, and the state. In 18th-century Paris, for example, street names functioned as a way to exert and signify royal power, a form of "symbolic eminent domain."[13] After the French Revolution, revolutionaries sought to efface these emblems of monarchic power, bolster the ideals of rationality and modernity, and edify and unify the populace by proposing new, politically correct names. "With their inscription of the revolution on the cityscape itself, words, names, and eventually texts […] produced in effect a new, revolutionary landscape."[14] At the same time, annotation inherently supports diverse, abundant, and competing messages, and offers a dynamic forum for public discourse and debate. Jean Baudrillard wrote of the May 1968 student strikes in France:

> The real revolutionary media were the walls and their speech, the silk-screen posters and the handpainted notices, the street where speech began and was exchanged – everything that was an immediate inscription, given and turned, spoken and answered, mobile in the same space and time, reciprocal and antagonistic. The street is, in this sense, the

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[12] Priscilla Parkhurst Ferguson, *Paris as Revolution: Writing the Nineteenth-Century City* (Berkeley and Los Angeles, CA: University of California Press, 1994), 16.
[13] Ibid., 18.
[14] Ibid., 13.

alternative and subversive form of the mass media, since it isn't, like the latter, an objectified support for answerless messages, a transmission system at a distance. It is the frayed space of the symbolic exchange of speech – ephemeral, mortal.[15]

Networked locative technologies add a new dimension to annotation, rendering the world a spatial hypertext linking physical locations and virtual content. This ability to digitally overlay information and inscribe narrative on physical space allowed *Yellow Arrow* (and other similar projects) to become a collectively authored document of subjective experiences between the physical and the virtual. Many have noted the significance of this development, describing it as the "geospatial web,"[16] "reality browser,"[17] "hypertextual universe,"[18] and "real-world websurfing."[19] In *Headmap Manifesto*, Ben Russell predicted that with the advent of locative and mobile technologies, "The whole world will become an annotated space, which links from the real to the information space and back again. The world as interface."[20] This connection of the physical world to networked virtual worlds, according to Jillian Hamilton, emphasizes the importance of sense of place and "provides an alternative to the assumption that digital content is placeless," as exemplified by the term "cyberspace."[21]

Many artists and creative technologists were interested in exploring these new possibilities, and a number of notable geo-annotation projects appeared around the same time as *Yellow Arrow*, including *Urban Tapestries* (2002-4),[22] *(area)code* (2004),[23] *Murmur* (2003),[24]

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[15] Jean Baudrillard, *For a Critique of the Political Economy of the Sign*, trans. Charles Levin (St. Louis, MO: Telos Press, 1981) 176-77.

[16] House, "Yellow Arrow."

[17] Malcolm McCullough, *Ambient Commons: Attention in the Age of Embodied Information*, (Cambridge, MA: The MIT Press, 2013), 130.

[18] Martin Rieser, "Locative Media and Spatial Narrative" (paper presented at the REFRESH conference, Banff, September 29–October 4, 2005), http://locative.articule.net/wp-content/uploads/2013/06/Reiser_LocativeMediaSpatialNarrative.pdf.

[19] Sean Miller, "Yellow Arrow points to new connections," June 12, 2007, http://seanmiller.blogs.com/whizdumb/2007/06/yellow_arrow.html.

[20] Ben Russell, "Headmap Manifesto," 1999, http://technoccult.net/technoccult-library/headmap.

[21] Jillian G. Hamilton, "Ourplace: the convergence of locative media and online participatory culture," the Proceedings of OZCHI 2009, The University of Melbourne, Melbourne, Victoria, November 23-27, 2009, 393.

[22] "Urban Tapestries," Proboscis, last updated March 11, 2009, http://urbantapestries.net.

and *Grafedia* (2004).[25] Like *Yellow Arrow,* these projects used mobile phones (or PDAs) and text messaging to link digital content with physical locations, invited participants to share their experiences of a place, and explored the affordances of new locative technologies. Another similar project, *Semapedia* (2005), generated QR codes for Wikipedia entries, allowing people to print them out and post them on or around corresponding physical locations.[26] Among this generation of projects, *Yellow Arrow* is particularly interesting because of its scale, and because of the diversity of its usage—not only the different types of user content and interactions it supported, but also the different thematic instantiations of the work.

  Yellow Arrow is also notable for the way it drew on the appeal and interaction mode of physical tagging. Architecture scholar Malcolm Mcullough writes about annotation through the lens of tagging:

> There is no simpler piece of situated technology. Although overtly semantic itself, a tag quickly shifts attention to the intrinsic structure of whatever it labels. Tags are simpler and possibly more prevalent than screens, which are the assumed focus in today's economics of attention. Whereas the contents of a screen are disembodied and usually disengaged from context, a tag is almost always about something right here. More basically still, a tag is physically inscribed and not sent.[27]

Tagging is most commonly associated with graffiti, acting as a boasting system and mode of marking territory.[28] However, new technologies have facilitated new forms of tagging, including programmable LED lights, wearables, and GPS-enabled mobile applications. Mcullough also notes the evolution of the tag as a key mechanism for organizing and identifying digital content, from SEO-friendly keywords to Twitter hashtags; the tag as metadata is another mode of

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[23] Jen Southern, "(area)code," accessed March 18, 2017, http://www.theportable.tv/areacode/areacode.html.
[24] "About," [murmur], accessed November 13, 2016, http://murmurtoronto.ca.
[25] John Geraci, "Grafedia," accessed October 24, 2016, http://www.grafedia.net.
[26] Wiechers, Stan, "Semapedia - Status: Offline," accessed April 13, 2017, http://www.merkwelt.com/people/stan/semapedia_offline.
[27] McCullough, *Ambient Commons*, 111.
[28] Joe Austin, *Taking the Train: How Graffiti Art Became an Urban Crisis in New York City* (New York: Columbia University Press, 2001), 4, 178.

contextualizing and providing information.[29] *Yellow Arrow* successfully combined the somewhat

rebellious attraction of physical tagging with the conceptual and functional roles of metadata.

Annotation is information that overlays and augments the physical world, and as such, it

is an important framework for augmented reality. Of AR, Malcom Mcullough says, "The basic

idea is certainly one of tagging."[30] He notes the early mobile geo-annotation apps and AR

platforms Layar[31] and Wikitude;[32] these apps also reflect AR's intrinsic connection to place,

imitating "more conventional guidebook technologies" in providing information about historical

landmarks and local attractions.[33] Thinking about AR as annotation allows us to reflect on

questions of attention and how technology facilitates our interactions with place. As noted in

earlier chapters, many proposed industry applications of AR tend toward gaudy and distracting

visual interfaces and content. A great deal of spatial annotation can also be described this way

(e.g. neon signs and flashing electronic billboards), but its overwhelming abundance demands

consideration of how attention operates in space. Over the course of its long history, spatial

annotation and visual attention have been extensively studied in fields like architecture, urban

planning, mapping, and graphic, retail, and exhibit design; AR developers would do well to draw

on the deep expertise in these fields to better understand the visual attention economy AR

operates within. Approaching AR as annotation also invites consideration of attention modalities

outside of the current industry paradigm of head-mounted displays, which treat screen-mediated

selective visual gaze as the sole, or primary, mode of attention.[34] The creators of *Yellow Arrow*

sought to augment the city without distracting from it: "The limitations of text-messaging (no

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[29] McCullough, *Ambient Commons*,117.
[30] Ibid., 130.
[31] "Layar," Layar, accessed May 3, 2017, https://www.layar.com.
[32] "Wikitude," Wikitude, accessed May 3, 2017, https://www.wikitude.com.
[33] McCullough, *Ambient Commons*, 131.
[34] Ibid., 131.

images, no sounds, only 140 characters) allow the visual and sonic environment of the city to take precedence."[35] Similarly to Roundware, users are encouraged to interact with their mobile phones only minimally, navigating primarily with their bodies through the interface represented by the physical environment around them.

Protocol (vs. Narrative)

Yellow Arrow exemplifies a mode of storytelling that could be more readily described as a protocol than a narrative in the traditional sense. Co-creator Jesse Shapins describes it thusly:

> *Yellow Arrow*'s authorial structure models conventions of software development more so than traditional artistic practice. In effect, *Yellow Arrow* is a software application with a fixed feature set. Any user with the appropriate technology can use the software within the constraints we set up.[36]

While Shapins and his *Yellow Arrow* co-creators defined the "software's" features and restrictions, users were free to use the software as they saw fit. Compared to Roundware, *Yellow Arrow* more strictly separated the authors of the platform from the authors of the content, and allowed users more freedom to communicate directly with each other and create their own themes and communities of use (although they could not set up independent projects within the platform).[37] Co-creator Christopher Allen says of this model, "We really thought of them as authors and artists, more than users."[38] This emphasis on contributory content, and high degree of user agency, resulted the diverse range of uses described in preceding sections.

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[35] Jesse Moss Shapins, "Mapping the Urban Database Documentary: Authorial Agency in Utopias of Kaleidoscopic Perception and Sensory Estrangement," PhD diss., Harvard University, 2012, 172.
[36] Ibid., 173.
[37] Allen, interviewed by author. The Yellow Arrow creators did briefly experiment with "text walks"—linear, timed, singly authored experiences using the Yellow Arrow platform—and found these to provide a compelling experience for users.
[38] Ibid.

Shapins situates *Yellow Arrow* in the genre of urban database documentary, which he theorizes as "a mode of media art practice that uses structural systems to uncover new perspectives on the lived experience of place."[39] He cites examples including the city symphony films of the 1920s and, more recently, Janet Cardiff's audio walks.[40] *Yellow Arrow*'s open narrative structure and conceptual framework also reflect precedents in avant-garde art, including Dada events at Hugo Ball's Cabaret Voltaire, Surrealist theater, interdisciplinary performances at Black Mountain College, and the happenings of the late 1950s and 1960s.[41] American artist Allan Kaprow coined the term "happening" to describe a type of participatory event that blurred the boundary between art and life, between performance and the everyday. Members of the audience were conceptualized as active, and essential, participants in the work. In fact, Kaprow wrote, "audiences should be eliminated entirely," through their full integration into the performance.[42]

Happenings reflect many of the key affordances, both formal and conceptual, of participatory location-based media. Their creators sought to bring art outside of galleries and theaters, and beyond the singular, delimited time of conventional performances—to make art in the real world, and in real time. In "How to Make a Happening," Kaprow wrote:

> Break up your spaces. A single enactment space is what the theatre traditionally uses. You can experiment by gradually widening the distances between your events, first at a number of points along a heavily trafficked avenue, […] then on more than one street, then in different but nearby cities, finally all around the world.[43]

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[39] Shapins, "Mapping the Urban Database Documentary," 1.

[40] Ibid., 5, 105.

[41] Kirstie Beaven, "Performance Art 101: The Happening, Allan Kaprow," Tate, May 30, 2012, http://www.tate.org.uk/context-comment/blogs/performance-art-101-happening-allan-kaprow.

[42] Allan Kaprow, "Notes on the Elimination of the Audience," in *Participation*, ed. Claire Bishop (London: Whitechapel and Cambridge, MA: MIT Press, 2006), 103.

[43] Allan Kaprow, "How To Make A Happening," (New York: Primary Information, 2009), http://primaryinformation.org/files/allan-kaprow-how-to-make-a-happening.pdf.

For Kaprow and other artists creating happenings, the world was the stage, and the performance built on real-world locations, situations, and interactions, both planned and unplanned. Beginning with a short list of scenarios, images, and instructions, participants (largely non-professionals) interacted with both each other and their environment to create the happenings. As Kaprow describes it, "A happening is for those who happen in this world, for those who don't want to stand off and just look. If you happen, you can't be outside peeking in. You've got to be involved physically."[44]
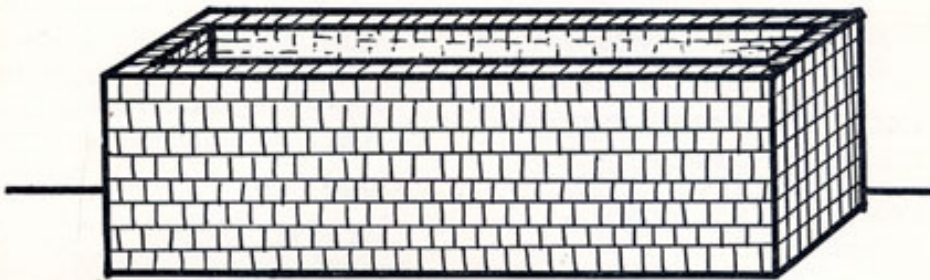

Fig. 8: *Fluids* by Allan Kaprow, photographed by Dennis Hopper, Beverly Hills, October 1963.
From: http://www.tate.org.uk/context-comment/blogs/performance-art-101-happening-allan-kaprow.

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[44] Kaprow, "How To Make A Happening."

Fig. 9: Poster for *Fluids*, a happening by Allan Kaprow, 1967.
From: https://imageobjecttext.com/tag/fluids-a-happening-by-allan-kaprow.

Many participatory location-based projects, including *Yellow Arrow*, share a similar authorship model with the happening. Creators establish a protocol, or in the case of Kaprow's happenings, a "program"—a term that clearly derives from the happening's theater performance roots, but in which we can now also identify a connection to the software development use of the term. Participants are then given a high degree of agency in operating within, and interpreting, this rule set in order to realize an improvisatory and multi-voiced work. This creative act of interpretation is a crucial aspect of many location-based works, helping to transform places into active and meaningful spaces, and presenting enormous potential for narrative, affective, and political intervention.

Alternative Uses and Experiences of Public Space

These projects also share a goal of creating a heightened experience of the everyday. They invite actions—whether wrapping yourself in tinfoil or licking jam off a car, as in some of Kaprow's works, or annotating a building with a sticker and a story—that resist functional, officially approved uses of space. In doing so, they offer people an opportunity to call into question the daily routines, social norms, and often hidden dictates shaping our movements, encounters, and actions in public space. This emphasis on alternative uses, narratives, and experiences of public space is central to *Yellow Arrow*. Christopher Allen says the goal of the project was to document people's lived experience of place—to prioritize the everyday and the personal rather than official landmarks and attractions.[45] Jesse Shapins also notes the project's indebtedness to the Situationists, "in particular, their emphasis on critiquing the presumed

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[45] Allen, interviewed by author.

objectivity of the map, and instigating play and experimentation in the physical environment."[46]

Some local projects explicitly engaged with *Yellow Arrow*'s more critical aims: Guerilla

Geography,[47] in the UK, invited participants to post stickers on CCTV surveillance cameras,

prompting them with questions like "How does CCTV change your personal, private social,

emotional, party, peace or love space?"[48] Other groups focused on climate change, debates about

urban revitalization, and bikers' rights.

Annotation, as a mode of collective authoring, also generates new social connections

between participants, as well as new individual relationships to place. Annotation of public

spaces provokes conversation and debate between both users and observers, often carrying

discourse across conventional socio-economic divisions. It can profoundly reinforce or transform

a community's understanding of itself, while also creating new social bonds among a community

of practice. Annotation is often necessarily brief (for reasons of cost, convenience, or risk), and

epigrapher Bradley McClean notes that it "tend[s] to omit pertinent information that is already

known by the intended audience"[49]—creating two groups, those who are in the know and those

who are not. Christopher Allen echoes this, describing *Yellow Arrow* as "a subversive mode of

communication […] you were a part of this secret society already if you knew what you were

supposed to do with it."[50] Furthermore, with digital-only modes of geo-annotation, information

and interactions can be completely invisible except to those in the know.

On an individual level, participation in creating or altering the narrative of a space

encourages users to reexamine their relationships to the places they traverse, and see the world

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[46] Shapins, "Mapping the Urban Database Documentary," 172.
[47] "Guerrilla Geography," Guerilla Geography, accessed April 23, 2017, http://guerrillageography.blogspot.com.
[48] "Yellow Arrow," GGiP, April 6, 2008, https://www.flickr.com/photos/yellowarrow/2398138640/in/album-72157604391479036.
[49] Bradley H. McLean, *An Introduction to Greek Epigraphy of the Hellenistic and Roman Periods from Alexander the Great until Constantine* (Ann Arbor: University of Michigan Press, 2002), 2.
[50] Allen, interviewed by author.

around them from a new perspective. Presented with the task of annotating a space, people must consider what they find interesting and important in their everyday environments. What might they want to document, point out, or share with others? The inscription of personal anecdotes on city surfaces renders the private public, augmenting public spaces with intimate stories. Participatory location-based media also invite a more active relationship with space, in contrast to the passive consumption of space facilitated by many location-aware mobile apps. With the prevalence of mobile navigational systems, Kazys Varnelis and Leah Meisterlin claim:

> […] We have come to know [the city] from above, as a two-dimensional, planimetric experience. Instead of seeing ourselves as part of the city fabric, inhabiting a three-dimensional urban condition, we dwell in a permanent out-of-body experience, displaced from our own locations, seeing ourselves as moving dots or pins on a map.[51]

Furthermore, Mark Shepard notes that for a great deal of location-based media, "'The city is here for me to use' is the underlying logic: a searchable city with an easily accessible shopping cart."[52] Location-based media that facilitate writing as well as reading, creation as well as consumption, encourage more multifaceted, generative relationships with spaces.

At the same time, it is crucial to interrogate the dynamics of who is doing this reading and writing, and where. Overlaying public spaces with new stories can be a way to counter dominant narratives, but can also contribute to the marginalization of other voices. For *Yellow Arrow*, no comprehensive demographic data on users is available. However, given the outlets in which the project was covered (*Wired*, tech and art sections of major newspapers, academic writing on locative media), and the events where it was shared (Art Basel, design festivals, civic and academic conferences), we might hazard a guess at its likely user base: art- and tech-world

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[51] Kazys Varnelis and Leah Meisterlin, "The Invisible City: Design in the Age of Intelligent Maps," Adobe Think Tank, 2008, https://s3.amazonaws.com/arena-attachments/883424/8b516f5966a276a47cd403badb4c43d3.pdf
[52] Mark Shepard, "Toward the Sentient City," in *Sentient City: Ubiquitous Computing, Architecture, and the Future of Urban Space*, ed. Mark Shepard (New York City: Architectural League of New York; Cambridge, MA: MIT Press, 2011), 26.

urbanites. Based on the demographic makeup of these industries, we could further extrapolate

that *Yellow Arrow* users were probably disproportionately affluent and white. Is it possible that

these users were part of gentrification processes in the neighborhoods where they posted arrows?

Could their creative intervention in these spaces be read as invasive? While the aforementioned

lack of demographic data (as well as the project's geographic dispersal) prevents any conclusive

analysis, I believe *Yellow Arrow*'s use of accessible technologies, emphasis on civic

participation, and embrace of plurality were effective strategies for mitigating potentially fraught

power dynamics. Nonetheless, the project illustrates some of the possible asymmetries that can

arise with location-based media, and suggests important questions for creators and participants to

consider: Whose narrative is being disseminated? Who is able to participate? How might spatial

interventions perpetuate inequality? I will further explore these questions in my next chapter, a

case study of a community art project that engages explicitly with questions of how power

operates through space.

  Yellow Arrow was a pioneering location-based project, one that in many ways anticipated

the current ubiquity of locative mobile applications, and their immeasurable impact on how we

experience place. In its strong conceptual grounding, ambitious breadth, and diverse usage, it

exemplified many of the affordances of participatory location-based media. Its creators

understood annotation's centrality as a mode of inscribing meaning onto physical environments,

as well as its ability to invite the presence and contestation of multiple subjectivities. In its

implementation of the "geospatial web," connecting virtual content with physical locations,

Yellow Arrow also demonstrated digital annotation's potential for narrative, documentation, and

augmentation. The project's protocol-based authorial structure reflected a rich tradition of

collectively authored works, and highlighted participatory location-based media's capacity to

posit alternative uses and narratives of public space. More than ten years after the end of the project, *Yellow Arrow* is still a key example of participatory location-based media. Not only does it offer a case study of many practical concerns in this field, including accessibility, scale, archiving, and physical interface, but it also showcases how participatory location-based media can encourage more improvisation and discovery in everyday environments, as well as more complex and intimate understandings of space.

Chapter Five: 96 Acres Project

Cook County Jail is the largest single-site jail in the United States, occupying 96 acres of land—more than eight city blocks—next to Chicago's Little Village neighborhood. It admits approximately 100,000 pre-trial detainees each year, with an average daily population of 9,000; more than half of these inmates come from the residential areas surrounding the facility.[1] The jail's 25-foot-tall northern wall directly faces a row of single-family homes, presenting them with a view of gray stucco and concrete, chain-link fence, and barbed wire. Weeds poke up under windblown debris; there are no trees or sidewalks along the 800-foot-long wall.[2] Little Village, or "La Villita," is one of the country's largest Mexican communities, as well as a vibrant commercial area.[3] Yet the Cook County Jail looms over residents both physically and psychologically, an oppressive reminder of injustice, state violence, and for some, their separation from loved ones who are incarcerated inside.

Chicago-based artist and Little Village native Maria Gaspar grew up a few blocks away from the jail, and visited it as part of a "scared straight" elementary school field trip; she vividly recalls seeing the men in their cells, and the unspoken message that "you didn't want to end up there."[4] In 2012, she began the 96 Acres Project: "a series of community-engaged, site-responsive art projects that address the impact of the Cook County Jail on Chicago's West Side."[5] 96 Acres' artworks and events gather together artists, educators, activists, formerly and currently incarcerated people, youth, and jail administrators in conversations about space, power, change, and community. To a greater extent than the previous two case studies, this project is a

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[1] "Cook County Jail," 96 Acres Project, accessed February 22, 2017, http://96acres.org/cook-county-jail.
[2] Matthew Walberg, "Cook County Jail wall could provide canvas for storytelling," *Chicago Tribune*, December 27, 2012.
[3] Ibid.
[4] Maria Gaspar (Lead Artist, 96 Acres Project), interviewed by author, April 27, 2017.
[5] "96 Acres Project," 96 Acres Project, accessed February 22, 2017, http://96acres.org/the-96-acres-project.

collective work, community- and location-specific, and focused on disrupting and reclaiming an existing spatial narrative.

When exploring the affordances of location-based media, it is important to remember that all spatial narratives are also structures of power. The 96 Acres Project shows how participatory location-based media can reveal, interrogate, and contest these structures. Speaking about the Cook County Jail, Maria Gaspar says, "The space is both visible and invisible. And that to me really signifies this larger understanding about our carceral system—either you see it or you don't. Maybe you can afford not to see it, but we're all affected."[6] The project is part of an expansive tradition of embodied interventions taking place at sites of contestation—of sit-ins, marches, and other demonstrations—as well as a long history of public art and social practice art. The project itself has taken many forms, including zine-making workshops, an oral history archive, videos projected on the jail wall, and gallery exhibits. In my exploration of 96 Acres, I focus on its use of digital technologies to amplify community-based practices and create compelling spatial narratives. 96 Acres and the Cook County Jail also offer a constructive lens through which to interrogate how power is intertwined with spatial narratives, and how creators and communities can utilize participatory location-based approaches to reclaim and reimagine existing narratives of public space.

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[6] Gaspar, interviewed by author.

Fig. 10: Part of Cook County Jail's 96-acre campus.
From: http://abc7chicago.com/news/cook-county-jail-on-lockdown-due-to-staffing-shortage/1329182.

Spatial Power and Spatial Justice

One of our most fundamental notions of freedom, understood at a bodily level, is freedom

of movement: the ability to move around in space according to our needs and desires.

Conversely, spatial power—the power to allow or refuse physical access to space, to define

space, to surveil space—is a key component of systems of control and subjugation. Spatial power

structures are simultaneously visible and invisible; Henri Lefebvre writes that by examining

spatial arrangements, we can see how these structures perpetuate justice and injustice.[7] In

"Spatial Justice: A Frame For Reclaiming Our Rights To Be, Thrive, Express And Connect," the

Boston-based Design Studio for Social Intervention succinctly traces the global and historical

use of spatial power:

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[7] Henri Lefebvre, "The Right to the City," in The *Blackwell City Reader*, ed. Gary Bridge and Sophie Watson (Malden, MA: Blackwell Publishing, 2002).

> Practices of domination, subjugation, and resource depletion have been historically honed and brought to bear through space. The taking of land, the massive capturing of bodies and taking them from one space to another, environmental exploitation, forced movement through economic deprivation […] Most wars, conflicts and genocides have at their core spatial claims and have resulted in distinct spatial power and consequences.[8]

On a more local level, America has a profound and particular relationship to space—the frontier myth of freedom, rugged individualism, progress, and bootstrapping enterprise is perhaps our most defining national narrative, tying together Manifest Destiny, the road trip, the Space Race, and Silicon Valley. Consequently, the exercise of spatial power in the U.S. is particularly massive, contested, and freighted with symbolic significance. Our national history is full of mass relocations (voluntary and involuntary), indigenous land redefined as capitalist property, and marginalized populations further ghettoized. American expansionism has run parallel to systematic racial and ethnic segregation as a way of defining and delimiting space. In *Headmap Manifesto*, a meditation on the disruptive potential of locative technology, Ben Russell describes American history as a spatial narrative of colonizing forces using technology to carve up the land into profit-generating, geographically bounded plots (sociologist Priscilla Parkhurst Ferguson calls the grid structure of many American cities an "aesthetic of expansion," allowing for the easy delineation, construction, and selling of lots)[9]. He mentions railroads, ploughs, guns, windmills, and barbed wire—we can easily add more examples like redlining, urban renewal, or even the dominance of cars at the expense of more multi-use pedestrian spaces. Russell wonders, "The question of land refuses to go away. How can we separate the concept of space from the mechanisms of control?"[10]

[8] Kenneth Bailey, Lori Lobenstine, and Kiara Nagel, "Spatial Justice: A Frame For Reclaiming Our Rights To Be, Thrive, Express And Connect," the Design Studio for Social Intervention, 2014, https://static1.squarespace.com/static/53c7166ee4b0e7db2be69480/t/540d0e6be4b0d0f54988ce42/1410141803393/SpatialJustice_ds4si.pdf.

[9] Priscilla Parkhurst Ferguson, *Paris as Revolution: Writing the Nineteenth-Century City* (Berkeley and Los Angeles, CA: University of California Press, 1994), 31-32.

[10] Ben Russell, "Headmap Manifesto," 1999, http://technoccult.net/technoccult-library/headmap.

In fact, while space is intimately connected with coercion and subjugation, space is also fundamentally linked to civic action—from the oft-cited Greek agora to Occupy Wall Street, from Tiananmen to Tahrir. Protesters claim the right to public discourse at the same time as they claim the right to public space, and the symbolism of the latter often undergirds the fight for the former. Marginalized communities have also long utilized practices like sit-ins, graffiti, and urban gardens to claim space, make their voices heard outside marginalized spaces, and redefine spaces on their own terms. For some activists and scholars, spatial modes of control are best understood—and best resisted—through the lens of "spatial justice," which approaches space from a social justice lens, and vice versa. The Design Studio for Social Intervention understands the two as inextricably linked:

> Spatial injustices end up embedded in both physical and social infrastructures that are shaped through decades […] If we demand the reworking of spatial arrangements, we are demanding the reworking of all other arrangements—those of nation, ownership, class, race, gender, etc.[11]

They propose a spatial justice framework consisting of spatial claims, spatial power, and spatial links: the right to occupy and be safe in space, the right to succeed and express oneself in space, and the right to access and connect to essential resources and infrastructures.[12] Geographer and urbanist Edward Soja situates spatial justice within a larger "spatial turn," a growing emphasis on critical spatial perspectives across many different academic disciplines, as well as in public and political discourse.[13] He writes, "Space is not an empty void. It is always filled with politics, ideology, and other forces shaping our lives and challenging us to engage in struggles over geography."[14]

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[11] Bailey, Lobenstine, and Nagel, "Spatial Justice: A Frame For Reclaiming Our Rights."
[12] Ibid.
[13] Edward W. Soja, *Seeking Spatial Justice* (Minneapolis, MN: University Of Minnesota Press, 2010), 13-4.
[14] Ibid., 19.

Location-based Media, Spatial Injustice, and Contested Public Space

It is crucial to reflect on notions of spatial justice and public space when creating, consuming, and critiquing location-based works. Documentary filmmakers have long wrestled with issues of representation, exploitation, consent, and access; these issues are perhaps even more viscerally present in location-based media, manifesting in the safety of bodies in space. Ethical issues are physically felt, and the fundamental right to occupy space is at stake. When considering location-based works, we must ask ourselves questions like: Whose version of public space is being disseminated? Is a project contributing to processes of spatial injustice—for example, gentrification? Who is being invited into a space, and who participated in the decision to invite them? What are the power dynamics at play? Who is being made vulnerable?

Location-based media have sometimes served as vehicles for perpetuating spatial injustices. Many location-based projects present a homogenized and idealized version of public space, inherently excluding marginalized groups whose experiences—and very existence—complicate this narrative. This is frequently demonstrated in tourism apps commissioned by heritage and civic organizations, which highlight historic buildings and ignore more fraught histories. One community's claim to space is also often prioritized over that of another group. The Hollaback mobile app,[15] launched in 2010 to combat street harassment, exemplifies this disparity. It allows women to upload geotagged reports of harassment, in order to inform other women (and, since the information is public, law enforcement and legislators) where these incidents took place. While the app addresses a serious problem faced by women, it does so in a way that negatively impacts the spatial claims of other groups. To promote their services and highlight the problem of street harassment, Hollaback released a video of a white woman

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[15] "History and Values," Hollaback! accessed March 6, 2017, https://www.ihollaback.org/about/history-and-values.

receiving over a hundred catcalls, largely from Black and Latino men, as she walked around New York City (the video production company later acknowledged that they had edited out some white catcallers, allegedly due to poor sound quality).[16] The video quickly accumulated over 33 million views, and contributed to the pervasive and problematic representation of Black and Latino men as criminals and sexual predators. Hollaback's creators state that they do not support the criminalization of street harassment.[17] But the promotional rhetoric of the app, and Hollaback's partnerships with legislators, contribute to the further marginalization and criminalization of men of color in public spaces—spaces in which their mobility is already curtailed by discriminatory policing and rapid gentrification.[18]

Thomas Hirschhorn's *Gramsci Monument*,[19] a public art tribute to Marxist theorist Antonio Gramsci, also demonstrates the complex ethics, politics, and publics of location-based works. For a year and a half, Hirschhorn employed residents of a Bronx housing project (at $12/hour) to build a wooden clubhouse and library, within which the community produced a local newspaper, ran a radio station, and facilitated community events like art classes for children.[20] Funded by the Dia Art Foundation, the project brought jobs to the community and provided engaging activities for community members, but these disappeared when the project ended in September 2013. Both Dia and Hirschhorn were criticized in the art world for everything from colonialism to egotism to a lack of sustainable vision for the project.[21] The idea of a celebrated and wealthy white man paying poor Black people to incorporate their bodies,

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[16] "10 Hours of Walking in NYC as a Woman," Rob Bliss Creative, October 28, 2014, https://www.youtube.com/watch?v=b1XGPvbWn0A.
[17] "Frequently Asked Questions." Hollaback! Accessed March 6, 2017. https://www.ihollaback.org/about/faqs.
[18] Liliana Segura, "No, We Don't Need A Law Against Catcalling," *The Intercept*, November 3 2014, https://theintercept.com/2014/11/03/we-dont-need-a-law-against-catcalling.
[19] "Thomas Hirschhorn: Gramsci Monument," Dia, accessed March 14, 2017, http://www.diaart.org/program/exhibitions-projects/thomas-hirschhorn-gramsci-monument-project.
[20] Whitney Kimball, "How Do People Feel About the Gramsci Monument, One Year Later?" *Art F City*, August 20, 2014, http://artfcity.com/2014/08/20/how-do-people-feel-about-the-gramsci-monument-one-year-later.
[21] Ibid.

images, and social history into a work ultimately lauded as that of an individual artist is uncomfortable—as is the fact that the project brought many privileged (economically, racially, and socially) members of the art world into a marginalized community for what was arguably a performative and paternalistic encounter with blackness. However, one of the project's lead employees and educators, Lex Brown, pushed back at these criticisms:

> Being in a poor, predominately black and latino neighborhood was difficult for a lot of white people who are not used to feeling their race or class. That some people […] would turn that into justification for why the Monument was somehow a spectacle is simply another example of white people who are used to being in relatively segregated workplaces and social circles, making something about themselves.[22]

All location-based media, intentionally or otherwise, support a particular interpretation of public space, and a particular understanding—and hierarchy—of the stakeholders in that space. Understanding how location-based media intervene in the contested terrain of public space is essential in order to address ethical issues like exploitation and consent. However, as the examples of Hollaback and *Gramsci Monument* demonstrate, negotiating multiple publics and competing interpretations of space is a complex and fraught process. A starting point is to imagine new uses of space, reexamine our assumptions about who belongs in certain spaces, and prioritize reaching people in ways that do not make them more vulnerable in space. Thinking through these lenses can highlight opportunities to create spatial narratives that draw on, and respond to, communities' complex histories and meaningful relationships to space.

The context of 96 Acres reminds us that individual and community memory have always been present as invisible layers overlaid on physical spaces: remembering events that took place in certain locations, recalling buildings that are no longer there. Subjective experiences of place,

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[22] Lex Brown, comment on Whitney Kimball, "How Do People Feel About the Gramsci Monument, One Year Later?"

particularly in cities, are densely layered on the physical world. These can build up over time and

create fraught environments; speaking about Cook County Jail, Maria Gaspar says:

> The stakes are high because we're working at such a loaded site. It is a place of
> contention, and for a lot of people this place is traumatizing. Not only for those that are
> detained but also for the people who work there, many of whom are also working class.
> This place involves a lot of people over generations and generations, so it's not a neutral
> space.[23]

Community-based practices like oral history and collective storytelling can help to reveal,

document, and engage with complex relationships to place. In many ways, community art

projects that draw on locative and digital technologies are continuing these practices, and in

doing so, they are not overlaying narratives, but rather revealing narratives that are already

layered on the landscape. By engaging with these historical, communal, and personal narratives,

and encouraging collaboration between diverse community stakeholders, participatory location-

based media can intervene in public space in thought-provoking ways, build sustainable

resources that address pressing needs, and create new connections among and between

communities.

Cross-Community Collaboration and Co-Creation

PARK was a 2015 participatory location-based project by artist Landon Brown and the 96

Acres Project: "A large-scale data visualization, public art, and radio broadcast event."[24] For one

half mile of Sacramento Avenue, adjacent to the Cook County Jail, the organizers planned to fill

all public street parking with crowd-sourced white, brown, and black automobiles, color-coded

to represent the racial demographics of the jail's inmate population (while Black people

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[23] Gaspar, interviewed by author.
[24] Landon Brown and 96 Acres. "PARK," press release, July 31, 2015,
http://www.chicagoartistsresource.org/sites/chicagoartistsresource.org/files/PARK_96ACRES_PRESS_RELEASE.
pdf.

represent only 25% of Cook County's population, they make up 67% of the jail's inmates).[25] At a specified time, all the cars were asked to tune into Vocalo 90.7, the local public radio station, for a live broadcast of B. B. King's historic 1970 concert, "Live in Cook County Jail"—rolling down their windows to collectively "perform" the recording. Interspersed with the music, the broadcast featured community residents sharing personal anecdotes about the jail and neighborhood in real time. Vocalo 90.7 producers were onsite at several recording stations along the street, even interviewing the new Cook County Jail warden Nneka Jones Tapia.[26] All the contributed stories joined 96 Acres' ongoing archive of community media around the jail.

In some ways, the project was disappointing. Although Brown and 96 Acres hoped to include 100 cars (67 black, 19 brown and 14 white) in the project, their call for participation yielded less than half that number.[27] And while Brown's art practice is based around making data more accessible and bridging the gaps in understanding between citizens and policy makers, we can certainly question the efficacy and ethics of representing prison statistics—and human bodies and histories—with cars.[28] However, the broadcast aspect of the piece was effective on several levels. The re-performance of B. B. King's 1970 concert underscored the lack of progress in fighting mass incarceration in the years since, and underscored the historicity of the struggle. The cars along the length of the street playing the broadcast together resulted in a "quasi-stereophonic effect that permeated the space"[29]—viscerally and collectively creating a space for community discourse, and in doing so, imagining alternative uses of this oppressive space.

[25] Erica Demarest, "96 Acres, 40 Cars, 1,000s of Stories: Residents Reflect on Cook County Jail," *DNAinfo*, August 16, 2015, https://www.dnainfo.com/chicago/20150816/little-village/96-acres-40-cars-1000s-of-stories-residents-reflect-on-cook-county-jail.
[26] Vocalo, "COOK COUNTY JAIL WARDEN - Nneka Jones Tapia," August 15, 2015, https://soundcloud.com/vocalo/cook-county-jail-sheriff-nneka-jones-tapia.
[27] Demarest, "96 Acres, 40 Cars, 1,000s of Stories."
[28] Sarah Rose Sharp, "On a Block in Chicago, a Participatory Project Visualizes Jail Data," *Hyperallergic*, August 17, 2015, https://hyperallergic.com/230236/on-a-block-in-chicago-a-participatory-project-visualizes-jail-data.
[29] Ibid.

PARK was perhaps most successful as an exemplar of cross-community collaboration and co-creation. These are key affordances of location-based media, which can bring together disparate groups for collaborative efforts rooted in physical proximity, community, and shared connection to place. Iterations of Roundware and *Yellow Arrow* generally involve(d) perhaps two or three major stakeholders—the artist(s) and various partner organizations—in addition to the users. *PARK*'s list of participating organizations is far longer. In addition to Vocalo 90.7, other partner organizations involved in the event included Yollocalli Arts Reach, Goodman Theatre, Imago Dei Violence Prevention Program, Project NIA, and the YMCA Youth Safety and Violence Prevention Program. The project received funding from four different organizations, including The National Endowment for the Arts and The Chicago Community Trust, and engaged "Public Official Stakeholders" including the Cook County Sheriff, two Cook County Commissioners, and the Cook County Board President.[30] This plethora of partnerships and stakeholders is representative of 96 Acres' approach: all project proposals undergo a "community-engaged review process via a community advisory committee [including] educators, activists, artists, violence preventions workers, community leaders, the formerly incarcerated, youth, and parents."[31]

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[30] Brown and 96 Acres, "PARK."
[31] "96 Acres Project."

Fig. 11: *PARK*, 2015. From: https://vimeo.com/147261203.

Fig. 12: Vocalo recording station at *PARK*, 2015. From: https://vimeo.com/147261203.

Social practice art in general tends to emphasize both collaboration within the community and community collaboration with outside entities—for example, design firms, local governments, or academic researchers. And social practice art itself draws on a rich history of place-based practice in marginalized communities, from street art to block parties. Co-creative approaches that put diverse stakeholders in collaboration with each other are crucial to fostering accountability, building solidarity, and generating productive discourse. For example, the 96 Acres committee deliberated at length about the role of public art in the community; some members prioritized beautification, pushing for a mural to cover the jail wall, while others saw that as a "band-aid" approach that failed to engage with deeper issues around incarceration and spatial power. The committee also debated whether certain projects were too abstract, or conversely, too didactic—and what exactly it meant for work to be "accessible" to the community.[32] Collaborative approaches can also amplify peoples' voices by bringing them into conversation with individuals and groups outside of marginalized spaces, and by developing new alliances. For example, 96 Acres was able to mediate between the Cook County Sheriff's Office and the local community, as well as facilitate partnerships between artists and local nonprofit groups.

However, collaborative community projects can be difficult to maintain over time, due to the vagaries of funding and the shifting priorities and availability of stakeholders. 96 Acres ran out of funding in 2016 and was forced to go on hiatus, although new funding has allowed Maria Gaspar to restart the project. She notes the importance of scaling activities appropriately for the capacity of a given project—something she learned after working on 96 Acres' large-scale collaborations like *PARK*, which overtaxed the project's small administrative staff. The project's next phase will focus more selectively on art and audio workshops for people currently detained

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[32] Gaspar, interviewed by author.

at Cook County Jail.[33] Gaspar identifies the dynamic and ongoing nature of the project as a key component of both community-based and location-based work:

> It's not static images or static experiences. It's organic, it's evolving. That's an important element of the work—we can evolve this issue over time and we can continue this dialogue through multiple projects. And it's a project that I think needs constant reflection. Do we want to continue it? Is there another form it needs to take?[34]

She is open to different potential futures for the project, and emphasizes that it exists alongside, and as part of, ongoing and longstanding community efforts for restorative justice. 96 Acres highlights how co-creative projects can address sustainability by taking on new forms and recognizing community stakeholders operating within different timeframes. Localore,[35] a project from the Association of Independents in Radio, also exemplifies this approach. Each round of the project—there have been three so far, each adding new features and addressing different issues— sends independent producers to collaborate with local public radio stations, with an emphasis on creating sustainable projects.[36]

Reclaiming Spaces

As the spaces we inhabit become increasingly mapped, commodified, and surveilled, location-based media can function as a mode of resistance. Location-based approaches allow people to reclaim, redefine, and reimagine spaces by imbuing them with alternative narratives and meanings—or simply, as a starting point, by better understanding the ways that power operates through space. Many of 96 Acres' community events focused on facilitating

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[33] Gaspar, interviewed by author.
[34] Ibid.
[35] "Localore: Finding America," AIR, accessed March 2, 2017, https://airmedia.org/localore.
[36] "Localore launches 15 new public media projects to cover diverse communities across America," Nieman Lab, November 2, 2015, http://www.niemanlab.org/2015/11/localore-launches-15-new-public-media-projects-to-cover-diverse-communities-across-america.

conversations about power and place—defined as physical, imagined, or internalized space.[37] The project hosted several workshops around this theme, with content collaboratively shaped by artists, activists, and educators. The goal of engaging youth and educators in these events was to "radically imagine new narratives that allow us to actively participate in the transformation of our communities [and] to activate alliances, build solidarity, and continue working towards creating alternative and socially just spaces."[38] The workshop conversations were documented and used to create toolkits to facilitate further discourse among the community.

Location-based, co-creative approaches also allow communities to reclaim space in more tangible ways. For more than 20 years, residents who lived on Sacramento Avenue across from Cook County Jail were deprived of a simple but meaningful forum for community building and socialization—the block party. Although their front yards opened up onto it, the street was a restricted space, one that de-prioritized the community's needs: because the street bordered the jail, residents were never able to obtain the necessary permits to block off the street for a party. Ninthe Serrano, a longtime resident of Sacramento Avenue, said, "Block parties were a big thing [for me, growing up]. Every kid looked forward to it all summer, and they've never had one here."[39] 96 Acres' *PARK* finally helped make this possible, albeit temporarily: the street was blocked off, children played with water balloons, and residents shared tables of food and snacks.[40] By shaping an artistic intervention centered around occupying the street in front of the jail, and amplifying residents' voices and needs through institutional collaboration between community arts nonprofits and the jail administration itself, 96 Acres redefined the space as one that served the needs of the community, rather than the criminal justice system.

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[37] Silvia Gonzalez, "Educational Zine Toolkits for Addressing Power," accessed February 6, 2017, http://www.silviaigonzalez.com/190493/2876593/community/thesis-art-and-transformative-practices.
[38] Ibid.
[39] Demarest, "96 Acres, 40 Cars, 1,000s of Stories."
[40] Gaspar, interviewed by author.

While marginalized communities have a rich tradition of location-based tactics that are low-tech—from hand-drawn posters to neighborhood meetings to alternative tours—digital location-based media present powerful new opportunities for reclaiming space. Individuals and groups may not have the power to reorganize the city grid or tear down an oppressive building. But with the rise of location-based technologies, ubiquitous computing, and mobile media, Ben Russell argues: "New forms of collective, network organised dissent are emerging. Collectively constructive rather than oppositional. Now capable of augmenting, reorganising, and colonising real spaces without altering what is already there […]."[41] With digital media, he notes, new meanings and narratives can be overlaid on existing ones without having to obtain authorization or undertake the risk and cost of physically changing spaces. For example, The Illuminator is an "art-activist collective" born from the Occupy movement, and has organized hundreds of "projection-interventions" protesting global capitalism, gentrification, and restrictions on free speech and public demonstrations.[42] This mode of protest is still not entirely risk-free: members of the collective were arrested after projecting slogans like "Koch=Climate Chaos" onto the Metropolitan Museum of Art, in response the inauguration of a plaza named after billionaire and climate change denier David H. Koch. They defeated the criminal charges in court, however, and are now countersuing the city of New York for false arrest and violating the First Amendment.[43]

All of 96 Acres' projects have been sanctioned by the Sheriff's Office—Maria Gaspar says this is essential to preserving long-term relationships between residents and local institutions including the jail and nonprofits, ensuring the sustainability of the project, and protecting youth participants. She sees 96 Acres as an ongoing community discourse, rather than

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[41] Russell, "Headmap Manifesto."
[42] "About," The Illuminator, accessed October 11, 2016, http://theilluminator.org.
[43] Kashmir Hill, "The future of protest involves light, holograms and augmented reality," *Fusion*, October 3, 2016, http://fusion.kinja.com/the-future-of-protest-involves-light-holograms-and-aug-1793862373.

fundamentally oppositional.[44] In the project *Stories from the Inside/Outside*, 96 Acres projected

several video animations on the jail wall, giving voice to people's concerns about, and

experiences of, the effects of incarceration on individuals, families, and the community. Narrated

by Melissa Garcia, "Letters Home" explored her relationship with her father, through the lens of

his letters home during his ten-year incarceration. "Freedom/Time" was a collaboration between

artists Damon Locks and Rob Shaw, and eleven men incarcerated at Stateville Correctional

Center. *Stories from the Inside/Outside* also featured writing by local youth.[45]

Fig. 13: *Stories from the Inside/Outside*, projection on jail wall, 2015. From: https://vimeo.com/141363172.

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[44] Gaspar, interviewed by author.
[45] "Stories from the Inside/Outside," 96 Acres, accessed March 2, 2017, https://vimeo.com/141363172.

Fig. 14: Community members watching *Stories from the Inside/Outside*, 2015. From: https://vimeo.com/141363172.

Digital media offer alternative approaches to publicly claiming space when certain modes of mass communication and occupying space are forbidden. In 2015, a new public safety law— popularly known as the Gag Law (*Ley Mordaza*)—took effect in Spain. Enacted by the conservative governing party, the bill banned many forms of protest and set down heavy fines— up to €600,000—for unauthorized protests, demonstrations outside Parliament and other government buildings, and even documenting protests or publishing information about them.[46] The No Somos Delito ("We Are Not Crime") movement against the bill, made up of over 100 social justice, political opposition, and human rights groups, sought to raise awareness of the new restrictions and agitate for the bill to be repealed. Together with advertising agency DDB Spain, No Somos Delito created *Hologramas Por La Libertad/Holograms for Freedom*, "the first

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[46] "Spain's Ominous Gag Law," The New York Times Editorial Board, *The New York Times*, April 22, 2015, https://www.nytimes.com/2015/04/23/opinion/spains-ominous-gag-law.html.

hologram protest in history."[47] They called on people around the world to participate by recording shouts, writing sign slogans, or sending in photos or webcam videos of themselves. These crowdsourced contributions, as well as professionally recorded participants, were used to digitally render thousands of holograms for a protest in front of the Parliament building in Madrid. This tactic was used again in 2016, when activists with Amnesty International Korea organized a holographic "ghost rally" after their request to hold a demonstration was rejected.[48] These holographic events offer an avenue for public protest when physical demonstrations are prohibited; in evoking the proscribed physical protests, they also foreground questions of who has the right to occupy and use space.

A number of augmented reality projects also participate in this tradition. When Occupy Wall Street activists were prevented from physically protesting onsite, artist Mark Skwarek created *AR Occupy Wall Street*.[49] He asked people around the world to send in photos and videos of themselves holding protest signs, as well as geolocated 3D models and protest art. Using the Layar app, Skwarek added all of these into one master layer blanketing Wall Street, in which *Charging Bull* was caged, Chase Bank logos were added to police cruisers, and the New York Stock Exchange became an enormous slot machine.[50] Skwarek also organized an "Augmented Reality Flashmob Protest" at the NYSE, in which people (cautiously) met onsite to view and participate in the virtual protest; by wearing specific markers on their heads, participants appeared in the AR layer masked as George Washington.[51] AR can also help marginalized

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[47] "Holograms for Freedom," No Somos Delito, accessed January 15, 2017, http://www.hologramasporlalibertad.org/en.html#project.

[48] Jenny Starrs, "Activists stage holographic 'ghost rally' in South Korea," *The Washington Post*, February 25, 2016, https://www.washingtonpost.com/news/morning-mix/wp/2016/02/25/activists-stage-holographic-ghost-rally-in-south-korea.

[49] Mark Skwarek, "AR Occupy Wall Street," accessed April 27, 2017, https://aroccupywallstreet.wordpress.com.

[50] Ibid.

[51] Ibid.

groups reclaim space in less oppositional ways. A new AR app called Wikiupedia[52] (named for a wickiup, a traditional American Indian dwelling) overlays crowdsourced Indigenous stories onto Canadian cities, aiming to both preserve cultural heritage and educate the broader public about Indigenous histories.[53]

While networked location-based media can be accessible tools for broadcasting dissent or alternative narratives to a wide audience, communities can also use locative technologies to safely and secretly communicate amongst themselves. As Ben Russell notes, "Real space can be marked and demarcated invisibly."[54] Location-based media have long allowed groups to communicate with each other surreptitiously, often at low or no cost—for example, vagabonds hitching rides on freight trains used a symbol system to share information with each other, identifying safe berths or warning of danger.[55] Locative technologies now allow marginalized groups to communicate amongst themselves with an unprecedented degree of complexity and connectivity. As described in the previous case study, *Yellow Arrow* stickers were publicly placed, but mostly available to an "in-group" of people who already knew about the project. We can find another example in Cuba, where home internet connections are banned, and government-sanctioned internet access is both expensive and slow. Groups of neighbors are increasingly setting up their own local area networks using concealed Wi-Fi antennas and Ethernet cables strung over rooftops. Although these local networks are not connected to the internet, users are able to access popular TV shows, chat with each other, play games, and look up information. Born of necessity, this mode of internal communication—hidden from authorities or simply "outsiders"—can also be a way of using location-based technologies to

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[52] "Wikiupedia," Wikiupedia, accessed May 4, 2017, https://wikiupedia.com.
[53] Megan Devlin, "This Augmented Reality App Tells Indigenous Stories in Canadian Cities," *Motherboard*, February 15, 2017, https://motherboard.vice.com/en_us/article/augmented-reality-vancouver-indigenous.
[54] Russell, "Headmap Manifesto."
[55] Ibid.

reclaim space.[56] Of course, locative technologies are also frequently inaccessible to marginalized communities, and furthermore, can easily act as avenues for surveillance. It is important to recognize both the communicative and subversive potentials of these technologies, as well as the necessity of continually interrogating and resisting the inequalities and subjugation they often perpetuate.

We are accustomed to ever-more pervasive and restrictive regimes of spatial control in our everyday lives: surveillance of our movements in space via cameras and mobile devices, constraints on the right to protest and record in public spaces, increasing border security apparatuses, and more generally, states and corporations decreeing where we can and cannot be, and when we can or cannot (or must or must not) be there. We are inculcated in these regimes; the spatial and temporal organization of many of our educational institutions mirrors that of prisons.[57] It is easy for location-based media projects to perpetuate spatial modes of control, as they often rely on technology, infrastructure, and platforms that are inherently tied to industry imperatives, government regulation, and hegemonic notions of public space.

At the same time, it is possible to use new technologies and existing physical structures in ways that subvert or redirect their intended purposes. While spatial control and spatial injustice are ubiquitous, participatory forms of location-based media can challenge spatial boundaries, dispute conventional narratives of public space, and imagine transformative new uses of space. The 96 Acres Project highlights how this can be accomplished through cross-community collaboration and creative approaches to reclaiming space. 96 Acres is also part of a rich tradition of place-based practice in marginalized communities, and a long history of participatory location-based media that contest official narratives of public space. Walls—concrete symbols of

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[56] Orlando González, "Telefonía gratis en barrios de La Habana," *Cubanet*, December 5, 2014, https://www.cubanet.org/noticias/telefonia-gratis-en-barrios-de-la-habana.
[57] Bailey, Lobenstine, and Nagel, "Spatial Justice: A Frame For Reclaiming Our Rights."

state-imposed demarcations of space and restrictions of physical movement—have long been sites of heterogeneous collective discourse about public space, spatial power, and community. We need only look to the Berlin Wall for another example of an oppressive wall whose narrative of state power, separation, and deprivation was forever transformed by the contributions of artists, tourists, and everyday citizens.

Conclusion

Opening the Map

The spaces around us are overlaid with innumerable layers of narrative, from

architectural details to hand-drawn posters to city grids. Despite this heterogeneous array of

voices, however, in many ways we live in a world of closed maps. With the exception of a few

small territories that are contested or overlooked, every inch of the Earth's surface is claimed and

controlled by states and corporations. Furthermore, it has all been scanned, mapped, and

transformed into proprietary data points by satellites and GIS. As Ben Russell writes in his

Headmap Manifesto, "Mapping is a mode of knowing and a method of controlling."[1] How can

we resist the overwhelming annexation of space by systems of surveillance, control, and profit?

Where is the space for enchantment—for discovery, creativity, and multiplicity? Deleuze and

Guattari theorize an alternative open map:

> The map is open, connectable in all its dimensions, and capable of being dismantled; it is
> reversible, and susceptible to constant modification. It can be torn, reversed, adapted to
> montages of every kind, taken in hand by an individual, a group or a social formation. It
> can be drawn on a wall, conceived of as a work of art, constructed as a political action or
> as a meditation...Contrary to a tracing, which always returns to the 'same,' a map has
> multiple entrances.[2]

I propose that participatory forms of location-based media exemplify the affordances and

potential of the open map. They resist regimented and utilitarian conceptions of space, and allow

us to re-enchant the landscape with intimate stories, playful encounters, and communal

experiences. They invite us to transform inert places into dynamic spaces, and to build

compelling new worlds combining the virtual and physical**.** They also problematize conventional

modes of authorship and consumption, appropriate location-based technologies for creative and

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[1] Ben Russell, "Headmap Manifesto," 1999, http://technoccult.net/technoccult-library/headmap.
[2] Gilles Deleuze and Félix Guattari, *On the Line*, trans. John Johnston (New York: Semiotext(e), 1983), 25-26.

subversive purposes, and invite more pluralistic, democratic, and complex narratives of public space. Thus, participatory location-based media can be understood as a dynamic open map with multiple interpretations, applications, and points of entry.

Findings

Location-based media occupy a vast and widely dispersed field. There are many forms of participatory location-based media that I have not been able to fully engage with in this thesis, particularly games, experimental theater, and linear and fictional narratives. However, I hope that my participation-based taxonomy for location-based media, distinction between contributory, connective, and co-creative works, and exploration of their affordances, have led to some valuable findings:

- Location-based projects are often most effective when they draw on the power of place and community. By substantively engaging with primary documents in the form of physical locations and objects, they build on the existing history and social significance of spaces. By inviting stakeholders to participate in collaborative authoring practices, they shape a multifaceted story of place and build a deeply invested community of practice.

- For documentary, participatory location-based media suggest new modes of production, consumption, and interaction. Collective storytelling allows for the inclusion and juxtaposition of multiple subjectivities, while nonlinearity invites exploration of multiple temporalities and spatialities. Protocol models of authorship that invite participants to

independently interpret rule sets can amplify conceptual, social, and political intervention through the power of this dispersed creative act.

- For location-based media, it is important that interfaces and content do not distract from the environments in which they are situated. Despite pressure to showcase flashy content and exciting new technology, minimal interfaces and embodied interaction often offer the best user experience, allowing users to devote the majority of their attention to the content of the work.

- Augmented reality projects should look to location-based media for effective examples of embodied interaction, augmenting rather than masking environments, and collaborative social constructions of space. Questions of scale, different attention modalities, and the effectiveness of low-cost and more localized projects are also pertinent.

- AR holds enormous potential for documentary purposes, particularly through annotation and collective authoring. Although current AR content does not fully embrace this potential, the ability to build on existing environments and facilitate new modes of social interaction are key affordances of this technology.

Participatory location-based media and AR offer many challenges for creators as well. They present enormous ethical issues, involving privacy, surveillance, intellectual property, access to technology, access to space, and physical safety. The question of how to effectively scale projects is difficult as well, involving calculations about reach, density, and feasibility. And for projects that are invisible without mediating devices like mobile phones or headsets, how best to engage potential participants? The disparate production and consumption of location-based media also present many difficulties. For creators, this fragmentation complicates questions of

how to situate a project, where to apply for funding, and how to reach audiences. For consumers,

scholars, policymakers, and others, it hinders the development of robust discourse regarding the

creative affordances, social implications, and ethical concerns of location-based media.

Producing Spaces and Producing Publics

What are the larger implications of this research? Why does a fuller understanding of

participatory location-based media matter, outside of a relatively small community of

practitioners? To answer these questions, I turn to Raymond Williams' writing on

communication as constitutive of humanity, life, and reality itself:

> My own view is that we have been wrong in taking communication as secondary. Many
> people seem to assume as a matter of course that there is, first, reality, and then, second,
> communication about it. We degrade art and learning by supposing that they are always
> second-hand activities: that there is life, and then afterwards there are these accounts of it.
> […] The struggle to learn, to describe, to understand, to educate, is a central and
> necessary part of our humanity. This struggle is not begun, at second hand, after reality
> has occurred. It is, in itself, a major way in which reality is continually formed and
> changed.[3]

Sven-Olov Wallenstein, writing about public art, also avows art's role in shaping reality, rather

than simply commenting on it. Wallenstein emphasizes art's disruptive and confrontational

potential for intervening in political, social, and creative discourse in "the ongoing experimental

construction" of public space.[4] While he is discussing site-specific art, I find his argumentation

enormously relevant for the larger field of location-based media:

> […] The kind of place that the artwork wants to occupy when it moves out into the street
> does not exist prior to the *work of the work*, as it were, it is never simply "there," but
> neither does it simply *result* from a set of operations performed: the site is always already
> structured, architecturally, symbolically, ideologically, and the work of the work is to

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[3] Raymond Williams, *Communications*, revised ed. (London: Chatto & Windus, 1966), 18-19.
[4] Sven-Olov Wallenstein, "Public Subjects," in *Placing Art in the Public Realm*, ed. Håkan Nilsson (Huddinge: Södertörn University, 2012), 25.

> prise it open, to expose its hidden contradictions. Just as little as reality could simply be signified by the work, just as little is there an outside that simply awaits the work.[5]

In other words, art and media that operate in public spaces play a central role in *creating* these spaces: positing specific uses and narratives of space, making spatial claims for specific communities, and shaping flows of movement, information, and social interaction. They produce and enact the public in question. By linking virtual content to physical locations, networked digital forms of location-based media also shape new hybrid public spaces: not simply two overlapping layers, but rather endless dynamic intersections between virtual, physical, data, geographical, and communication spaces.

Location-based media have always played a key role in defining both spaces and publics. Now, with the increasing popularity and sophistication of geolocative technologies, location-based media are more ubiquitous than ever before. Their production and consumption span fields as diverse as gaming, healthcare, marketing, engineering, art, and urban planning. Thus, practical, ethical, and conceptual questions about location-based media have broad relevance for understanding and imagining how we create stories, interact with each other, travel through space, use technology in our daily lives, and participate in civic discourse. How will issues of privacy, surveillance, and control play out in hybrid virtual-physical spaces? What does it mean to augment reality? What kinds of embodied interaction and user interface will prove effective in emerging media technologies? How can participatory forms of location-based media problematize singular, linear, and "objective" conceptions of narrative, documentation, and mapping? Who has the right to occupy and define public spaces, and how are these rights negotiated and claimed? What new modes of participation and social interaction can location-based media generate? I have attempted to begin answering some of these questions. However,

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[5] Wallenstein, "Public Subjects."

only further research, discussion, and critical making will reveal the full—and in many ways

radical—potential of participatory location-based media.

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