

We Are Martinsville (WAM): Leveraging Mobile Gaming for Community Engagement and Improving Health

Mona El Khafif, School of Architecture, University of Virginia, USA

Kathy Hsu Wibberly, Center for Telehealth, University of Virginia, USA

Elgin Cleckley, School of Architecture, University of Virginia, USA

Tho H. Nguyen, Department of Computer Science, University of Virginia, USA

Marcus H. Divers, Center for Telehealth, University of Virginia, USA

ABSTRACT

Rural communities in Virginia have experienced a decline caused by national economic trends. Formerly vibrant towns with rich histories and cultures increasingly suffer from a shrinking population and a lack of new investment, directly impacting the quality of life and services like education or healthcare. The loss of identity is a hindrance to innovative planning strategies and entrepreneurship. This paper reflects on an ongoing serious game effort developed by the University of Virginia and piloted in Martinsville, VA. That city's once-vibrant community faces challenges like unemployment, opioid addiction, and obesity. We Are Martinsville (WAM) recognizes Martinsville's rich ties to its history and cultural assets, offering a digital tool in support of a creative placemaking strategy. WAM fosters community engagement while simultaneously increasing outdoor activities and allowing stakeholders to generate place-based game content. This paper describes the findings of the pilot project.

KEYWORDS

Community Engagement, Creative Placemaking, Local Identity, Mobile Gaming, Regional, Serious Games, Shrinking Rural Communities, Smart and Connected Communities

1. INTRODUCTION

Regional Context and Research Agenda

Shifting economic trends over the past few decades have resulted in the loss of population and regional identity in Virginia rural communities. With this economic decline, formerly vibrant towns with rich histories and cultures increasingly suffer from a lack of new investment, impacting quality of life, education, and health care. Researchers have consistently found correlations between a community's identity and culture and its overall well-being. Regenerative planning strategies and entrepreneurship are both critical drivers for a better future (Florida, 2014; Weaver et al., 2017). While identity shaped through local culture and social capital is not easily measured, it plays a critical role in the vibrancy

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and attractiveness of a place. Culture manifests itself through museums and galleries, built artifacts, events, and creative cultural productions. Cultural activity, in specific, is an expression of shared values expressing a sense of belonging. In addition, the principles of cultural economy can strengthen the growth and attractiveness of both urban areas and rural communities (Klaus, 2006).

Project Setting

Over the past two years, the University of Virginia (UVA) has been implementing a Smart and Connected Communities Research Coordination Network (RCN) grant titled “MainStreet21: Polycentric Development Toward the Vision of 21st Century Main Street in Virginia” (MainStreet21.org, 2020), looking at challenges in rural Virginia and building research networks to address them. Through our work with rural communities in Virginia, a series of critical issues have emerged (El Khafif, Berman, & Matsuno, 2019), among which are shrinking population, school closures, medical isolation, and a lack of infrastructure investment and economic development.

During the peak years of economic growth in the 1960s and 1970s, most of Virginia’s currently declining communities were financially supported by private investments stemming from patriarchal industries on which towns depended for their economic and civic stability. Those investments included public parks, facilities, and/or cultural institutions. With production moving offshore and population declining, rural communities struggle to replace former private investments with alternative or public funding strategies, at the same time as they suffer from a lack of entrepreneurship. The old sense of place that is often grounded in past years of growth is transitioning to a new identity. However, population decline and lack of vibrancy or cultural activity often create a shared sense of depression and stagnation. The lack of economic opportunities further causes younger residents to move away to urban centers. The reversal of this process through a positive discovery of former, current, and future assets is crucial for empowering these fragmented communities.

While many rural communities suffer from seemingly permanent decline, Virginia’s rural communities share the advantage of having a rich history within the context of one of the most beautiful landscapes in the US. This region contains four centuries of relevant American cultural history (Heinemann et al., 2007). Virginia is the birthplace of America’s colonial occupation and the site of the first permanent English settlement in the New World in Jamestown, 1607. Virginia is also the home of America’s “founding fathers” Thomas Jefferson, James Monroe, and James Madison, who created the constitutional order of today’s United States. Historic sites of the Civil War, such as the Manassas National Battlefield (Manassas) or the Virginia Museum of the Civil War (New Market), are popular tourist destinations. The Chesapeake Bay is one of the important port entrances for the northeastern seaboard (Kirby, 1991), adjacent to the Piedmont region, stretching from the Tidewaters to the scenic Blue Ridge Mountains. The Piedmont provides access to the Shenandoah National Park, offering destinations such as the “founding fathers” plantation homes, hiking on the Appalachian Trail, and places known for the complex hybrid mountain folk culture of Virginia (Wilhelm, 1975). In the southwest of the state, manufacturing industries stimulated wealth at the turn of the last century, now leaving behind historic city centers, artifacts of their time. Nonetheless, Virginia’s documented success as a wedding destination is based on its rich cultural history, incomparable culinary offerings, and diverse landscapes fostering a total economic impact of \$1.7 billion annually (Roanoke Star News, 2015). Virginia features more than 300 vineyards and a booming craft beer scene, partly connected through a beer trail offering beer, local food, and music events. In sum, the state’s emerging economies today benefit from a shared cultural history and landscape assets (Virginia Tourism Corporation, 2020). These developments show that community well-being is not solely dependent on hard location factors like infrastructure and industry but also on soft location factors like cultural assets and growing tourism.

As previously noted, one of the most important and evident metrics for community well-being is the health of its citizens, a core philosophy for the University of Virginia Karen S. Rheuban Center for Telehealth. The Center for Telehealth has been a leader in providing timely access to specialty

medical services otherwise unavailable in communities throughout Virginia and worldwide. Building on over 25 years of experience in the use of advanced technologies and broadband communications, the Center for Telehealth works to facilitate access to specialty medical care and support the UVA Health System's mission to advance clinical service, teaching, research, and public service. UVA's own clinical telehealth footprint spans more than 150 actively participating telehealth sites in Virginia, mostly rural in location (including Martinsville), through which it provides clinical services in more than 60 subspecialties of healthcare.

Where a person lives can determine their health status, health risks, and health outcomes. The interplay between six key factors that make up "place" has been identified as a social determinant of health (Commission on Social Determinants of Health, 2008). These factors include economic stability, education, food access, neighborhood and physical built environment, social and community context, and healthcare resources. Rural Americans face significant challenges in all six factors. As rural communities continue to decline, these conditions are further exacerbated, putting the health of rural Americans at risk. In order to reverse this trend, it is apparent that the place where they live must first be improved.

Research Question

The revitalization of declining rural communities depends not only on hard factors like the economy but also on soft location factors like local identity, sense of belonging, and culture. As noted earlier, the interplay between the key factors that make up "place" have been identified as social determinants of health. A more comprehensive understanding of local culture, trends, and behaviors is necessary to shape our strategy for strengthening these soft location factors. Data informing this is highly desirable but extremely challenging to capture. Conventional approaches to data gathering (e.g., paper surveys, phone calls) are effort-intensive and often not deployed in rural communities due to the small populations spread across large geographic areas.

This research assumes that strengthening the awareness of former and current cultures can support a sense of belonging and community identity – both of which are critical components in revitalization strategies (Sedlacek, Kurka, & Maier, 2009). Further, with the widespread penetration of smartphones, new opportunities are emerging to communicate place-based content and capture meaningful civic data to inform city planning. Within the framework of "creative placemaking," we see the opportunity to leverage a georeferenced mobile game as a data communication and acquisition tool that can engage the public and constitute a practice of collaboration and co-production. In this context, gaming technology functions as a two-way medium, one in which users can produce and discuss content, allowing for a feedback loop between researchers and the built environment. Crucial for this strategy is the development of a game that can reach a self-sustaining equilibrium, where users generate and manage place-based content. At the heart of our investigation is a pilot project entitled WAM (We Are Martinsville), an integrated and interdisciplinary approach to strengthening local identity and health simultaneously through a mobile game. Within this context, we raised the following research questions:

What are the conceptual, technical, and collaborative conditions required for implementing a mobile gaming app that serves as a catalyst for a creative placemaking strategy that:

1. Strengthens the local community network?
2. Deepens a connection to the physical environment and place?
3. Allows for the collection of potentially important data?

This paper is organized in five parts. This introduction is followed by a literature review positioning the pilot project within the context of creative placemaking and mobile gaming applications. The third part provides an overview of the digital tool We Are Martinsville, and a detailed description of the pilot study conducted in 2019–2020, followed in the fourth part by a summary of initial findings.

These findings can only be understood as a first reflection referring to the pilot studies conducted. The game was scheduled to be launched in summer 2020, but this launch was delayed by restrictions tied to COVID-19. An in-depth analysis of retrieved game-based data and community feedback will be provided in future publications. The paper concludes with a discussion that includes the potential for replication and scalability.

2. RESEARCH CONTEXT: LITERATURE REVIEW AND PRECEDENTS

Creative Placemaking

Creative placemaking as a cultural policy emerged from the idea of placemaking, which has ties to Jane Jacobs and the work of urban planners and theorists of the 1950s and 1960s (Zitcer, 2018). As a direct response to the loss of place caused by urban renewal policies and projects, placemaking was a call to action for an integrated approach to place that combines geographic, social, and material aspects. Here the concept of placemaking and place activation is deeply rooted in the reimagination of public spaces to foster social connectivity (Courage, 2017). People iteratively create and recreate the experienced geographies in which they live. Placemaking is an inherently networked process, in which socio-spatial relationships link multiple stakeholders to a common place-frame (Pierce, Martin, & Murphy, 2011). With this, placemaking moves beyond the solely physical reality of a place, and toward the perception of place and its imagination as a common mental image.

Placemaking explicitly tied to arts and culture (and labeled as creative placemaking) was fostered under the Obama Administration beginning in 2009 and has since then been highly debated in urban theory and practice. Coined by Ann Markusen and arts consultant Anne Gadwa in a white paper for the National Endowment for the Arts (NEA), an independent agency of the United States federal government that offers funding for projects exhibiting artistic excellence, the following is the most cited definition of creative placemaking: “In creative placemaking, partners from public, private, nonprofit, and community sectors strategically shape the physical and social character of a neighborhood, town, city, or region around arts and cultural activities. Creative placemaking animates public and private spaces, rejuvenates structures and streetscapes, improves local business viability and public safety, and brings diverse people together to celebrate, inspire, and be inspired” (Markusen & Gadwa, 2010, p. 3).

Their definition further emphasizes three essential features: strategic action by cross-sector partners, a place-based orientation, and a core of arts and cultural activities, ultimately leading to a form of collaborative arts practice or co-creation. As outlined by the NEA, this concept of creative placemaking follows President Obama’s approach of moving the arts out of the studio and into the neighborhoods during the 2008–2009 recession. However, as a “fuzzy concept” (Markusen, 2013), it is hard to measure and evaluate the impacts of creative placemaking. Balancing between competing economic and social interests, arts and culture can engage citizens and transform physical places, but the breadth of creative placemaking does not lend itself to a precise definition (Zitcer, 2018). While there are varying definitions of “creative placemaking,” the American Planning Association’s description is most suitable in this paper’s context. Here, creative placemaking describes “projects that emphasize the unique characteristics of communities and places.” These projects connect local history with the present, highlighting cultural influences while introducing or creating new cultures or traditions. Creative placemaking always builds relationships between people and places through cultural artifacts or other art forms, and projects can vary in time and permanence. While the ultimate goal of creative placemaking is to transform the physical space, it simultaneously builds and depends on community relationships using an inclusive process with multi-stakeholder involvement (planning.org, n.d.).

The NEA’s role in developing the creative placemaking policy is, without doubt, central, as it includes offering and leveraging funding, shaping the conversation, providing insights, and spurring

collaborations (Redaelli, 2016). Kelkar & Spinelli (2016) argue that, beyond the characteristics described earlier, creative placemaking has the capacity to build social capital by empowering communities to take ownership of place and of planning processes, and by decentralizing the power of creation and circulation of local assets within a community.

An essential question raised in this paper regards the capacity of placemaking and creative placemaking to foster community participation and partnerships. References in this context are delivered by Borrup (2016), who refers to diverse scholar-practitioners like Schneekloth & Shibley (1995) and others to call out the need to invest in people and their relationship to places to restore a sense of empowerment. Their practice further underlines that placemaking is not only about the relationship of people to places, but itself creates relationships among people in places. “Finding people disconnected from stewardship of their cultural and physical surroundings, they advocated the role of professionals as enabling and facilitating others in the various acts of placemaking” (Borrup, 2016, p. 3). The establishment of agency and the integration of various stakeholders in a placemaking process is essential so that communities can take control over events and circumstances in their lives.

While creative placemaking as defined by the NEA is often related to the arts and the involvement of artists, a wide variety of methods and cultural programs have been developed to invite community members to join the process (Borrup, 2006). Here creative placemaking emerges from a philosophy of creative and celebratory interaction among people who share a place, which includes local residents, visitors, and different age groups and ethnicities. It brings new tools to the localized community development and animation (Borrup, 2016).

An asset-based approach, as articulated by practitioners Kretzmann & McKnight (1993), starts with the qualities of a place or a community instead of its problems, in order to strengthen internal relationships while simultaneously connecting to external resources. The Asset-Based Community Development (ABCD) method calls out the importance of a broad community participation in the process of asset identification. Kretzmann & McKnight established a community-building process through five steps: the mapping of assets, the establishment of relationships, a mobilization for economic development and information sharing, the development of a community-based vision plan, and lastly the leveraging of outside resources to support locally driven development and community improvement processes.

Borrup argues further that place-specific history is a critical part of any creative placemaking strategy. “To fail to connect with the historical trajectory that shaped the place is to move down a dark or empty path” (Borrup, 2016, p. 9). Significant architectural periods, monuments, events, and music scenes (among other cultural contributions) are important evidence of a place’s history and are critical aspects of future stories that reflect on how people interact with a place.

In summary, Borrup (2016) identifies twelve important steps in ongoing creative placemaking projects. Most important in the context of this research paper is to start the process by knowing and valuing the history of a place and developing an inclusive design process that allows community members to identify assets and to actively join the discussion. While it is important to engage outside thinkers, local knowledge is a key component, and the process should be carried through an ongoing program or “vehicle” that connects it to community leaders. Also important is the inclusion of local artists, designers, and cultural institutions. The engagement process can offer a variety of participatory strategies among those new technologies to engage people in creative thinking. And lastly, public visibility is important to increase community participation over time.

Through this pilot project, we further explore how mobile app technologies and the use of serious games can serve as an armature for creative narratives, allowing a diversity of community members to interactively engage in game content creation while simultaneously co-creating their new place-based culture. These are emerging technologies and applications also researched by others. Marques & Borba (2017) for example took a similar approach with their Playtown pilot project in Recife, Brazil. Playtown investigated how digital technologies could be used to actively engage multiple stakeholders

in the co-creative remaking of a place to revitalize both its material and sociocultural fabric. This pilot provided new insights at the intersection of urban planning, tourism, and digital game design.

Serious Games Addressing Health, Community, and Place

The game design field has matured to include educational and social service initiatives (Ma, Oikonomou, & Jain, 2011; Freitas & Liarokapis, 2011). With the recent success of popular geolocation-based games like Pokémon Go, community health researchers have been asking how these games can be used to improve population health (Primack et al., 2012). Pokémon Go uses a combination of fictional characters, a popular franchise, augmented reality, and mobile technology to encourage players to explore their environment to collect creatures, significantly increasing physical activity among its players (Althoff, White, & Horvitz, 2016). Even though this might be an accidental by-product of the game, this type of experience has been shown to be a valuable tool in promoting health. It can also be used to tie healthy behaviors to interactions with the physical environment.

Massively multiplayer online games (MMOs) are popular because they introduce players to an expansive environment and immerse them in a storyline. Pokémon Go can be considered an MMO. Overall, games that immerse players can have psychosocial and physical benefits (Kaye, Kowert, & Quinn, 2017). Connecting an online community with a person's physical community through creative placemaking could help to improve community engagement and sense of local identity, which in turn positively affects the physical, social, and emotional well-being of players. In addition to fostering community engagement, video games can also be leveraged to foster family interaction. Gaming together has been shown to be effective for bringing families closer together (Wang, Taylor, & Sun, 2018).

Excessive use of technology can sometimes be seen as a negative behavior, especially with the adoption of smartphones which enable continuous screen time. Still, there is an opportunity to use this increased screen time for the benefit of the user. Most public concerns about excessive screen time have been directed at teenagers and the potential for negative social and psychological effects. Recent studies, however, have shown "little substantive statistically significant and negative associations between digital-screen engagement and well-being in adolescents" (Orben & Przybylski, 2019).

"Serious games" are games used not only for entertainment purposes but also to help the player learn and grow (DeSmet et al., 2014). In the framework of serious games, we see the opportunity to leverage a georeferenced mobile game as a data acquisition tool that engages the public and constitutes creative placemaking. Gaming technology serves as a two-way medium, one in which users can produce and discuss content, allowing for a feedback loop between researchers and the built environment (Sanchez, 2018). Learning and gaming is not a new trend, but due to recent technological developments, location-based gaming has become more common than ever. Smartphones and smart watches with GPS, GIS, and other global positioning technology aid in creating game boards out of real-world spatial information. These location-based games can be used to help players create a meaningful relationship between aspects in the game and in their real life (Lund, Lochrie, & Coulton, 2010).

Location-based games emerged over the years and have been used for a variety of purposes, from improving health to urban planning (de Andrade et al., 2020; Kim et al., 2020). Before these services and technologies were available, gamers-built communities in the digital world. Now games can use the digital world to strengthen connections a player has with the physical world by building on location-based social networks, mobile devices, and existing physical infrastructure. Geobased apps like Foursquare, Yik Yak, and Pokémon Go create connected communities by either allowing location-based communication or requiring users to check into physical places and broadcast this information to their social networks (Papangelis et al., 2020). These social networks can help generate connections, while location-based games can be used to create situations where players explore new parts of their city – thus learning more about their local environment (Papangelis et al., 2017).

Generation Z (those born from 1997 to 2009) and Millennials (those born 1981 to 1996) play digital games at a much higher rates than other generations, potentially allowing digital games to be a critical tool for behavioral change, social interaction, and community building in the coming decades (Haghshenas & Richards, 2016). The accessibility and overall reach of mobile gaming makes it the ideal future tool for health promotion, and the use of health-related apps is on the rise. Mobile phone apps are already used for mental health, alcohol addiction, physical activity, weight control, lifestyle improvements, and medication management (Zhao, Freeman, & Li, 2016). Serious mobile games as a tool for health promotion have not been studied extensively. Most reviews on the topic point to some successes in using serious games as a health promotion tool, but suggest that additional research on the subject is needed (Berkowitz, 2003; Carmo & Palmeira, 2014). Starting from individual handheld devices, mobile games are now being integrated into the smartphones that people carry everywhere. New features and sensors allow game developers to track movement, location, and even things like step count and heart rate. Wearable devices aid smartphones in the accuracy and extent of the data collection by adding extra sensors or abilities (Amft, 2018). As the mobile technology in smartphones continues to advance, we will look to integrate more features into WAM to help drive healthy behaviors.

Our premise for designing WAM is that mobile technology, serious gaming, and creative placemaking could be used to help individuals establish healthy behaviors, create social interactions, and shape community culture and identity. Using wearables and other technology, we are able to collect health data to provide back to the community to help with creating new health promotion programs. Developing and studying the effects of WAM in a community significantly contributes to research in the field.

Precedents

3. PILOT STUDY: WE ARE MARTINSVILLE, VIRGINIA, USA, 2018–2020

Leveraging the success of the Beat the Street model for improving physical health outcomes, but using a customer-friendly mobile app to allow for flexibility and lower-cost implementation, the WAM pilot project uses place-based sites and community partnerships to turn Martinsville into a playable city for residents and visitors across all age groups. This mobile game/app is being developed by an interdisciplinary team that involves representatives from the University of Virginia Schools of Architecture and Engineering, the UVa School of Medicine's Center for Telehealth, as well as community representatives. During the last three years, the game was developed in several stages, offering today a game narrative that allows for continuous game content development authored by community stakeholders and local institutions.

Digital Armature and Game Narrative

The situation in Martinsville: Martinsville is an independent city located in southwest Virginia, at the Blue Ridge Mountains' foothills near the state's southern border (Figure 1). For nearly 100 years, the furniture, textile, and tobacco industries powered the city's economy. However, globalization and foreign competition have taken a toll, and Martinsville had the highest unemployment rate in the state from 2008 through 2013. These challenges resulted in a steady population shrinkage, with the peak population of 19,653 in 1970 (Census Bureau, 1990) declining to 13,821 in 2010, with an estimated new low of 12,902 at the next census (Census Bureau, 2018). Furthermore, Martinsville was ranked 131st out of 134 Virginia cities and counties according to the County Health Rankings & Roadmap (2017) and first in the nation in per-capita opioid prescriptions according to a Centers for Disease Control report (CDC Injury Center, 2019). According to estimates of Youth Health Risk Factor Profile Estimates for 2015, youth in Martinsville exhibited significant risk factors, with 66% not meeting recommendations for physical activity in the past week and 31% being overweight or

Table 1. WAM Direct Precedents

Project	Game Description	Relationship to Technology, Place, and Community
Pokémon Go	Pokémon Go is a 2016 augmented reality (AR) mobile game developed by Niantic in collaboration with The Pokémon Company for iOS and Android devices. Players are prompted to capture virtual world creatures called Pokémon, which are augmented into the player's real-world location. The game is free-to-play; it uses a freemium business model and supports in-app purchases for additional in-game items. The game launched with around 150 species of Pokémon, which had increased to about 600 by 2020. The POI database allows players to win poke balls once they approach the site's geofence and has an open API. https://www.pokemongo.com/	<ul style="list-style-type: none"> • Augmented reality browser in a mobile app that uses GPS function. • Facilitates an intertwined new play world that combines the physical place with the game environment. • Location-aware technology integrates points of interest of the physical environment into the game narrative. • Privacy and safety concerns. • Capacity to form teams and to follow a complex game narrative with different levels. • The game was referred to as a "social media phenomenon," which has brought people together in the real environment with positive and negative impacts on the physical place.
Beat the Street	Beat the Street has been able to energize communities in England and increase the proportion of people meeting physical activity guidelines by an average of 40–50%. Beat the Street is a 12-month community-wide program where the first three months are spent engaging with stakeholders and communities to learn about suitable walking and cycling routes, integrate local events and amenities, create champions and teams, and generate excitement. In 2020 the game can account for 1,141,021 players worldwide. Unlike other games, Beat the Street was initiated as a health-related game and can measure its success and impact. http://www.intelligenthealth.co.uk	<ul style="list-style-type: none"> • Participants pick up a Beat the Street card containing radio-frequency identification (RFID) technology and tap it against sensors called "Beat Boxes." RFID technology uses electromagnetic fields to identify and track tags attached to objects. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data. • Players receive points for each box they tap and can even create or join teams. • This motivates entire schools, community groups, and businesses to become more active. • Open to all age groups. • RFID technology requires investment in hardware and keeps the game static and place-bound. • Beat the Streets is a well-established business run by Intelligent Health Ltc with a vision plan for 2026.
Stamp Rally	Stamp Rally (Dae Yong Kim, Matthias Pietsch, Nicole Uhrig), developed in 2017, incorporates stamping activity to receive a stamp book for visiting sites critical to the history and culture of a city (tourist guide). The web-based stamping city rally software has an integrated geopositioning system. Using the functionality of gaming to encourage public participation in the development planning of a local area allows local inhabitants to consider local issues and engage with local development planners. https://www.ufo79.com/PIX/ufo/bct/stamp	<ul style="list-style-type: none"> • GPS and location-aware web-based software; anyone can access the site using a link via messaging or social media without downloading a sizable new app. • The proximity parameter was set as 20 meters in diameter from the point of interest (POI), at which point participants can activate the stamping icons and access their missions. • Effective method to encourage public participation in a multicultural society, considering both language and cultural barriers and space and time.

obese (C. H. Solutions, 2017). However, like many historical communities in Virginia, Martinsville has a rich history still present in the city's urban fabric and a wide range of underutilized, and partly undiscovered, community assets and resources. Toward reversing the city's economic trends, Martinsville has identified promoting awareness of these assets as a critical component of the city's newly developed strategic plan to revitalize Uptown (the city's downtown core).

In many ways, Martinsville represents other shrinking rural communities in the US. The city is actively looking to reinvent itself and has a rich set of assets and resources to build on. UVa has been working in Martinsville over the past four years to support its revitalization effort. Funded through a grant by the Department of Health and Human Services, the electronic-Better Health and Care for

Kids, Parents, and Communities (e-BACKPAC) program is a partnership between UVA and local providers in Bland County, Patrick County, and Martinsville City (all rural areas in southwest Virginia with some of the worst health indicators in the state). The project works directly with stakeholders to increase access to primary and specialty care services for students in these rural communities. The e-BACKPAC program, now in its fourth year, engages key health organizations in Martinsville and surrounding areas. During the last stage of the program, community members and researchers both agreed to investigate the potential to address the lack of local identity and community health in an integrated approach to allow the community to reconnect. These stakeholders involved in Martinsville include: Boys and Girls Club of the Blue Ridge, Martinsville-Henry County Coalition for Health and Wellness, The Virginia Museum of Natural History, City of Martinsville, Martinsville-Henry County Tourism, West Piedmont Health District, Martinsville Police Department, Martinsville-Henry County Chamber of Commerce, Martinsville United Way, New College Institute, Martinsville YMCA, The Martinsville City School District, The Harvest Foundation, and several other small businesses in the City of Martinsville.

WAM game narrative and mechanism: Under the project name We Are Martinsville (WAM), the design team developed a game concept that allows players to learn about their city. The game serves as a motivator for both indoor and outdoor exploration, simultaneously building new knowledge and data about Martinsville while increasing levels of physical activity. WAM includes a variety of key features that help accomplish the goal of engaging players, creating fun ways to explore and contributing to their community. Key features include check-ins and quizzes that award points to players for either just visiting locations or getting close to the location and answering questions designed to require knowledge only found on site. These features motivate players to visit less popular places considered valuable by the community that they might not visit otherwise. This also gets players physically active, and this activity is also tracked. Players not only can see how many miles they have travelled but also their path while traveling, nearby players, time played, and steps taken. This is used as both a competitive measure that could be rewarded and a health metric. Another important feature of WAM is the ability to take photos of your community and supply feedback to game administrators, who then can relay information to city planners. This information could be used to add walking paths, fix unsafe spaces, create scavenger hunts, or share areas of pride in the community. All of these features can be combined into stories and events that are submitted by community organizations. These organizations can set up stories or events that require players to complete a variety of different task that can tell a specific story about Martinsville in a fun and dynamic way. The game is made to allow use of multiple game fields, with our first game field focused on historic Uptown Martinsville. Future game fields include areas along the Smith River, the nationally recognized motor speedway, and the historic Dick and Willie Trail (Figure 2).

WAM can be downloaded from the Apple App or Google Play Store free of charge. After a registration process that allows players a wide range of user customizations (color, avatar choice, background images) and collects basic player information (residency, generational identity), players begin play at game field number 1 in Uptown Martinsville.

In the main game narrative, WAM highlights Martinsville's existing cultural assets. The mechanism operates similarly to Stamp Rally. For example, within a given game field, Uptown Martinsville, players visit points of interest (POI) sites identified through community workshops in collaboration with the Department of Tourism. Once the player approaches the geofence, a game card pops up, and players first learn about the POI's history and relevance. In a second stage, a Q&A card appears and prompts players to answer questions whose answers can only be found on site. The basic game currently contains approximately 60 game cards for Uptown Martinsville and can be understood as a growing virtual archive of local destinations – like a tourist guide. Players receive points for reaching a POI and for answering the questions correctly.

A second game component allows players to obtain points by contributing points of places (POPs). Here players can submit geotagged photographs of places that they perceive as either positive

or unfavorable. Community members review images for appropriateness, and players receive points for successfully submitted imagery. Players also can rate local sites and write reviews and/or suggest ideas for improving those sites. These geotagged images, ratings, and reviews will over time help our understanding of the players' perspective on the identity of Uptown Martinsville. These images can potentially be curated as a photo exhibition and a possible publication featuring Martinsville, as seen through the eyes of residents and visitors.

Customized Game Administration: WAM was developed using React Native, an open-source mobile application framework that renders on IOS and Android platforms. Firebase Realtime Database was used to configure and manage the tables and records for WAM, allowing real-time data storage and synchronization of the React Native code uploaded in the Github. Users and activities are monitored under a customized administration panel. A dedicated database is linked to the admin panel that stores all vital user information once users give their security permissions. This includes user registration data, shared images, visited places, and geolocation tracking history. This back end of the mobile game application is intentionally designed as an open and user-friendly platform to allow volunteers from the community with administrative rights to add new game cards, easily monitor content, and invite collaborators (Figure 3).

This process allows for a growing database of POIs and cultivates a map of "icons" and relevant sites. Ongoing development of new game content as endogenous cultural production of the place is necessary to allow for sustainability and to enhance the creative placemaking process. In the following section, we describe the relevance of Design Thinking Workshops and how they helped establish community networks and the initiation of co-authored game content during the second phase of the pilot study.

Building A Network of Community Partners Through Design Thinking

WAM's digital tool relies on a well-functioning community partner network, already established through e-BACKPAC's partnerships in the southwest Virginia region. Building upon the trust established through existing partnerships created the ideal condition for community engagement and allowed for the digital tool's co-development through feedback from core target audiences in sessions called Design Thinking Workshops. Design Thinking Workshops are hands-on, activity-based sessions built around the designer's creative process. In these sessions, members of the partner network are introduced to the techniques, methods, and modes of inquiry of designers (Cleckley, 2019). All three workshops that we developed for WAM used the human-centered design (HCD) process coined by global design firm IDEO, a problem-solving approach beginning with *Inspiration* (discovery) and going on to *Ideation* (idea generation) and *Implementation* (Brown & Wyatt, 2010). Using HCD in the Workshops continued to strengthen the network, putting community needs first while informing the design team of connections to the physical environment and place, resulting in the acquisition of vital knowledge needed for game development and design.

In August 2018, the partner network connected the game app design team with fifteen local pre-teenagers of Generation Z of the Boys and Girls Club in Martinsville for the first Workshop. Held at the New College Institute (NCI), the session's goals focused on establishing user needs and discovering local assets, technological access and usage, local heroes, civic treasures, and desired additions to Martinsville. In terms of the HCD process, the Workshop began with Inspiration, with icebreaker activities, presentation of project mission and background by the game app development team, and youth team-building exercises. In the following Ideation, youth responded to a series of empathy-driven inquiry questions, validating technological access, physical activity levels, and personal behaviors. Sample questions involved how time is spent after school and on the weekends, favorable assets in Martinsville, types of phone technology participants had, and estimated time usage on devices. Inquiries provided more in-depth knowledge of community assets, essential to the development of the location-based game cards. Participants learned of the game app's planned pilot testing in Martinsville in Implementation, including a mental mapping exercise (drawing downtown

Martinsville from memory), influenced by urban theorist Kevin Lynch (Lynch, 1960). Mental mapping informed the design team of youth engagement with Martinsville's physical environment and sense of place.

A second Workshop took place in October 2018 with first responders, educators, community leaders, representatives of cultural institutions, and health practitioners of the partner network. This time, Inspiration focused on presenting the project mission and background by the game design team. Ideation featured several feedback stations taking participants step by step through the game app structure, while Implementation consisted of a collective conversation on future pilot testing, and strategic advice on parameters for a successful launch in Martinsville. The Design Thinking Workshops provided the app design team with an invaluable concentrated opportunity to glean information from a very diverse target audience. Using the HCD process ensured inclusive engagement, allowing community hosting with the partner network and spreading awareness of the game. Stakeholder ideas captured in the sessions act as the primary foundation for guiding the ongoing piloting efforts.

The pilot game was then successfully tested in August 2019 with 15 youths from the Boys and Girls Club in Martinsville (from Generations Alpha and Z) (Figure 4). For kids who had been born and raised in Martinsville, the POI sites and content of the game cards were new knowledge. Further, even when players were already aware of specific sites, they developed secondary knowledge about them. For example, kids knew where the public library was but weren't aware of the after-school programs that the library offered. Because of this, the students had to explore the library and talk to librarians to find answers to questions about the after-school programs offered. A follow-up debrief with youth (Figure 5) helped identify compelling aspects of the game, new desired features, and other valuable knowledge and best practices that could be applied to the next game update.

Developing a Strategy For Co-Authorship

The first pilot tests and Design Thinking Workshops, described above, showed an unpredictable excitement across players and the community network that helped develop game content. However, crucial for this game and data acquisition strategy is developing a narrative that can reach a self-sustaining equilibrium, where community stakeholders can generate and manage new content. To facilitate this, after the first pilot tests, the design team, in collaboration with community representatives, developed a mechanism that leverages ongoing cultural events in Martinsville. While the initial game field, with its game cards, serves as an opening chapter of WAM, the project team tested an attempt to write new chapters linked to ongoing events in town.

Working together with the Virginia Natural History Museum (VNHM) located in Uptown, the application was enhanced by the possibility of hosting an event. In the case of the VNHM, the team chose the annual Ice Age Festival taking place during the winter season. During the event, the VNHM developed a series of event-specific game cards and additional mechanics such as photo tagging and quizzes related to the ongoing festival's content. These elements allowed for a new chapter in WAM's game production, as some parts of new game content will be accessible for players later. Simultaneously, former players of the game received an invitation to join the new event. This mechanism allowed players to produce game content on an ongoing basis while simultaneously promoting ongoing cultural events in town (Figure 6). As such, the game not only serves as a digital armature to connect players to the physical place and its ongoing cultural production but also allows local cultural stakeholders to participate as hosts and co-authors. This mechanism facilitates linking current-day cultural production with the rich history of the place (Figure 6).

4. FINDINGS: PLAYING AS A MEANS OF BELONGING AND DATA COLLECTION

In this section, we present lessons learned over the previous three years and findings from our initial data from test runs. Overall, our pilot study to date confirms that playing and producing the game content strengthens the social, geographic, and material framing of the place.

As discussed earlier, younger residents in places such as Martinsville suffer from a lack of community identity and understanding of existing local assets, while older community members have rich memories and experiences that they long to share. WAM helps to reconnect the community to the place by (1) supporting the creative placemaking strategy that encourages community members to actively work together through the development of game content that is related to the culture and history of Martinsville; (2) providing a playful way to learn about the city's history and local assets through a game narrative that can be produced on an ongoing basis through community stakeholders; (3) exploring a novel approach to extracting the mental image of the place; and (4) gathering health and location data that can be provided back to city and community leadership to guide programs and improvements.

As such, the game mechanism can serve as a convener, bringing together constituents that traditionally do not participate in urban planning processes, detailed below. The success of the current pilot project lies in its interdisciplinary and synthesized methodology (Figure 7). More specific findings regarding the research questions raised can be summarized as follow:

Collaboration and Network

- The Design Thinking Workshops' collaborative conditions strengthened the local community network by directly connecting with partners involved with the e-BACKPAC project.
- Building a network of collaborators is a question of commitment and trust. The existing relationships that were initiated through the e-BACKPAC project generated a solid base for the WAM collaboration.
- The WAM pilot confirmed findings in the literature that playing games together creates a shared experience, promotes healthy behaviors, brings a sense of community, and enhances interactions across generations in a family and between diverse participants.
- Design Thinking Workshops are time-intensive and need to be accounted for in staffing and budgeting, which challenges future replications based on the same model.
- Across all community workshops, it was critical to seek out leaders and collaborators who could provide feedback beyond the workshop session. This engagement method allowed for a growing design team, which at the end of the pilot included members of the community.
- The Workshops, supporting the development of the game mechanism, brought together constituents that traditionally do not participate in the planning process. The Workshops established all participants as part of the design team, encouraging more collaboration than in traditional meeting formats.
- It was essential to ensure that the Workshops' format welcomes participants, makes diverse design teams, and leads teams in icebreaker activities and team-building exercises in the Inspiration stage. This progression encouraged participants to comfortably share vital personal behaviors, opinions, and ideas in Ideation.
- Design Thinking Workshops provided successful feedback from partner networks by beginning the session with a collective, comprehensive presentation of the digital tool's development that maintains trust as a part of Inspiration. Following in Ideation with feedback stations, each hosted by the game app design team for smaller conversations, maximized in-depth discussions of public safety, insights on local businesses, current and desired tourist volume, and cultural histories.

Relationship To Place and Physical Environment

- WAM was designed using a creative placemaking strategy that involved Martinsville residents and stakeholder institutions at each step to create environments that are responsive and appropriate

to the cultural, psychosocial, and practical needs of its end-users. This allowed for a stronger relationship to the place for everyone involved.

- As evident in the first pilot study, the game content provided in the form of game cards and POIs was confirmed and enriched through community feedback. These POI game cards highlight Martinsville's assets, and the questions attached to these POIs further strengthen a deeper relationship to the history of the place and the community. This makes WAM unique in comparison to other geolocation based games, that do not allow for in-depth content production through the community.
- The game's capacity to generate new content by inviting cultural institutions to host events that are linked to their ongoing programming is a successful way to connect players not only to the city's past but to its present and potential future narratives.
- Inquiry questions uncovered connections to the physical environment and place, namely that youth appreciate different parts of Martinsville, yet most have affinities for their school (and related activities) or home. Pre-teenagers rarely go to Martinsville's cultural attractions, such as the Virginia Natural History Museum and Piedmont Arts (a nonprofit art museum and educational center). This absence extends to Martinsville's recreational outdoor sites, such as the Smith River and the Dick and Willie Trail, with youth expressing a lack of interest and noting the difficulty in accessing these sites without a car. To address these concerns, the game invested in POIs and game cards highlighting these cultural assets through the geolocation aspects, including education and awareness opportunities through the digital tool's quizzes.
- While it is tempting to generate a whole suite of more complex game mechanics, it seems wise and cost-effective to limit the game and its technical infrastructure to a series of well-known functions like utilizing geolocation, answering questions, taking photos, and tracking activity levels. This is specifically important when the game is designed for a wide range of user groups across all generations.

Potential Collection of Important Data

- In the given framework, we see the opportunity to leverage a georeferenced mobile game as a data acquisition tool that engages the public and constitutes creative placemaking. In this context, gaming technology serves as a two-way medium, in which users can learn about the place while also being involved with game content production.
- POP data expressly can be understood as a novel form of cognitive data that can inform ongoing planning processes, starting the revitalization and reactivation of Martinsville's historic Uptown.
- Though sufficient data was not collected so far due to COVID-19, there is the potential that games like WAM can enable innovative cyber-physical systems by accessing data to inform modeling and decision support. A dynamic source of data that evolves with the community could produce more insights into their ways of life and enhance our understanding of the underlying social, economic, and cultural influences that could impact the community (Figure 8).
- POP data generated by tourists and the attached questionnaire for this player group can be analyzed and shared with the Department of Tourism, improving the city in terms of local tourism and external visitors' perceptions.
- Through the embedded review functions, WAM potentially captures players' perception of their community's culture (e.g., local art, entertainment, architecture, history, landscapes, and infrastructure) through photography, destination check-ins, activity logging, informational questions and answers, and social media.
- By using smartphone technology, WAM collects different measures of activity and location data displayed to the user, encouraging additional movement. This data could also be given to community organizations; the data is important for looking at which groups of users are getting

adequate exercise and can be used for targeted health promotion programs. As such, WAM combines functions of wearables with the game application.

- During both pilot tests a total of approximately 20 test players from Martinsville Boys and Girls Club, community members, and UVA students engaged with the app development and provided valuable feedback. Game content was developed through a series of community workshops and stakeholder meetings. These sessions facilitated over the past 2 years the involvement from approximately 60 community members and institutional stakeholders.

5. DISCUSSION: POTENTIAL FOR REPLICATION AND REGIONAL APPLICATION

WAM is currently limited to the location of Martinsville, Virginia, USA, and will allow access for IOS and Android users. While going through the registration process, players are informed about all legal aspects of the game and specifically about data anonymity and the fact that the game will produce essential data for the City's planning department. Only time can tell how meaningful and rich the data will be in ongoing planning processes. While WAM is so far limited to pilot tests, the excitement among the partner network is evident. Three critical aspects are currently discussed in the collaborative network of designers, community stakeholders, and researchers:

1. What are the mechanisms that could allow the game to become self-sufficient? Here, the team investigates working with big data stemming from Flickr, Instagram, and Twitter that could trigger impulses regularly. A first analysis of social media data (Figure 9) shows that Martinsville produces a high amount of social media data twice a year related to national events on the speedway. In addition to steady social media data flows, these big data spikes might be an opportunity to generate regular new inputs of players' responses.
2. All communities are unique, and no single data structure can efficiently capture all attributes of every community. As the WAM model scales up to other communities, the challenge is to identify critical technical and policy specifications for data collection, organization, and access to scale across communities. In other words, what is the appropriate data structure that is flexible enough to describe multiple communities, yet shares sufficient attributes to allow multi-site integration and analysis? Concurrently, approaches and tools for analyzing the data and closing the loop for decision support should also be transferable across communities.
3. If successfully launched, can the WAM pilot project be replicated for other rural or urban communities? The social and economic situation in Martinsville is not unique in former industrial regions. Hence, the situation needs to be addressed at a regional scale. While the mobile app can be replicated easily, WAM's collaborative aspects are time-intensive and site-specific. While a series of professional workshops would be necessary to replicate our method, the development of a manual would help guide communities in implementing a place-based mobile game application like WAM.

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WAM Project Credits

Project Design: Mona El Khafif (placemaking strategy), Elgin Cleckley (design thinking strategy), Marcus Drivers (project management), Suellyn Danter (community network), Shurui Zhang, Gabriel Andrade (research assistants)

Research Team: Mona El Khafif, Elgin Cleckley, Marcus Drivers, Tho Nguyen, Kathy Wibberly

App Development: Adaptive Telehealth

Community Network: Martinsville Boys and Girls Club [Joanie Petty], the Virginia Natural History Museum [Zach Ryder, Christy Deatherage, and Joe Kieper], the MHC Coalition for Health and Wellness [Suellyn Danter], Martinsville City Planning and Tourism Department [Leon Towarnicki, Sarah Hodges, and Beth Stinnett], New College Institute, Martinsville/Henry County Chamber of Commerce, United Way of Henry County and Martinsville [Phillip Wenkstern], West Piedmont Health District [Nancy Bell]

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APPENDIX I.

Image Credits

Figure 1. Martinsville location map, image credits: Mona El Khafif, Shurui Zhang

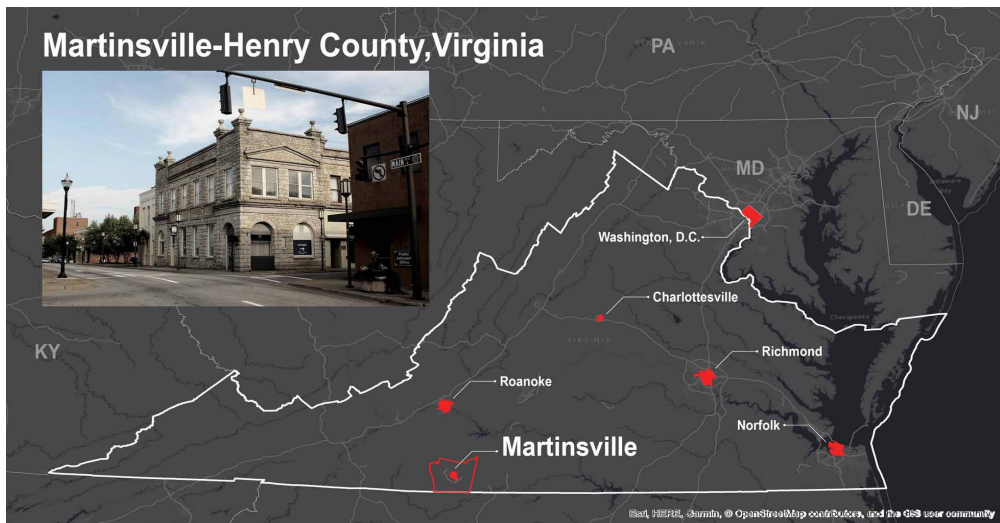


Figure 2. Martinsville game fields, image credits: Mona El Khafif, Shurui Zhang

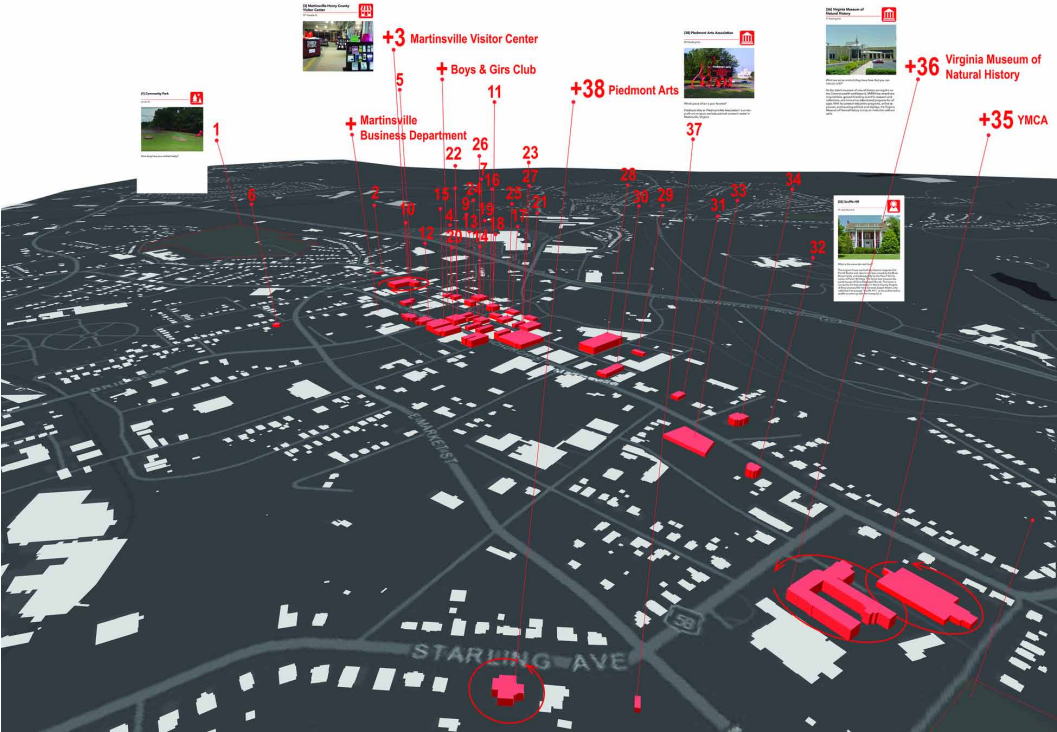


Figure 3. WAM application, image credits: Adaptive Telehealth

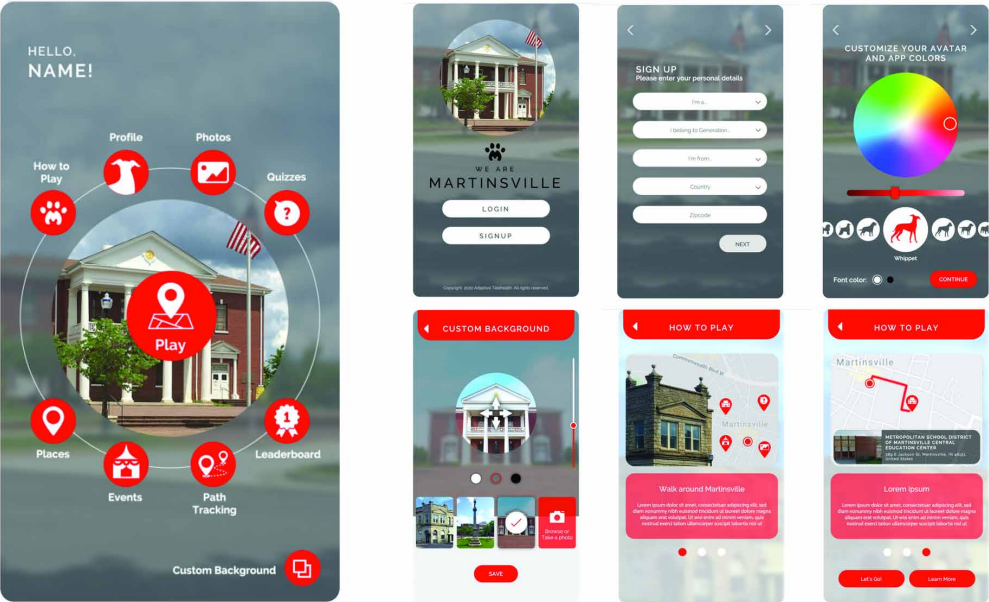


Figure 4. WAM pilot test 2019, image credits: Marcus Drivers



Figure 5. WAM debrief workshop 2019, image credits: Marcus Drivers, Elgin Cleckley



Figure 6. WAM event pilot test 2020, image credits: Mona El Khafif, Shurui Zhang, Adaptive Telehealth

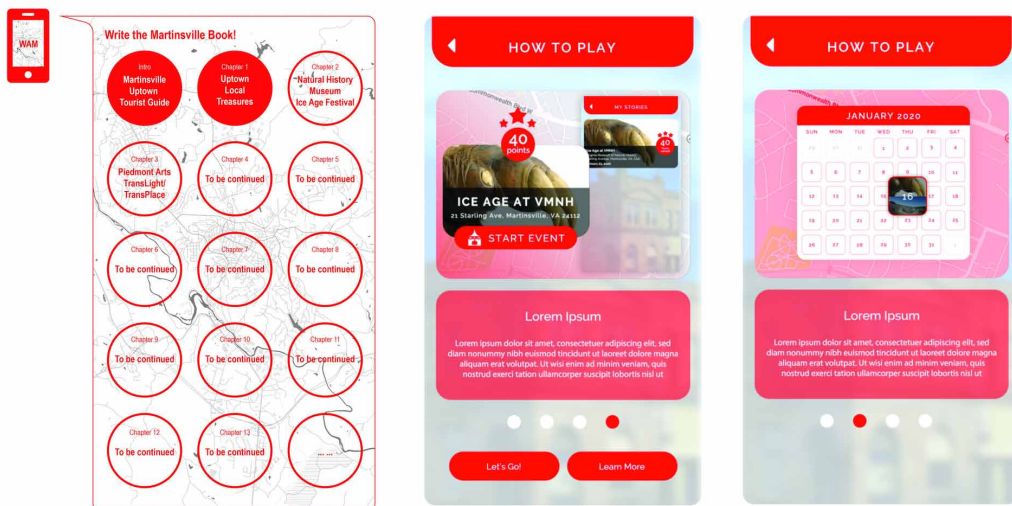


Figure 7. WAM data analysis diagram, image credits: Mona El Khafif, Shurui Zhang

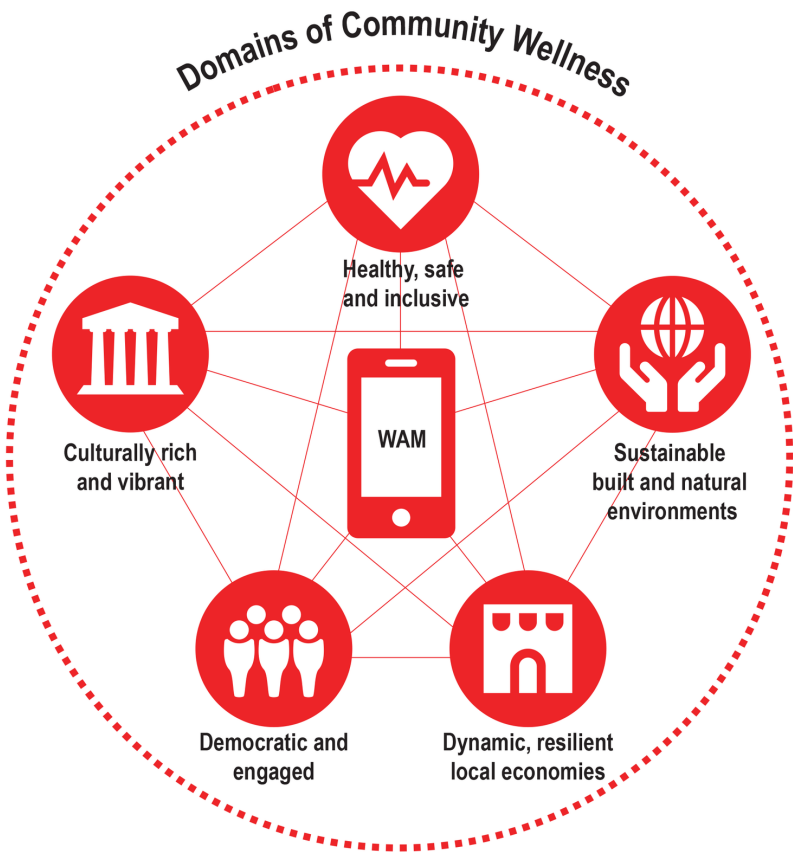


Figure 8. WAM integrative model, image credits: Mona El Khafif, Shurui Zhang

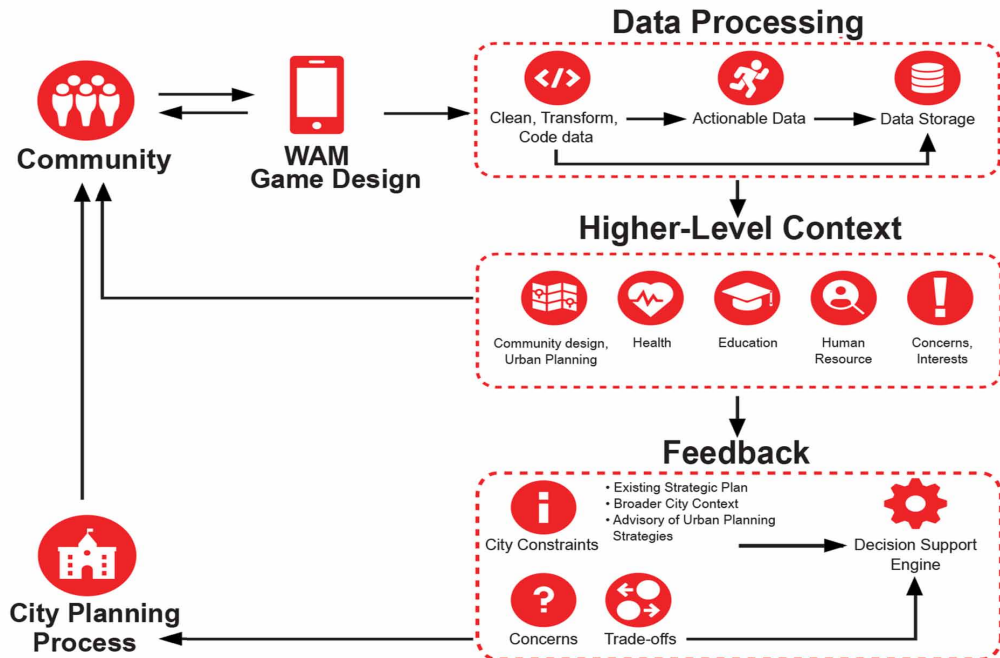
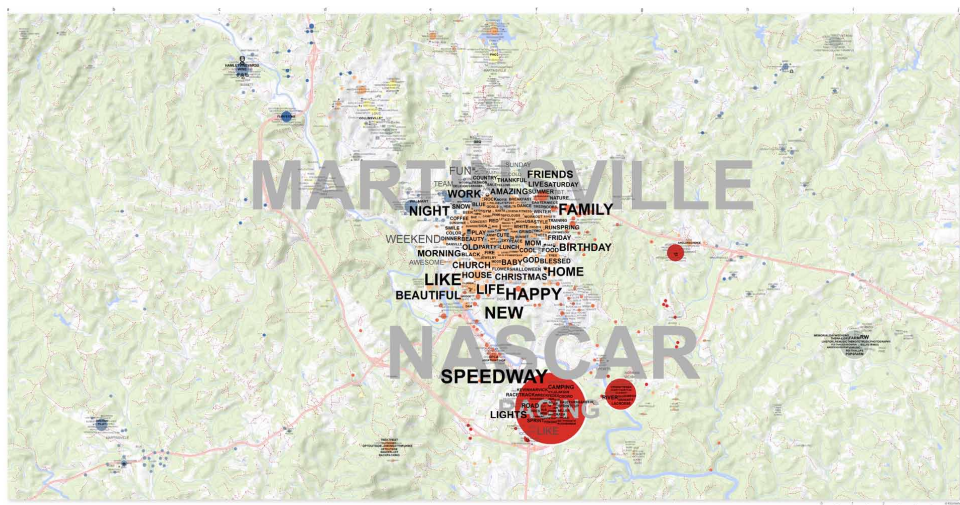


Figure 9. Martinsville tag map featuring Flickr and Instagram posts 2018, image credits: Alexander Dunkel (this map was generated with publicly available data from Flickr and Instagram with the use of tag maps Python package)



Mona El Khafif, Dr. Techn., is an Associate Professor at UVA School of Architecture, co-author of the award-winning publication 'URBANbuild: Local/Global' (with Ila Berman) and author of 'Staged Urbanism: Urban Spaces for Art, Culture and Consumption in the Age of Leisure Society' (German edition). Her research operates at multiple scales, examining the interdisciplinary aspects of urban design, temporary urbanism, urban prototyping, and strategies for the smart city. At UVA El Khafif serves as the RCN director of the recently funded NSF Grant entitled "MainStreet21" supporting a network of small and midscale cities in Virginia and co-directs the school's initiative on Smart Environments. Since 2013 El Khafif is a partner with Ila Berman of SCALES SHIFT a design research firm located in Toronto.

Kathy Hsu Wibberly is Director of the Mid-Atlantic Telehealth Resource Center (MATRC), federally funded to assist with telehealth program development in order to increase access to quality care for rural and other underserved populations. Kathy is also Director of Research for the Karen S. Rheuban Center for Telehealth and Assistant Professor of Public Health Sciences at the University of Virginia School of Medicine. Kathy's public service career reflects close to 30 years of experience in public health, public policy, program development, program evaluation, and strategic planning. Kathy received her BA in Psychology from Gordon College in Wenham, MA, and her MS and Ph.D. in Counseling Psychology from Virginia Commonwealth University in Richmond, VA.

Elgin Cleckley, NOMA, is an Assistant Professor of Architecture with an appointment in the Curry School of Education and the School of Nursing. He is the principal of Empathic design – pedagogy, initiative, and professional practice. After studying architecture at the University of Virginia ('93) and Princeton University ('95), collaborating with DLR Group (Seattle), MRSA Architects (Chicago), and Baird Sampson Neuert Architects (Toronto). Before joining UVA in 2016, he was the 3D Group Leader and Design Coordinator at the Ontario Science Centre (Toronto). Elgin is the recent winner of the 2020 ACSA Diversity Achievement Award, and the 2021 Dumbarton Oaks Mellon Fellowship in Urban Landscape Studies, supporting his forthcoming 2021 book with Island Press, Empathic design.

Tho H. Nguyen is a Senior Scientist in the Department of Computer Science at the University of Virginia and Associate Professor of Computer Science (by courtesy) at the University of Virginia College at Wise. He also manages the ACCORD Advanced Cyberinstrument Program for the UVA Office of the Vice President for IT. ACCORD is a consortium of eleven universities across the State of Virginia collaborating to develop a state-of-the-art next-generation cyberinfrastructure to support data-intensive research. Tho is a member of the Semiconductor Research Corporation (SRC) and the Center for Research on Intelligent Storage and Processing-in-memory (CRISP). His expertise and research interests include advanced cyberinfrastructure, computer system architecture, cyber-physical systems, and smart cities. His work has been funded by NSF, USAID, and multiple private foundations.

Marcus Divers has a B.S. degree in Health Sciences, from James Madison University and is a Certified Health Education Specialist (CHES). He is a project coordinator for the UVA Karen S. Rheuban Center for Telehealth and the UVA Department of Neurology. He has worked on HRSA grants to research and establish a prehospital tele-stroke program, develop education content related to stroke prevention and helped author a prehospital telemedicine in Telemedicine in the ICU. Along with this work he assisted in creating protocols and helping start a novel pre-hospital drug trial for stroke patients called PHAST-TSC that enrolled patient in the back of the ambulance using exception from informed consent (EFIC), and is actively involved in various other special projects related to stroke care delivery at UVA. He also works under a HRSA grant titled e-BACKPAC helping create a mobile application to drive healthier, more engaged communities using creative place making and health promotion. Also at UVA, he works under a CDC/Virginia Department of Health grant to help establish resources for providers looking to adopt and collaborate on tele-health practices called Innovation Exchange.