PUBLIC PLAY SPACE

PUBLIC PLAY SPACE *SYMPOSIUM*

PROCEEDINGS

Co-funded by the Creative Europe Programme of the European Union

Iaac Institute for advanced architecture of Catalonia

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Breda University of Applied Sciences

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Public Play Space

The Public Play Space international symposium is organized by the Advanced Architecture Group of IAAC in Barcelona, within the framework of the Public Play Space project, co-funded by the Creative Europe Programme of the European Union and developed by the Institute for Advanced Architecture of Catalonia, the Breda University of Applied Science of Breda and CLAC Palermo.

The objective of the Public Play Space Symposium is to investigate how Gamification strategies and Responsive Digital Technologies can foster and enable the implementation of Co-Creation and Co-Design processes in and for Public Space. The symposium is organised around the following topic sessions:

- Gamification and Serious Games for the co-design of Public Space
- Responsive Technologies for the co-design of Public Space
- Interactive and Community-based Strategies for the co-design of Public Space

Games, playful strategies and new technologies for the public space

Chiara Farinea and Marco Ingrassia

Participation of citizens in the design of the public space is recognized as fundamental to build inclusive, cohesive and sustainable environments.
Public Space is the physical framework that upholds societal interaction and plays a significant role in building social, cultural, economic and political functions (UN, 2004). Participatory practices generate benefits including citizen empowerment, increase of social capital and promotion of a sense of community (Sanoff, 2006). Furthermore, they can support the implementation of urban transformation processes, engaging citizens as agents of transformation (Michaelson J., Toth G., Espiau R., 2008)
However, notwithstanding the growing interest of local governments in civic participation and the activism of the civic society, participatory design process faces several challenges and barriers. These include the difficulty to engage citizens and the limited audience, the limitation of resources, the notions of power, responsibility and representativity related to the decision-making process, and the specialized skills required by the design procedures (Markopoulou et al. 2017).

During the last decade, policy makers and city managers have started to use digital technologies as means to further engage citizens in the design process.
For instance, these activities can be supported by digital platforms which include features like polls for decision making, forums allowing interaction and discussion, or visualizations and animations in order to ease the communication of complex concepts. Furthermore, the concept of Gamification is also receiving importance, intended as a strategy to thoughtfully make these processes fun by applying game elements to real-world activities . The objective is to trigger more appealing and engaging participatory practices, as well as incentivizing active and consistent behaviour of the participants. Games are in fact demonstrated to have a motivational effect on their users, consequently increasing their level of participation. Some of the dynamics applied include rules, competition, outcomes, conflict, and other gameful or playful elements.

Within the revolution triggered by digital technologies, public space evolves towards a more dynamic, performative and active behaviour (Markopoulou, Marengo, Farinea, 2017).
Public Space becomes hybrid (Castells, 2004), multilayered (Gausa, 2010), and can be programmed to perform (Markopoulou, 2016), demanding designers to develop approaches capable to include the actual embodied experience of spaces.
However, traditional approaches in public space design are organized around amenity creation, ensuring quality of life, and providing safe, sanitary, business friendly neighborhoods. Projects and strategies often promote visual coherence, spatial order and aesthetic improvements but hinder the creation of expressive spaces that can host and stimulate social dynamics in the neighbourhood.

The combination of Responsive Digital Technologies and Gamification Strategies can empower designers, policy-makers and citizens with a wide range of applications. These include **stimulating citizen reflection** and civic learning; **generating interaction and resolving conflicts** between citizens with contrasting views; promoting values such as sustainability, coexistence and circular economy thanks to the purposeful use of objectives, challenges and tokens; **simulating the impact of different design solutions; and generating awareness and informed decisions** thanks to data visualization and indicators.

In this challenging and constantly evolving scenario, Public Play Space promoted a two-year long intense research and development process, aimed at **exploring how play and gamification tools, in combination with advanced digital technologies**, can be used to foster the process of **public space co-design and placemaking**. The Public Play Space International symposium brings together researchers, practitioners, and innovators in a two-day event, opening a debate and collecting experiences on a novel and promising field of exploration.

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Gamification And Serious Games for the Co-Design of Public Space

SECTION 1

From Gamification To Integrated Urban Regeneration

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ABSTRACT

The primary challenge in urban planning is engaging citizens through their communities' urban regeneration projects. The authors of this paper explain how Paisaje Transversal has been able to use the gamification approach to encourage citizens to engage and participate within their respective communities. Through the use of this participative game technique, communities are able to assess a neighborhood's general requirements and suggest regenerative solutions specific to their urban initiatives. Through this approach, Paisaje Transversal was able to gauge participants' preferences for development of their own neighborhoods. Thus, allowing Paisaje Transversal to deduce and fine-tune solutions based on residential objectives. This research affirms the need for individual approaches and community inclusion: implying that urban changes are continuous rather than discrete.

KEYWORDS

Gamification, Urban Regeneration, Participatory Approach, Community Driven Solutions.

1. INTRODUCTION

Paisaje Transversal considers citizen participation a critical tool for improving all the urban challenges that a city faces. Creating a participatory culture, while difficult to cultivate, is a critical component in ensuring that cities suit the needs of both their citizens and visitors. Paisaje Transversal aims to do so through the gamification approach, where residents participate in a game in which they can analyze a neighborhood's overall needs and provide regenerative urban solutions that are tailored to their local community aspirations.

Participatory procedures are used in Paisajes Transversal's urban initiatives to discover a neighborhood's overall requirements and later suggest particular regeneration measures. Creating interactive and meaningful gadgets ensures that citizens are satisfied with their surroundings, all while incorporating physical interventions into the participatory process (Olszewski, 2016). This enables researchers to draw conclusions with the goal of adjusting and enhancing subsequent initiatives that are specific to community needs, rather than discrete ones. This also promotes the notion popularized by that urban regeneration is a developing and continuous process (Urban Regeneration Process, 1970).

2. GAMIFICATION

The gamification approach integrates game aspects to real-world tasks which functions as a way for making these procedures enjoyable for the users, in this case the citizens of an area or city (Thibault). The goal of this innovation is to encourage participants to engage in more appealing and engaging participation activities, while also encouraging active and consistent behavior. Games have been shown to have a motivating impact on its users, boosting their degree of involvement as a result (Kapp, 2012). Some key features of the gamification approach include (Kapp, 2012):

- Development of a system with features of a game, aimed at involving participants in an activity based on a system of rules, goals, interactions, feedbacks, and measurable score system;
- Use of particular mechanisms typical of games such as points, levels, score, or time limits for the performance of particular tasks;
- Development of a coherent plot and aesthetics characteristic of a game;
- Generating a playful approach to the activity in participants, leading to an increase in internal motivation for action;
- Focusing on the subject of the game, and increase in emotional involvement for better memorisation of new content, and faster learning in such an environment;
- Development of a clear motivational system for all participants;

Paisaje Transversal has been able to use the gamification approach in neighborhoods like Virgen de Begoña and the City of Olot. It functioned as a way for citizens' involvement towards their community regeneration projects.

3. BARRIO VIRGEN DE BEGOÑA (VdB)

The Virgen de Begoña neighborhood is one of almost 200 open-block polygons in Madrid's municipality that have been identified as priority intervention sites owing to their present state of decay. The isolation of Virgen de Begoña in particular, with borders formed by transit and infrastructure on all sides, made it particularly susceptible to deterioration. The neighborhood's vulnerabilities include building obsolescence and inadequacy, poor urbanization and low public space identity, a weakened demographic and socioeconomic structure, and limited economic opportunities due to its mono-functionality.

The area has a population of little over 8,000 people, with a sizable elderly population that is particularly susceptible. Residents of Virgen de Begoña have demonstrated they want to be engaged and committed to their communities. However, a challenge this area faces is a frequent lack of financial means to bring about the changes desired(Advocacy, 2020). In 2011, with the help of the Begoña Neighbors Association Paisaje Transversal was able to launch an integrated plan of action to address community concerns such as housing, building and public space degradation, and the need for improved economic opportunities.

Figure 1: Aerial view of Virgen de Begoña neighborhood (source: Paisaje Transversal)

Paisaje Transversal used the PIER (People Involved Effort for Regeneration) approach within the neighborhood of Virgen de Begoña (PIER, 2020). Within the PIER methodology, there exists an established list of criteria to measure the sustainability of our urban regeneration strategies from ideation to action. This allowed for us to carry out the bottom-up method, while laying out a detailed plan for improving many areas of urban life, including public space, local business, and housing. Galvanizing community involvement is integral to the bottom-up process, and so reaching community members from the beginning is essential. By connecting with the existing neighborhood networks in Virgen de Begoña, we identified existing problems as well as current and potential assets.

During the past six years, the regeneration process in Virgen de Begoña has been propelled by activism from within the community. Every year Paisaje Transversal participates in an event called "Fiestacción", a yearly celebration of local culture and civic involvement. The community's goal was to bring the neighborhood's condition of urban, environmental, and social degeneration to the attention of the City Council and the Fuencarral-El Pardo District Board, to encourage the administration to take action to help Virgen de Begoña regenerate. At "Fiestacción", we have implemented a number of projects, which have taken the form of inclusive games with instructional components. Throughout the years we have introduced two games: "Trivial VdB" and "¡Conquista el espacio público!" (Conquering public space!)

3.1 TRIVIAL VDB

Our first initiative called, "Trivial VdB" served as an introduction to local geography, history, and neighborhood dynamics. Each team is generated by neighborhood areas, depending on where each citizen lives (yellow, pink, and green). Each team rolled the

dice and whoever got the side that was labeled as “test” they began playing. Each team took turns rolling the dice and answering factual questions about the specific issue that interests them. If they answered correctly, they would place a marker in their designated neighborhood. This process continues until the question is answered incorrectly. There are 4 thematic blocks of questions: Society, Geography, Culture, and History. The aim of this game was to engage citizens within their communities and inform them of the current issues they may or may not be aware of; that is why the cycle continues until they answer incorrectly, because it ensures that topic areas that are unfamiliar to citizens are described. This can allow a tremendous amount of insight for community members and researchers like ourselves. Community members might learn about issues they may have thought were trivial and could become more willing to care about them, while researchers using these tools can understand the matters important to residents, across different community preferences.

Once a team has completed their neighborhood area, they received an urban regeneration award for each correct answer from the following categories: cultural endowment, urban gardens, architectural barrier elimination, underground parking, pedestrianization, bike lanes, recycle rainwater, reuse inter-block space, energy renovation of homes, accessibility of homes, sports facilities, and urban furniture. The game ends when a team considers that it has enough rewards and decides to withhold any further action. Finally, the citizens debated which team had the best choice for the complete regeneration of the neighborhood.

3.2 ¡CONQUISTA EL ESPACIO PÚBLICO! (CONQUERING PUBLIC SPACE!)

For the second game Paisaje Transversal manufactured a new giant board game that would serve as an urban pedagogy tool. We used the same concept as the Party & Co. game which had a defined route with boxes that included different types of games: Gymkhana, Pictionari, Taboo, Mimicry or general questions. All the games were related to the VdB neighborhood and its public space. The players were divided into three groups (green, yellow and pink, and once again, divided according to the areas of the neighborhood in which they resided. Once the teams are formed, they would roll the dice and whichever team got the highest number would begin.

Whenever a team would win a certain number of games there would be two types of prizes. For those that won a game three times in a row, the prize would be a creation of an interblock space that would serve as an open area for the neighborhood. For the team that had won 4 consecutive times, the prize awarded was one of a few rehabilitation options. The options included: either the elimination of architectural barriers, the addition of urban architecture, the installation of a wall to make graffiti, and planting trees, among other activities.

The objective of the game is not for one team to win, but rather for the whole neighborhood and its community to win. Additionally, the game included intergenerational activities, so that there were different types of activities aimed at different age groups. Therefore, it was convenient for the team to include insights from older people, adults, young adults, and children. The game ends when the public “interblock” spaces on the board are fully regenerated. That is, they have achieved all rehabilitation strategies. If a team completes its space before the rest, they will collaborate with that team to achieve more strategies for the rehabilitation of the public space. The group with the most regeneration prizes wins.

Figure 2: Trivial VdB at Fiestacción (source: Paisaje Transversal)

Figure 3: “¡Conquista el espacio público!” game (source: Paisaje Transversal)

3.3 RESULTS OF THE GAMES

The objectives of "¡Conquista El Espacio Público!" and "Trivial VdB" games consisted of generating awareness for the need to establish strategies and actions of appropriation for the improvement of residents' closest shared environment. It is a strategy aimed at promoting citizen participation and emphasizing that the neighborhood can only regenerate when the people who live in it collaborate.

The "Trivial VdB" game revealed management difficulties, provided a foundation of engagement from which to grow, and, with our support, helped define three strategic themes for the project's second phase: public space optimization, economic reactivation (to transform the residential area into a hub of varied activity), and urban edge creation (to solve the neighborhood's geographic isolation due to its boundaries).

The use of our participative indicators to identify key themes, assisted in the development and prioritization of our initiatives. The economic reactivation topic, for example, inspired us to do a communal mapping project that included both digital and physical components. The initiative of optimizing a public space led us to create a collaborative design workshop involving neighbors and specialists. A plan to activate inter-block areas illustrated where we could create public space and increase the mobility of pedestrians, particularly handicapped persons. A collaborative plan has since been in place to improve the quality of life in the VdB and Olot neighborhoods.

4. SANT MIQUEL

Sant Miquel is a neighborhood in the City of Olot that, while having valuable resources and significant potential, has had a negative reputation among the rest of the City of Olot. For many of the residents, the neighborhood is now unappealing since it is one of the areas with the highest immigrant populations (Pinyol-Jiménez, 2015). Sant Miquel has suffered neglect during the last decades that has caused deterioration in the quality of the public space, due to infrastructures like large commercial and industrial parts (#OlotMésB, 2020). This has resulted in making it a comparatively unattractive neighborhood. Sant Miquel is considered one of the neighborhoods in the City of Olot with the highest proportion of young people (#OlotMésB, 2020). In this sense, the opinion of children and young adults of the neighborhood is essential to understand the foundation of the neighborhood.

Figure 4: Integrated Urban Regeneration Plan for Sant Miquel (source: Paisaje Transversal)

4.1 JOC DE BARRI (GAME OF THE NEIGHBORHOOD)

Joc de Barri functioned as a recreational activity with the primary goal of raising awareness for the Sant Miquel project. Simultaneously, the game detected the neighborhood's major value elements: its significant spaces and its elements of identity. These aspects, like the people and local events, are what gives Sant Miquel its character. Afterwards, we gathered suggestions for improvement from the neighborhood's residents.

The groups were chosen randomly at the day of the event and all stood around a three-dimensional model of the neighborhood. Each group was given a set of questions on Sant Miquel drawn from one of five categories: geography, history, society, culture, and the environment. The team was able to build an area of the neighborhood (residential or an open space area), for each correct response . Then, the group was allowed to go on to the next phase once they had contributed to their region. Each team earned tokens for each correct response, which they could then use toward their community. Each modification had an assigned value, based on how difficult it would be to implement them (pedestrianizing a roadway, enhancing pedestrian safety, etc.). These modifications were grouped into four main themes: the neighborhood's relationship with Olot, mobility and accessibility, public and free spaces, and socio-economic activity.

As the questions were answered, each team determined together which improvements were the most vital for the area, as well as where they should be placed. The game concluded when one of the teams collected five tokens. It was then determined which side made the better selections in terms of the changes chosen and their placement.

Figure 5: Joc de Barri (source: Paisaje Transversal)

4.2 RESULTS OF THE GAMES

The Joc de Barri game was a participatory activity in which the residents were able to share their knowledge of the neighborhood and began to form a shared identity. Residents learned more about the history of Sant Miquel, its locations, and the people that are residing there by answering these questions. As a result of the improvement activities, the participants began to collaborate and collectively decide on neighborhood suggestions. Some of the main conclusions that were gathered from the Joc de Barri activity are explained below:

- Mobility appears to be one of the most important issues. Improvements were made to the security and accessibility of certain conflictive points, such as the La Canya and Les Tries roads.
- Due to their scarcity and lack of adaptability, open spaces are another pressing concern. In this regard, suggestions were made for the development of spaces such as the Ignasi Buxó park via sports activities and the resuscitation of Mas Les Mates through cultural activities.
- Avinguda Girona reappeared on other occasions, considering it necessary to improve the commercial activity of this street, which is understood as the "main street" of the neighborhood, the gateway to City of Olot and a space that must be valued.

5. CONCLUSION

Our cities' public spaces are a valuable resource. They give several opportunities for people to interact with one another and with their surrounding communities. Around the world public spaces function as an inclusive atmosphere, where everyone in the community can participate to create a healthy social environment. The COVID-19 pandemic has prompted drastic changes in public spaces, requiring communities to adapt and integrate innovative behavioural and usage patterns to meet evolving demands.

Based on collective quantitative diagnostics and community feedback through the games, Paisaje Transversal presented a strategy to make Virgen de Begona more accessible to everyone. Our first project focused on making pedestrian routes more accessible by removing physical obstacles like steps and stairways, reusing pavement and masonry, and rearranging parking and public areas. Making communities more walkable promotes public space interaction, social cohesiveness, and local business (#OlotMésB, 2020) . On the other hand, for the Olot neighborhood we saw a high demand for open green spaces. Citizens wanted more recreational areas in order for them to feel more connected with their environment and community. This and other insights offered in this project underscore the need to include community participants while also treating every neighborhood with the unique care its unique problems deserve.

In this paper the authors were able to explain how Paisaje Transversal has been able to use gamification to encourage citizens to engage and participate within their respective communities. At Paisaje Transversal, we began to consider and innovate with the gamification approach. This allowed us to handle our communities' urban changes from an integrative and participative viewpoint. We hope to show the results of the gamification approach that can transform the physical, environmental, and social reality of a neighborhood. At the same time, we also hope to incentivize citizens to understand that they can be the protagonists of their neighborhood regeneration projects. As a result, we can only be pleased with the feedback and we can declare that this gamification approach to urban regeneration is a resourceful method with measurable outcomes.

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Modern Board Games And Modern Urban Play: Design And Interaction Advantages To Foster Social And Participatory Planning.

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ABSTRACT

Human societies play games. They do it as social expression and socialization, with games being part of each group's culture. Contemporary societies tend to be complex, and there seems to lack spaces of positive social interactions from where communities can interact. Public spaces that allow urban play can explore the design innovations from modern board games. People play these games mainly for social face-to-face interaction, and planners can explore these game approaches to establish participatory planning. This paper discusses and compares three case studies of modern board game applications as serious games. Planners can use these low-tech and low-complexity games to foster urban spaces of interaction and participation. These game approaches can fuel social interactions just by allowing persons to gather and play. But can also deliver the testing and playtesting for game-based participatory. Experimentation and playtesting are essential for planners to learn how to explore games.

KEYWORDS

Board games, Participatory Planning, Serious Games, Urban Planning

1. INTRODUCTION

There is the growing notion that citizens want to participate in the collective decision-making that affects their daily life. We should expect that a planning process that allows citizens to participate and influence the decision-making process would deliver high levels of participation. But reality seems to be different. Planning processes tend to be tedious, long, overcomplicated, and participated by the "usual suspects". Even when citizens participate, they might be frustrated by the absence of feedback (Ampatzidou et al., 2018; Innes and Booher, 2018).

Planning practitioners need to feed new ways to deliver engaging and efficient planning to foster participation. Games seem to be an alternative. They can be a powerful tool urban planners could use (Mayer, 2009), especially the serious game approaches (Tan, 2016). Games can provide the tangibility, testing and learning in virtual environments with instant feedback (Salen and Zimmerman, 2004).

Designing a game is difficult. It demands time and resources. But game design knowledge can be a factor that frightens planning practitioners. This demand can jeopardize the use of games as a tool for participatory urban planning. Digital games can be powerful engaging tools, but analog games can be simpler to use, easier to adapt and empower participants' decisions and interactions (Tan, 2017). Analog games like board games can be developed as Serious Games and become engaging planning tools (Abspoel et al., 2019; Dodig and Groat, 2019).

We propose to present several cases studies of analog game development and adaptations that allowed participants to play and use the games as planning decision-making tools. We will critically compare each case study and summarize their key findings. From this comparison, we will explore the viability of using low-tech and low-complexity games as planning tools. We will focus on possibilities that urban planners can use in practice without profound game design knowledge.

2. FROM MODERN BOARD GAMES TO PLANNING GAME

Almost everyone played board games, card games and other tabletop games in their childhood. So, board games are something people can relate to. But in the last decades, the phenomena of modern board games as a hobby emerged (Sousa and Bernardo, 2019), departing from a hobby community that gather on regular bases (Rogerson and Gibbs, 2018). These game are becoming popular even outside the hobby community that gathers to play (Matalucci, 2021; Nand, 2021). Modern board games provide concrete examples of how the combination of game mechanisms, narratives and simple components can be engaging for a growing number of persons, but mostly because they are social activities (Woods, 2012; Kosa and Spronck, 2019).

Digital games are excellent for simulating complex realities, but they tend to demand higher expert knowledge to develop. To apply them in participatory planning approaches requires considerable time and resources that planners cannot mobilize rapidly. Modern board games are now more accessible. Their variety offers many possible solutions to modify and use as serious games in sustainable projects (Bilińska-Reformat, Dewalska- Opitek and Hofman-Kohlmeyer, 2020), as well as a source of inspiration to develop new serious games for collaboration and ideation (Sousa, 2021). Analog games, when compared to digital games, are more flexible, easy to adapt and modify and always foster collaboration (Zagal, Rick and Hsi, 2006).

Learning from these modern board games can be a source of innovation. Planners that want to adopt game-based planning approaches to foster participation can use them. There are several cases of game-based (Gamification and Serious Games) approaches applied in urban planning (Vanolo, 2018). Some planning approaches departed from these modern games to inspire interactive collective dynamics (Schouten et al., 2017).

But it is possible to strive to modify modern board games to deliver planning exercises (Sousa, 2020b; Sousa and Dias, 2020) and even use the concept of game mechanisms to develop new planning games (Sousa, 2020a). One alternative approach is to foster urban play spaces as physical spaces of social interaction. Citizens of all ages can play these modern board games as indirect ways to foster social ludic interactions in public spaces (Figure 1). A new community made of persons from different backgrounds can emerge. Games can be the social hub that fuels new communities and the feeling of belonging in the age of the network society (Castells, 2011). These social gathering events of board gamers are occurring in cities worldwide (Donovan, 2017). This phenomenon can be associated with the post-digital movement that values physical tangibility (Cramer, 2015). Having these spaces of play are useful because the community has organic new ways of collective interaction. These social events give planners opportunities to test and experiment with participatory game-based approaches. The analog dimension of modern board games can be a way to replicate what playful digital and hybrid urban environments have achieved (Nijholt, 2020) without such investments and digital technology expertise, being potentially more sustainable.

Figure 1. Community gathering to play modern board games (Nazaré, Portugal)

Benefiting from modern board game designs provides an immense quantity of mechanisms to build engaging playable simulations (Engelstein and Shalev, 2019). Although these board games are designed to be entertaining games they can be modified and combined to engage different player profiles and specific serious goals (Sousa, 2021). Urban planners can explore these approaches.

2. PRESENTING CASE STUDIES

We present three case studies (CS) where modern board games were tested as serious games (Ampatzidou and Gugerell, 2019). The games were adapted and combined to deliver engaging activities that could achieve predefined goals.

2.1 PLANNING OVER A MAP

In the first case study, Sousa (2020a) explored two different games played over an urban map of Leiria city, Portugal (CS1). It was possible to play an adapted version of the Spyfall game over the map to familiarize players with the urban landscape. After this game, players experimented with a different approach. Over the same map, they planned the urban system, making a planning process for urban regeneration. This game was based on emergent games that resulted from complex environments (Portugali, 2016). But this game approach was presented in a structured way, applying game mechanisms like tile-placement, adjacency effects and a defined game economy that players needed to manage collaboratively.

The sequence of games explored in CS1 allowed establishing a design thinking process where the explored urban realities acted as a context to define policies to support traditional commerce at the city centre.

2.2 MAKING AN EFFICIENT TRANSPORT NETWORK

Defining a transport network is essential to the sustainable development of any urban area. Sousa and Dias (Sousa and Dias, 2020) used the Steam board game system, challenging players to compete and build an efficient network (CS2). The game was modified because in a previous playtest, it became clear that the standard game was too complex to understand in just a play by non-gamers(Sousa, 2020c). The game was modified to reward players that build railroad infrastructures to establish the shortest paths between cities, to address the demand for cargo transportation. Players could use other players' infrastructures and get collective benefits.

Two groups played the game at the same time. In the group where the collaboration between players happens the most, the network was more efficient, and the players scored higher. In the group where players tried to block each other and avoided collaboration, the scores were less than half of the other groups. In this case study (CS2), the debriefing process was undeniably necessary. The debriefing explained to groups why some collaboration, even in a competitive game, was necessary to achieve efficiency. The analysis of the game dynamics allowed a collective reflection on the need to establish some collaboration synergies for a complex system to be efficient and distribute benefits to all participants. This kind of collective experiential knowledge is useful to address urban issues like inequality and poverty.

Figure 2. Spyfall game adaptation (Sousa, 2020a)

Figure 3. Collaborative urban regeneration game (Sousa, 2020a)

Figure 4. Playing Steam board game during CS2

2.3 FAST BRAINSTORMING TO UNDERSTAND EACH OTHERS

Contemporary urban areas tend to be complex. The overlapping of different interests, cultures, and people are hard to plan. It is difficult to find efficient solutions that deal with all the claims and demands from citizens(Innes and Booher, 2018). Collaborative planning is a possible solution (Healey, 1997). Games can be a tool to deal with this complexity and find agreements between clashing interests (Innes and Booher, 1999; Ampatzidou et al., 2018).

In the experience about brainstorming game-based approaches (CS3), Sousa (2020b) tested a sequence of games with participants that never met before. They were able to present several projects and ideas to each other in a collaborative process. Players developed ideas with dynamics fuelled by modern board games. Even rejected ideas were explored and gathered feedback to improve. This process was done in less than two hours. Playing time could be reduced even more to allow fast interactions that would fuel citizen engagement. Each game could be played in half an hour, anywhere. This approach could be done outside, in a public space and as a support process for idea collection and discussion with citizens.

Figure 5. Playing Telestrations board game during CS3

3. LEARNING FROM THE EXPERIENCES

The three case studies revealed that a small percentage of participants are familiar with modern board games (±5%). Participants realized that games are tools to achieve serious goals, although that perception increases after experimenting with the games (increase between 20% and 30%). We should highlight that this was valid for entertainment modified games and for new games developed to be serious games.

All the case studies reveal that participants considered the games more complex than the evaluations from hobby gamers. This different perception of complexity should warn us about the complexity and simulation level we can introduce into a serious game for participatory processes. This obstacle can be a problem for planners that need to guarantee that the games deliver results and provide meaningful experiences for citizens. The role of a facilitator and the debriefing stage is mandatory (Crookall, 2010). The facilitator teaches how to play the games, clarify doubts, and collects data through observation to support the debriefing processes. These observations are critical because debriefing might be the last opportunity to enable consciousness and insights from game results. The facilitator acted as a mediator to the negotiations games required.

It is important to explore if the presented case studies are applicable in fast processes and outdoor activities. The played games are conventional board and card games. Even the games explored in CS1 rely on traditional components, cards, and bits over the map.

Table 1 summarizes the serious game objectives, time demand, and if the games could be played outside. Only CS3 games could be played outside directly. CS3 games are fast, simple, and portable games. Adapting CS1 and CS2 game components could be played outside by citizens. Planners could build bigger maps and components to allow outdoor playing.

Case Studies	Serious game objectives	Complexity	Time demand	Playable outside
CS1	Learn about a city and replan it	High	2 hours	Yes, if components are adapted.
CS2	Learn about efficient transport networks	Medium	1 hour	Yes, if components are adapted.
CS3	Express ideas and collect feedback	Low	30 minutes per game	Yes, direct application in any space.

Table 1. Applicability of the Case Studies (CS) to use outdoors.

4. CONCLUSIONS

Using games for urban planning is a growing trend as urban planners recognize they need new tools to engage citizens. Participatory planning can benefit from game usage, using direct game approaches like gamification and serious games, and introducing tweaks and game elements to increase citizen engagement.

Urban planners can benefit from the tangibility, transparency, flexibility and easiness to adapt modern board games. The new modern game trends offer immense new game mechanisms urban planners can learn progressively through playtesting participatory processes.

Exploring the trend to play modern board games as social activities seems to be a

promising possibility because it allows emergent new communities that interact in public spaces. Public space that fosters these kinds of organic reunions and social interaction grants planners the opportunities to explore games and simulations. Planners can start interacting and introducing game-based planning approaches in these spaces. We argue that this is of great value to future urban planning approaches because playtesting and experimentation is mandatory to establish successful game-based planning approaches. Having public spaces prepared to play games opens many new and exciting possibilities.

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Project Disco As A Participatory Platform

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ABSTRACT

Inspired by recent developments in architecture around the topic of discreteness and the movement that emerged around fab labs, Project DisCo was created as an immersive sandbox game for playful co-design of modular structures. This paper investigates the potential of Project DisCo as a design tool for participatory projects at the scale of public spaces.

Describing ways of scenario building, we propose a module kit to play out a design brief for a participatory project, introducing different methods of shaping the interaction of participants in a design session. The paper concludes by reviewing a design outcome from an experimental design session with four participants.

KEYWORDS

Discrete, Serious Gaming, Virtual Reality, Gamification, Immersion

1. BACKGROUND

In 2014, Barcelona was the first city to make a pledge to attain urban self-sufficiency within the next forty years, following the fab city initiative, which grew out of the fab lab movement. (Diez et al., 2018) This pledge was not meant to restore the status as a medieval city state, but rather a promise for sustainable production, tied together with a free global exchange of ideas. (Gershenfeld et al., 2017, p. 8) In an open-source economy, these ideas would belong to the public domain, allowing anyone to apply, develop and profit from them, thus lowering the bar of entry for production.

1. BACKGROUND

1.1 FAB ARCHITECTURE

The ideas of Neil Gershenfeld, founding figure of the first fab labs, have been brought to Architecture not only in the form of adapting fab manufacturing, but also through so-called "digital materials", introduced by the Center for Bits and Atoms' academic research on 3D printing. (Popescu et al., 2006) This approach is based on the aggregation of modular units which combine through discrete connections, allowing for error correction to be embedded into the part geometry, similar to Lego® bricks.

This process of defining shapes as syntactical aggregations of modular building blocks has been taken up in architecture and framed in "The Discrete" (Retsin, 2019). One proponent of this approach to architectural design is Gilles Retsin, who combines the production of architecture from digital materials, with the construction of these materials in fab-labs. (Retsin, 2019)

1.2 SANDBOX GAMES

Project DisCo can be categorised as a sandbox game with a serious gaming approach; this means it does not have any objective within the game, but is meant for the creation of spatial content for use outside the game. Sandbox games allow players to shape the virtual world around them (Nitsche, 2008, p. 171). Some games like Minecraft or SimCity have made this virtual creation their sole purpose, while others like Skyrim or ARK incorporate sandboxing ideas.

Sandbox games have a long history in architectural pedagogy, linking back to the kit-of-parts exercises used in American academic institutions from the 1950s to the 1970s, most notably John Hejduk's nine-square grid problem, as developed at the University of Texas (Love, 2003). They remain relevant today as exemplified by Damjan Jovanovic's Platform Sandbox, used at Städelschule Architecture Class (Jovanovic, 2017).

1.3 FOR THE COMMONS

In his recent book "Architecture for the Commons" Jose Sanchez, another advocate of "The Discrete", envisions architecture as a participatory project in the public domain. Participation in this framing does not simply mean involvement in the decision-making procedure, but with it the propagation of actual knowledge; empowering people to make informed decisions in the processes they are asked to contribute to. As a means of knowledge propagation Sanchez asks for platforms, which offer a low bar of entry and introduce people to designing through playful tools and methods. (Sanchez, 2020, p. 107) For the purpose of architectural and political participation Sanchez developed the two sandbox games Block'hood and Common'hood with his company plethora-project.

2. COOPERATIVE DESIGN IN PROJECT DISCO

Out of these ideas for an open design platform leveraging the power of digital materials, came Project DisCo, an immersive tool for designing modular structures through a virtual reality (VR) or first-person-view approach (Drude et al., 2020). It enables users to aggregate assemblies of modular building blocks through a choreographing or shooting methodology, allowing players to experience the design space in one to one scale.

Project DisCo is built on the Wasp plugin for Grasshopper created by Andrea Rossi. (Rossi and Tessmann, 2019) Modular geometry and connection syntax can thus be created in the environment of Rhino and Grasshopper and simply exported to Project DisCo via an exchange pipeline. Once set up, users can model an assembly of building blocks by either shooting at an initial aggregation or choreograph blocks that fly around in space, through controller movements. These free building blocks, both shot and choreographed, will scan their surroundings for free connections on an assembly and snap to it, when certain conditions of proximity and alignment are met. An aggregated structure can receive further editing through the deletion of certain building blocks, or be exported back to Wasp via a bidirectional geometry pipeline, retaining full control over the assembly.

Project DisCo was first introduced at the Design Modelling Symposium 2019 in Berlin and was originally targeted towards Virtual Reality platforms. With its use in teaching, a shift in focus became necessary, when the COVID-19 pandemic hit. With students confined to their homes, the use of Project DisCo in university facilities with the VR hardware was not an option, so a strong desktop integration had to be developed. To keep the experience as immersive as possible, Project DisCo supports Anaglyph technology to allow for a degree of stereoscopic vision, providing a cheap alternative to the still rather bulky VR hardware.
The features added for desktop compatibility incorporate the shoot-mode as an alternative to the choreographing methodology and a multiplayer version for online co-design.

For the purpose of this paper Project DisCo is tested for the use case of a participatory application to co-design public spaces in a playful manner, leveraging those features recently added to the Project DisCo platform. Project DisCo is a free software in the public domain and as such well positioned to be used and adapted in scenarios that build on openness and participation.

2.1 MULTIPLAYER SCENARIOS

Most prominent among the new features, is the multi-player version, enabling the real-time co-creation of spaces. As soon as the scenario is created in Wasp, setting up all information necessary to play it out, a session can be opened by a host. After entering their names, others can join the multiplayer session simply by clicking a button, providing a low barrier of entry for anyone not concerned with the setup of the scenario in Wasp.

For the setting of the scenery additional geometry can be imported from Rhino, allowing for the usage of city models, to both mark the site and set the context for the design. In a participatory process with laymen familiar with the site, it will be especially important to provide a model that can be used for localization.

2.2 PLAYER-CHARACTERS

Once in the design environment, participants can choose from a list of player-characters provided by the creators of the scenario, which allow the users to assume different roles in the design process. These player-characters can be modelled in Wasp, through the provision of certain variables and constraints. Most important among these is the limitation of tools available to the users, by enabling just a subset of the

options available in the Project DisCo toolset (Table 1). Users can thus be designers, concerned with the creation of geometry, master planners, tasked with creating the grand scheme of the design, or editors with the power to edit what is done by others, simply by changing the palette of tools available to them. Moreover, player-characters can be constrained to certain positions or assigned a scale at which to work, further consolidating their role. It is finally possible to assign different platforms to certain players, allowing for the use of both desktop computers and virtual reality.

Available Tools	Designer in Chief	Master Planner	Artisan	Editor
Part Filters	x	x	x	
Rule Filters	x	x	x	
Placement Tools	x	x	x	x
Shoot	x	x	x	
Grow	x	x	x	x
Delete	x	x	x	x
Recursive Delete	x		x	x
Delete Sphere	x		x	x
Enable/Disable	x		x	x
Save	x	x	x	x
Load	x			
New Game	x			
Character Settings	x	x	x	x
Scale	x	x		x

Table 1. Available Tools per Player Character – Specific to project scenario

2.3 FIDELITY

The driving force behind Project DisCo is the creation of aggregations from modular systems. Any kit of modules made available must therefore follow assembly rules set up in Wasp. At the scale of public spaces, different approaches in choosing a design system are imaginable on a spectrum of abstraction (Figure 1). The example of Minecraft shows that even through a system as simple as cubes people have had great success in participatory design schemes for public spaces (Westerberg and von Heland, 2015). Project DisCo allows for the use of simple cubes as well as any other geometry. So, the opposite approach of choosing very specific real-world components is also feasible, allowing for the planting of realistic trees, choosing outdoor public furniture directly from the catalogue or using a modular building system straight from the rack. This is only limited by the quality of the geometric models used, to keep game performance at a place where it is inclusive to users on less powerful hardware.

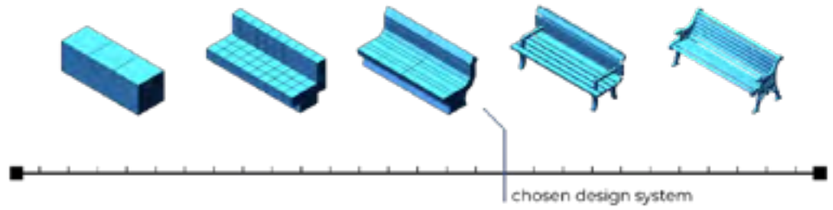

Figure 1. Spectrum of Abstraction

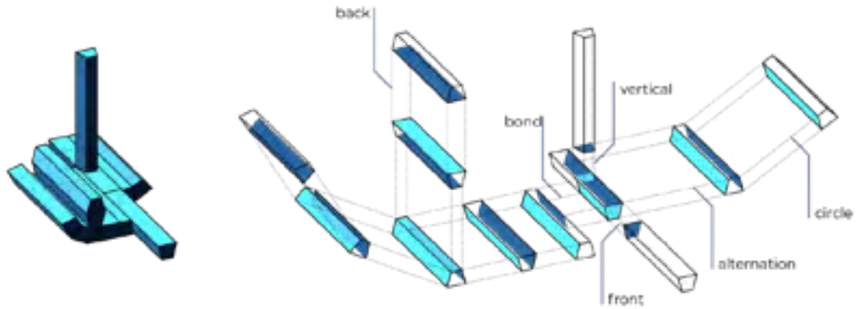

Figure 2. Module Kit Assembly Rules

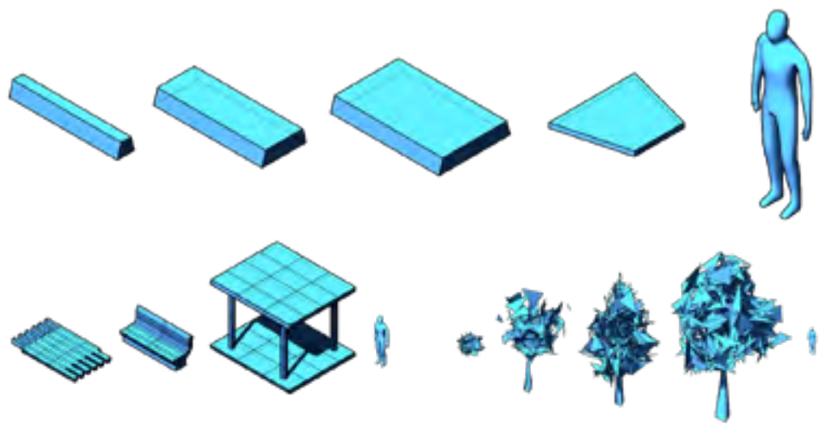

Figure 3. Module Kit

3. THE DESIGN SYSTEM

As a proof of concept, a scenario was created and played out with a group of four people equally made up of trained architects and laymen. The scenario was deliberately set on a small scale to be on a robust footing in terms of performance, though the experience has shown a lot of potential for scale.

3.1 MODULE KIT

The design system chosen is made up of modules, which could resemble real world objects, while still retaining a lot of abstraction, to keep the design process playful. The module kit is based on a beam with a trapezoid section and a length of approximately 1.15m. Due to the trapezoid section, multiple beams can be aligned to form a slab, by alternating their orientation, or form a circle from twelve beams aligned next to one another. The kit also allows for different bonds, doubling up as well as changes in direction, providing for a wide array of possible forms to emerge (Figure 2).

The base module is supplemented by two larger versions, corresponding to the size of three and five base units. The system was further complemented with a set of rudimentary architectural modules: a pavilion, a platform and a bench and completed with a trapezoid pavement slab. Outside of the system, some vegetation was added in the form of three different sized trees, modelled after maple, beech and sycamore trees, and a bush as a placeholder for all different kinds of shrubbery (Figure 3).

The system was intentionally created to be simple and easy to fabricate. While it retains a lot of openness through its abstract nature it is well equipped to be taken more literally. Modules could then be fabricated in a fab lab and constructed by laymen using tested augmented reality assembly processes (Goepel and Crolla, 2020), keeping the spirit of the fab movement in the project.

3.2 CHARACTERS

For the scenario discussed, players could choose from four different types of player-characters (Table 1). The game is led by a “Designer in Chief”, who has access to all tools in the scenario and is responsible for session management through restarting the game or loading previously created content. The design is led by one or multiple “Master Planners” tasked with placing large modules on the ground as starting points for architectural features and planting vegetation. “Master Planners” are scaled to five times the size of a normal character and can change their scale at will to work from different vantage points. Setting the grand scope of the design, the master planner should stay in verbal contact with all participants and discuss decisions, via everyday meeting software. The task of the more detailed design of architectural pieces is given to several “Artisans” on the ground, aggregating the base modules to form larger assemblies. The work of these characters is audited by an “Editor” who can delete building blocks or place specific modules at certain locations. Users can change their player-character during the scenario, allowing them to take on a role as an “Artisan” while still checking on the overall work in their capacity as “Editors”.

3.3 SITE

The site chosen for the scenario is a parking lot in Berlin Neukölln, an area known for its grassroots movements and civilian activism. It is next to the former brewery of Berlin’s largest beer brand Berliner Kindl. The building currently hosts a centre for contemporary art.

With an area of approximately 2000m² the site is comparatively small, which again was decided on, to not overwhelm Project DisCo. Here also it proved reliable and able to accommodate larger spaces. Close to Neukölln’s citizen centre and the centre for contemporary arts, the site is well fitted as a public space for community gathering.

3.4 BRIEF

At the outset of playing the scenario, the users discussed a brief for the session, setting the goal to design a park with an outdoor stage, a kiosk with an archway as an entrance, sanitation facilities and several small community gathering places. Following the initial rough division of the site by the “Master Planner”, the “Artisans” aggregated architectural pieces, all the while collaborating and checking on each other’s work (Figures 4, 5, 6).

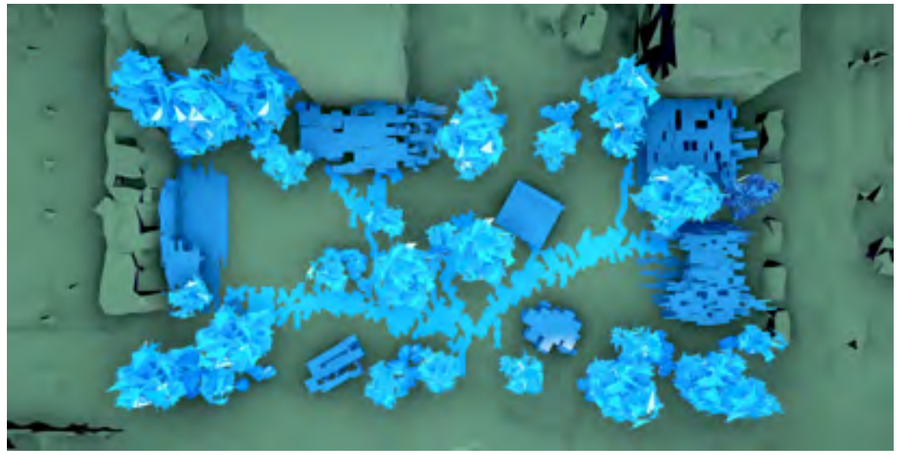

Figure 4. Aerial View of Design Outcome

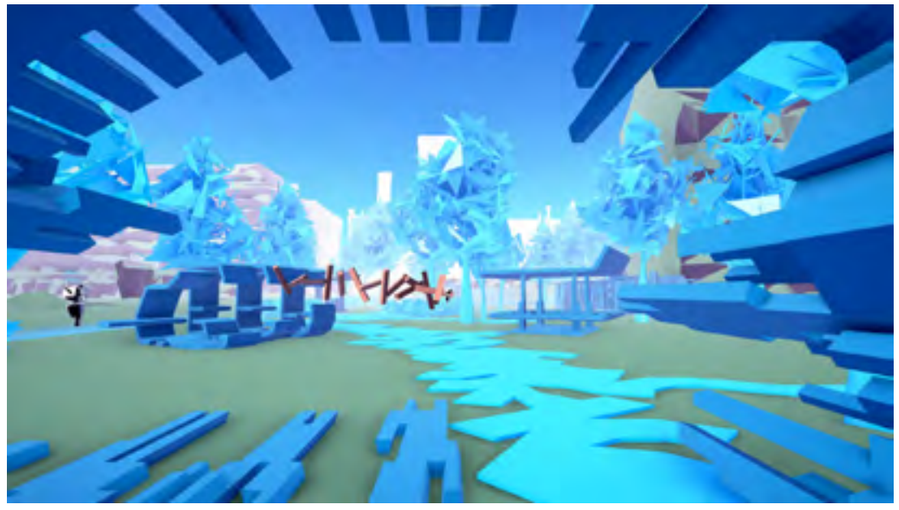

Figure 5. Screenshot from Project DisCo Scenario

4. RESULTS

The scenario was tested by a group of four people. While this low number of participants was originally chosen, to not overwhelm the new multiplayer capabilities of Project DisCo, these proved resilient and capable of facilitating a larger number of users. The session lasted approximately three hours and was preceded by one-hour worth of introduction and learning. The users not familiar with Project DisCo proved quick to adapt and immediately started collaborating and discussing desired features and concepts, working them out thereafter. Project DisCo was therefore instantly taken up as a design tool by the users, who swiftly started to come up with novel design approaches, not previously expected by the developers. Thereby, a low barrier of entry seems to be given, empowering non-professionals to quickly use Project DisCo. The knowledge slope between the use of Project DisCo and the setup of a scenario on the other hand is rather large, placing scenario building in the hands of professionals still. Due to the use of Rhino and Grasshopper on the other hand a platform was chosen that provides proven ways of knowledge transfer and has a large community base to help out one another (Hirschberg et al., 2020, p. 166), thus working with an already populated literacy ladder as requested by Jose Sanchez (Sanchez, 2020, p. 121) and extending the ladder to the general public by providing easy access to users through the gamified experience of Project DisCo.

It is to be mentioned that both of the non-professional users present in the experiment play video-games as a hobby, which could have led them to pick up the workings of Project DisCo more quickly than others. This hypothesis remains to be tested in the future, when the scenario will be repeated with a larger number of participants.

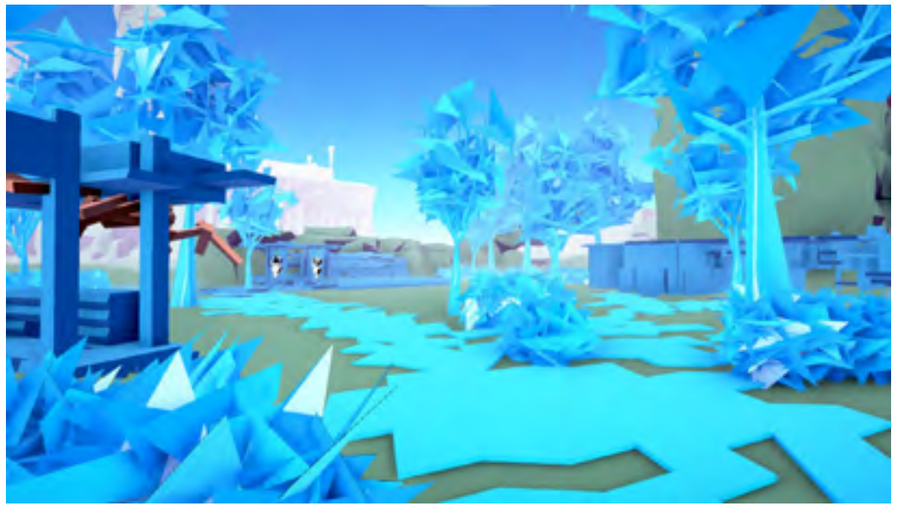

Figure 6. Screenshot from Project DisCo Scenario

5. CONCLUSIONS

It is to be concluded that we consider the experiment a success, though it should be repeated with a larger user group. We furthermore believe that a scenario on the realistic end of the abstraction spectrum would also prove to be successful. This would allow to embed building regulations directly into the scenario, constraining the outcome to be fit for construction. More generally we believe that constraints and regulations can be modelled inside participatory games to bypass the usual back and forth between different actors in the planning process.

Project DisCo is an ongoing project and will be further developed in the future. At present it is already at a stage where it is comparatively easy for Grasshopper users to pick it up and design scenarios through Wasp. To further lower the bar of entry, a platform for sharing scenario files and loading them into Project DisCo via a simple interface is part of the development roadmap. Our experiment has shown that it can be picked up quickly by users and employed to create interesting design output from architects as well as non-professionals. To further test this hypothesis another run of the experiment should be made in the future. Moreover, it would be desirable to play out an actual planning process, testing a realistic scenario in a participatory process. The writers will be forthcoming to proposals of such a project by any readers.

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Game-Based Participatory Urban Design: engaging children to co-create sustainable and inclusive public spaces

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ABSTRACT

The engagement of citizens through participatory practices can raise attention on neglected or under-represented components of society and let critical needs and issues emerge (Davidoff, 1965). It can educate citizens to positive values such as inclusivity and diversity (Friedmann, 1973) and can facilitate the actuation of urban transformation projects, activating the citizen agency (Forester 1989, 1999). It is possible to observe the emergence of innovative approaches to participatory urban design, with the objective of simplifying the complexity of the decision making process and engaging a larger e more representative sector of society. However, children are hardly included in participatory design (Bishop and Corkery, 2017).

This study aims to assess the potential of serious game approaches and gamification strategies to involve children (citizens aged <12) in participatory design processes of the public space. It presents three case studies developed at the IAAC - Institute for Advanced Architecture of Catalonia, based on the use of digital and analogue interfaces. Case studies are assessed and compared based on their capacity to engage childrens, to collect data on their needs and desires in relation to the public space, as well as to educate them to sustainability and inclusiveness and promote behavioural change.

KEYWORDS

Participatory Design, Children, Education, Serious Games, Gamification, Behavioural Change

1. RESEARCH FRAMEWORK

Participatory Design is unanimously recognized by designers and policy-makers as a key strategy in urban planning and urban design processes.
The engagement of citizens through participatory practices has several objectives. It can raise attention on neglected or under-represented components of society and let critical needs and issues emerge (Davidoff, 1965). It can educate citizens to positive values such as inclusivity and diversity (Friedmann, 1973). It can facilitate the actuation of urban transformation projects, activating the citizen agency (Forester 1989, 1999).

According to Sanoff (2011) two main challenges for participatory design processes can be found in i) making complex topics accessible and understandable to citizens who are not experts and ii) engaging a large and representative part of the population interested by a project. It is possible to observe the emergence of innovative approaches to participatory urban design, with the development of methodologies and instruments to address the above mentioned challenges. Among them, this paper wants to survey the use of digital interfaces, serious games and gamification strategies.

Already in the 1960s Negroponte (1968) identified the potential of digital interfaces as facilitators in the participatory design process. However, it is in recent years that a quantity of new tools for participatory decision-making and citizen engagement have been developed by public and private actors (De Filippi, 2020; Yang et al, 2021). Similar tools can be limited by the small number of users, due to the quality of the engagement strategies (Calzada & Cobo, 2015) or the complexity of use (Dembski et al, 2020).

Scholars have proven the potential of using Serious Games as means to represent real issues through fiction, as well as to perform complex tasks in a simplified way. Furthermore, they can allow players to develop a number of different skills (Susi and al, 2015). The seminal work of Play the City (Tan, 2020) proves the effectiveness of the application of serious games to urban planning. The methodology is based on city games that reproduce real urban scenarios and are played by the stakeholders, to facilitate the interaction, educate players, and make decisions. On the other hand Gamification has been used as a strategy to engage citizens in participatory design processes. In their extensive review, Seaborn and Fels (2015) analyze different approaches to Gamification as a tool for "engaging users in non-entertainment contexts" using typical elements of games such as scores, rules, challenges, or awards. Various researchers developed experiments comparing gamified and non-gamified tools to engage citizens, proving the better results of the first. (Thiel and Fröhlich, 2017; Romano at al., 2020).

Within this context, this paper inquires into the capability of participatory design processes to engage children, defined as citizens aged <12, considered as a fundamental component of society. For Bishop and Corkery (2017) it is fundamental to ensure that children's rights and desires are recognized by urban planners, and highlight how this can improve the design quality of public spaces for the entire community. Derr and al (2018) describe how participatory and placemaking actions can allow children to "acquire social skills" and be educated on positive values such as respect, inclusivity, sustainability. They delineate methodologies to involve them in participatory processes but point out that challenges are represented by the complexity of the topics, and the laboriousness of the engagement process.

Despite few positive experiences, it is possible to observe that the practice of participatory design processes with children is still limited. It seems convenient to enquire into innovative approaches to participatory design based on serious games, gamification strategies and digital interfaces to evaluate the potential of them to be used with children.

2. AIM OF THE RESEARCH

This study aims to assess the potential of serious game approaches and gamification strategies to involve children (citizens aged <12) in participatory design processes of the public space. We present three case studies developed at the IAAC - Institute for Advanced Architecture of Catalonia between 2017 and 2021, based respectively on the use of a digital interface, two interfaces in parallel (analogue and digital), an analogue-digital interface.
Case studies are assessed and compared based on their capacity to engage childrens, to enable the emergence of their needs and desires in relation to the public space, as well as to educate to sustainability and inclusiveness and promote behavioural change.
Each case study was organized into three phases: play, feedback, data-collection.

3.1.1 CASE STUDY A - SUPERBARRIO BARCELONA

The first case study is based on the use of the digital gaming Interface "Superbarrio" with 20 childrens aged between 9 and 12 years.

Superbarrio is a digital interface using gamification strategies to engage citizens in the co-design of the public space, developed by an IAAC research team led by Areti Markpoulou in 2017. The interface allowed each player to make a design proposal for the public space of a neighborhood which had been recently pedestrianized (Superblock of Barcelona). By deploying 3D modules in the streets and squares, represented in a 3D environment, citizens could visualize possible design solutions and understand their impact through a metric system.
Each module belonged to one of four categories (ecology, mobility, energy, social interaction) and had a score assigned related to 5 metrics (accessibility, economy, productivity, ecology and social) which represent the impact of each design solution on the neighborhood. Game mechanics were designed to foster inclusive and balanced design solutions for the neighborhood: a series of awards (bronze, silver, gold metals) were assigned to those players capable of keeping a good balance between the 5 metrics.

Each design solution was stored on an online database and visualised in an digital dashboard, to collect information about citizens' desires, needs and game behaviour.
The interface had already been tested on site, in the newly pedestrianized public space of the Superblock, in two different sessions, with a total audience of 50 users, all of them over 18 years old (Markopoulou et al., 2017). Audience was equally composed of citizens who answered to an open call and invitation online (audience-by-choice), and citizens who were passing in the streets (audience-by-surprise). The first test proved the potential of the gamification strategies to engage citizens, as well as to educate them about the impact of design solutions, to inclusivity and sustainability. Moreover, it facilitated the collection of data on citizens' desires and needs.

Figure 1 - Superbarrio Barcelona - Interface and Data Visualization Dashboard

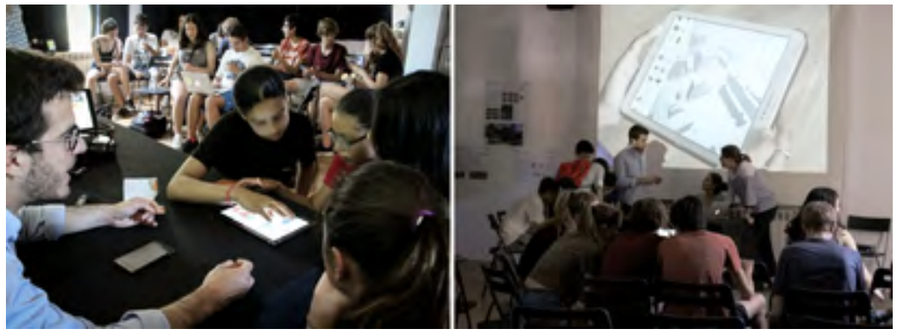

Figure 2 - Test of Superbarrio Barcelona with children Figure 2 - Test of Superbarrio Barcelona with children

In the case study presented in this paper, participants were childrens from a school of the
Superblock neighborhood, who were invited to play in the protected environment of a classroom. All the participants were living close to, or inside, the Superblock area.
After a short introduction on the Interface, participants were asked if they were in favour or against the pedestrianization. Seven out of twenty were not in favour.

The game session lasted 35 minutes, supported by 3 tablets loading the Superbarrio Barcelona interface, with one member of the IAAC team acting as facilitator. Each participant had an indicative maximum time available to play of 10 minutes.
Participants played for an average of 5 minutes, two game sessions lasted less than 2 minutes, while 1 session lasted more than 15 minutes.

In the feedback session, the majority of participants rated the experience positively, specifically the possibility to visualize possible future configuration of the public space in 3D to imagine new scenarios. In particular, one of the participants said that the game experience let him change opinion about pedestrianization, having understood the multiple potential functions of the public space. Only two participants gave a neutral assessment, showing low interest in the interface. The Data collection engine of the game showed that players in average located 20 modules each, mainly located close to the squares of intersection of the streets. The majority of the modules deployed belonged to the "Ecology" level. Out of the other levels, the most used modules were the "Energy Generating Playground" (Energy category) and the "Electric Scooter Station" (Mobility category).

3.1.2 CONCLUSIONS FROM CASE STUDY A.

We can observe that the use of the digital interface Superbarrio allowed a playful and fluid interaction with children, raising an immediate interest, and proving the potential of the interface to engage them in a complex participatory design activity. Moreover, gamification strategies such as score and the awards, proved to be able to keep the attention and interest of the players for a sufficient time to collect significant data (design modules allocated in the virtual public space by each player).
The majority of participants reviewed their proposals during the game session, editing the selected modules and proposing more balanced design solutions, in order to achieve a best score. This behaviour, observed in previous experiments with participants over 18 years, confirms that the design of the game affects the decision-making process also in children. Together with the comments expressed in the feedback session, this also proves the potential to foster behavioural-change in the users.

From the analysis of the users' performance, an important limitation was found in the limited interaction with other players offered by the interface, which doesn't support a multiplayer option. In fact, the majority of children were keen on sharing and commenting on their design decisions with other peers, but this interaction had to be limited to vocal feedback. This observation raised the attention on the possibility to embed multiplayer and interactive tools (such as a forum) in future iterations of the project.

In conclusion, we found that the gamification strategies were successful to engage childrens in the co-design process, that the use of the interface facilitates the educational process about sustainability and inclusivity and has the potential to foster behavioural change. We also found that strategies to support interaction between players could be introduced in future iterations of the project.

3.2.1 CASE STUDY B - SUPERBARRIO FAVARA - DIGITAL AND ANALOGUE INTERFACES

In the second case study we tested the use in parallel of a digital and an analogue interface with a group of 20 childrens aged between 6 and 12 years. The test was carried out in the Italian town of Favara.

The digital interface was a second iteration of Superbarrio, adapted to the local scenario, with the insertion of the 3D model of the main square of the town, the object of co-design, and its surroundings. The mechanics and functionalities of the interface were the same as the previous iteration. Each participant played individually, for a session between 5 and 15 minutes. The second interface was a multiplayer game board version of Superbarrio, introduced in the experiment to assess the game mechanics in two ways. One the one hand, to test a multiplayer functionality, without a complex development of the digital interface. On the other hand, to have a control group to compare and evaluate the impact of some functionalities of the digital interface including the tokens and awards, and the data collection engine.

In the analogue version, instead of the virtual 3D space, a 2D plan of the square had been printed on an A2 sheet, and the modules were represented by cards, each one showing a module and its value. Children were asked to play in five teams of four players of different ages for 30 minutes, with the support of an adult acting as facilitator and helping to calculate the score manually. Teams were challenged to design the most balanced and inclusive public space deploying the cards on the board, and were invited to present their final proposal to the other groups after the game session.

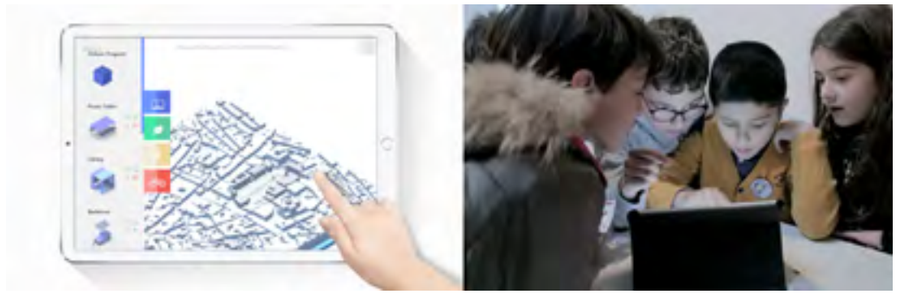

Figure 3 - Superbarrio Favara - Digital interface and game session

Figure 4 - Superbarrio Favara - Analogue game board and cards

Figure 5 - Superbarrio Favara - Score calculation and presentation of collective proposal

The game session with the digital interface counted on a team of 5 facilitators, to support players in case of technical issues. Each child had a tablet, and the majority of players played for 15 minutes, the entire time available. Only 3 participants, aged between 6 and 8 years, stopped playing after 4 minutes. We observed that, similarly to the test held in Barcelona, participants were keen on interchanging ideas and opinions orally during the game session.
During the game session with the analogue interface, children showed excitement and high interest in the activity for the entire duration of 30 minutes. However, facilitators had to support them at the beginning of the session, to remind the rules of the game, kick-off the discussion, and explain to participants how to read the plan of the square, which proved not to be easily used by the participants.

The activity fostered interaction and dialogue between children, who started to share their opinions about the public space, based on the modules offered by the interface. As it happens in real participatory design processes, the game mechanics raised contrasts between diverging opinions, and facilitators played a key role in solving them, inviting participants to take a shared decision. The function of facilitators was also to calculate the scores while childrens were playing. During the presentations of each team's proposals, children showed pride and sense of ownership for their collective project, and were able to explain the reasoning behind decisions.

In the feedback session all the participants showed a positive evaluation of the experience. The majority of them showed surprise and interest about the public space design, confirming that both the interfaces allowed them to envision possible configurations, functions and uses that they had not previously considered.

Data collected through the digital interface showed that participants deployed an average of 20 modules each. The predominant category was Ecology. The most used module out of the other categories was the energy-generating playground. The game mechanics based on the metrics and the related awards were able to inform the decision-making process and foster behavioural change, as participants modified their design solutions based on the score, in order to achieve a more balanced design. Interestingly, this is aligned with the data collected in case study A in Barcelona.

3.2.2 CONCLUSIONS FROM CASE STUDY B

The experiment with the digital interface corroborates the conclusions of the case study A,confirming the validity of the gamification strategies to engage childrens, let them share their ideas and desires, and involve them in a co-design process. It also confirmed the potential to be used as an educational tool and to foster behavioural change.

The limited interest in the digital interface shown by two participants is aligned with the data collected in the previous experiment. However, it is valid to hypothesize that the young age of them has influenced their behaviour, suggesting that a more clear user experience (UX) can be developed for children aged <8.

The positive outcome of the introduction of the analogue interface demonstrates the validity of embedding a multiplayer functionality to foster interaction between players and mutual enrichment, proving that it can be considered as a possible development in future iterations of the Superbarrio App. Moreover, acting as a control group, the test with the analogue interface enables constructive considerations on the digital game mechanics and the data collection engine. In fact, the score manually recorded on paper was not able to significantly influence the decision making process, reducing the impact of the metrics, which otherwise proved to work successfully in the digital interface. Moreover, the gamification strategies of the digital interface, such as tokens and awards, had to be substituted in the analogue one by an intense support activity made by the facilitator, which would be impossible in tests with a bigger scale. A similar consideration can be done regarding the role of facilitators to describe the printed plan of the square to the participants, compared with the immediate recognition of the 3D space in the digital version. Finally, in the analogue interface the data collection is not immediate as in the digital one, but the presence of a physical item (gameboard with cards) supports the possibility for participants to share their design solutions with others. From this last consideration, we concluded that it can be useful to develop a new functionality for the digital interface, to visualise online each player's individual proposal.

3.3.1 CASE STUDY C - PPS URBAN GAME BOARD BARCELONA - ANALOGUE-DIGITAL INTERFACE

The third case study focuses on a test made in Barcelona with the "PPS Urban game board", an analogue interface in the form of a game board, augmented with sensing devices (camera tracker and computer vision) in order to collect data about the users' behaviour and proposals. The interface was developed in the framework of the Public Play Space Project, co-funded by the Creative Europe programme of the European Union and developed by three international institutions: IAAC - institute for Advanced Architecture of Catalonia (Spain), BUas - Breda University of Applied

Sciences (Netherlands) and CLAC lab (Italy). The project promotes innovative and creative practices for the co-design of inclusive, cohesive and sustainable public spaces, through the use of games and digital technologies.

The PPS Urban Game Board was tested in September 2020 in the Parking Day of Barcelona, an event which aims at raising awareness on the social and ecological importance of public spaces and promoting their pedestrianization: parking lots are assigned to associations and institutions to develop placemaking actions.

The PPS Urban Board Game is a digitally fabricated interface that can be deployed in any Public Space of the city and wants to enable participatory design processes of the public space, through playful interaction and advanced digital technologies. Following a DIY (Do-It-Yourself) logic, the PPS Urban Board Game is open source and can be adapted to other cities. In fact, it can be downloaded, adapted to the context and reproduced in every digital fabrication lab in the world.

The board represents a sample neighborhood of Barcelona in three dimensions. The public space is drawn on a rollable water-resistant surface, while buildings are manufactured in recyclable plywood using Digital Fabrication tools, reproducing different typological elements of Barcelona's built environment.

Following a simple set of rules, the player can develop a proposal for the design of the public space: different "cards" represent functions belonging to six categories: Health (physical and mental) and Safety, Resilience, Energy and Carbon Neutrality, Food, Circular Economy, Mobility.

Figure 6 - PPS Urban Game Board - Cards in the public space and description of the categories

Figure 7 - PPS Urban Game Board - Game session with children and view of the interface

Each player counted on an available budget of 50 points, which could be invested in the purchase of different modules for the city's public space, including all the categories. Each module had a value of 2, 3, 4 or 5 points.
Differently then in case study A and B, there were no metrics related to the balance of the district, but only the rule to use modules from all the categories. Players were in fact challenged to deploy the entire number of cards obtained with 50 points, and we tested if the interaction with other players and proposals was able to foster inclusivity and diversity.
A camera-tracker collected information on each proposal with the aim of generating knowledge about the desires and needs of players.

The two-hours event was open to citizens of all ages, including children aged between 3 and 12. The activity had been promoted on social media, but it didn't require registration, and the majority of participants were passersby.
The experiment took place during the Covid-19 pandemic, and therefore finds some limitations in the limited number of 20 players and in logistic requirements which limited the potential of the interface, such as the interaction of maximum three users and social distance. This might reduce the validity of the data collected, however, it is possible to describe key aspects of the players' behaviour, children in particular , and extract significant conclusions.
The interface was able to generate interest in all the users, including children, and engage them in playing for at least 5 minutes each. Children used to ask for information about each card, despite the presence of icons on each one of them. A facilitator was therefore needed to support them, as well as to calculate the score. Facilitators took advantage of each interaction to reiterate information on the game mechanics, as well as notions about the concepts of sustainability, health, and circularity.
The interface fostered interaction between players of different ages (child-to-child, child-to-adult, adult-to-adult), as the majority of them decided to play in groups of two or three users. Co-design proposals were therefore the output of a collective, relational process.
The multiplayer game mechanics encouraged dialogue and confrontation between users. In addition, it was possible to observe the influence of each design decision on the proposals of other players. For instance, players used to deploy benches or water fountains close to trees placed by other participants, or biogas stations close to urban orchards. This phenomenon also let emerge areas of major interest in the game board, where more cards were deployed through this collective and reciprocal process.
The feedback on the experience from participants of all ages was positive, and in particular children expressed their surprise and interest about innovative functions and uses for the public space proposed by the interface.

3.3.2 CONCLUSIONS FROM CASE STUDY C

The interface proved to be able at engaging a variety of users, confirming the potential of playful interaction and gamification strategies to involve citizens, and specifically children, in a potential participatory process.
We found that the 3D environment was beneficial to allow players to visualise and understand the scale of design and the spatial relations in the built environment.
A possible limitation can be found in the need of a high level of interaction between facilitators and players about mechanics and scores, which suggests that a more intuitive description of the game can be developed. However, this interaction corroborates the validity of the PPS Urban Game Board as a mediator for educational processes related to sustainability and inclusivity. In fact, children who participated in the event learned new concepts and experienced complex interactions with other peers and adults throughout the action of Play.
The experiment proved the validity of a multiplayer functionality, confirming the results of case study B. Nonetheless, we can observe a limitation in the difficulty to extract useful data about individual proposals and needs when the final co-designed solution is the result of a collective effort. This type of data is needed to structure participatory processes with a large number of participants. This suggests that future iterations of

the process might be articulated into two phases: an individual session to let single participants' opinions emerge, and a collective session to let participants interact and find common solutions.

4. CONCLUSIONS

The aim of the research is to assess the potential of serious game approaches and gamification strategies to involve children (citizens aged <12) in participatory design processes of the public space. The three case studies presented prove that serious games and gamification can be beneficial with regards to the three aspects analysed: engagement, education and behavioural change, data collection on needs and desires of children in relation to the public space.With the introduction of analogue systems as control groups we proved the validity of digital interfaces as responsive systems capable of augmenting and facilitating the participatory design process. Furthermore, we found that multiplayer functionality can foster dialogue and confrontations between players, promote the development of social skills and improve education to inclusivity. Notwithstanding that a series of limitations have been identified, the study aims at contributing to the state of the art promoting further research and projects in the field of children-focused participatory design processes.

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Carbon Crunch

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ABSTRACT

The building industry alone contributes to 39% of worldwide global carbon dioxide equivalent (CO2e) emissions divided into operational and embodied carbon. Operational carbon comprises the emissions from active building processes, while embodied carbon includes the emissions from building materials. The associated operational carbon has been reduced through the advancements in buildings, but the embodied carbon remains static. Embodied carbon is intangible to building occupants, yet it can contribute up to 49% of life-cycle emissions. In this paper, we present Carbon Crunch, an augmented reality game that educates individuals on the environmental impacts of building materials and empowers them to make better decisions. The game employs the Global Warming Potential (GWP) of building components as a key metric and allows users to swap out assemblies for maximizing carbon savings in a virtual building. Adopting the game in existing and newly developed public spaces can help propel sustainability to greater social prominence. This project aims to encourage communities and governments to embrace green material choices, thus facilitating sustainable urban development.

KEYWORDS

Embodied Carbon, Augmented Reality Game, Carbon Footprint, Carbon Dioxide Equivalent (CO2e), Global Warming Potential (GWP)

1. INTRODUCTION

The architecture, engineering, and construction (AEC) industry is currently using 40-50% of global raw materials and generating 40-45% of worldwide carbon dioxide emissions (Maassarani, Khalifa and Mohareb, 2017). When considering a building's life cycle, energy consumption can be separated into operational and embodied uses. Operational carbon is released from regular building processes like space conditioning and ventilation, while embodied carbon is emitted during the production, transportation, and installation of a building's constituent materials (Jensen et al., 2021) (Petkar, 2016). Due to advancements in technology over the years, building-related operational carbon has declined but embodied carbon remains static (Taffese and Abegaz, 2019). As the world's population approaches the ten-billion mark, the global building stock is expected to double in size, significantly increasing related embodied emissions (Lucon et al., 2014). The increasing ratio of embodied to operational carbon represents a significant hurdle for tackling climate catastrophe (Dascalaki et al., 2020).

Unfortunately, it is difficult to communicate the complexities of the embodied carbon problem to building occupants, especially since there are only limited and abstract financial incentives for reducing embodied carbon. A recent survey across Europe highlighted that most people acknowledge the basic tenets of anthropogenic climate change but do not raise strong concerns about the issue, which can be attributed to the feeling that personal efforts are futile (Poortinga et al., 2018). A study also found that while six in ten Americans say that the global warming issue is important to them, seven in ten Americans report that they "rarely" or "never" discuss the topic with family and friends (Maibach et al., 2016). Talking within social networks of friends and family can also stir up opportunities to voice opinions that would otherwise be kept to oneself (Priest, 2016). Discussions can also increase public engagement through collective stimuli (Goldberg et al., 2019).

The key to sustaining large-scale psychological change is the awareness and education of lay citizens. From a behavioural science perspective, a gamification is an effective tool for explaining climate change to a diverse audience (Wu and Lee, 2015). Playing games is an emotive experience, instigating fervour and enthusiasm to solve complex problems (Shaffer et al., 2005).

Therefore, Carbon Crunch has been developed with an intention to bridge the knowledge gap among non-experts. As an interactive game, it helps interpret and analyze the global warming potential (GWP) of the materials used in our built environment. Adaptable for smartphones, the augmented reality (AR) game allows a public visitor to engage with the built environment directly through their screens.

2. METHODS AND MATERIALS

2.1 SCOPE

The scope for embodied carbon is limited to the cradle-to-gate or the product stage (ISO 14040:2006, 2006). The core reason behind this qualification is the ease of availability of data for the production stages (A1-A3) in most countries. Additionally, showing users the amount of carbon emitted to produce and distribute for a material encourages greener material selection. The users can also play with the time factor, showing the trade-offs between the embodied carbon and the age of a building. To give them a sense of the associated costs, the price (in US dollars) per kg has been provided. The work could be extended to include end of life scenarios as part of the next stage.

2.2 TARGET AUDIENCE

The users include a broad range of visitors to any public space, from enclosed buildings to outdoor public spaces. The main target group consists of students and young professions between 18-29 years, based on smartphone usage in public areas (Andone et al., 2016). Younger visitors (from ages 7-14 years) to a public place, accompanied by parents, also constitute the primary user since this acts as an opportunity for informal learning and social interaction between the two to explore and learn together. Apart from this, architecture, design, and construction professionals, and climate change activists are also recognized among the key end-users. Policymakers, governmental organizations, and the municipality form the secondary user group.

2.3 TECHNOLOGY

The current prototype of the game has been built in the Unity game engine (Unity Hub, version 2020.b.0b12, Unity Technologies, San Francisco, California, USA) with Visual Studio (2019, Microsoft Cooperation, Redmond, Washington, USA) as the integrated development environment for additional features. The end product is imagined to be a standalone AR application for Android and iOS devices. The technology used is mixed mode, consisting of marker-based and markerless AR. The application aims to use real-time geolocation data and build an urban digital twin of the city.

2.4 PILOT PROJECT

This study was conducted as part of the course GSD-6338: Introduction to Computational Design at the Harvard Graduate School of Design during the Fall of 2020. For the demonstration of the project, Moesgaard Museum, designed by Henning Larsen Architects in partnership with Kristine Jensen Landscape, has been selected. The new 16,000-m2 Moesgaard Museum building opened in 2014 and is located in Skåde, a southern district of Aarhus, Denmark. This project attracts visitors from all over Denmark and even beyond, with an estimated 74% of visitors travelling from outside of the Aarhus municipality (Michael, 2020). The blurring liminality of the built environment into the natural landscape offers spatial variety. Further, the landmark sees visitors of all age groups throughout the year, even in winter when the terrace can be used as a skiing slope. The project was built with a key focus on creating value through a hierarchical integration of sustainability at the economic, social, and environmental level (Moesgaard Museum / Henning Larsen, 2015). Therefore, this project acts as a perfect prototype for Carbon Crunch.

Figure 1. Aerial View of Moesgaard Museum (Courtesy of Henning Larsen Architects)

Figure 2. Interior View of Moesgaard Museum (Courtesy of Henning Larsen Architects)

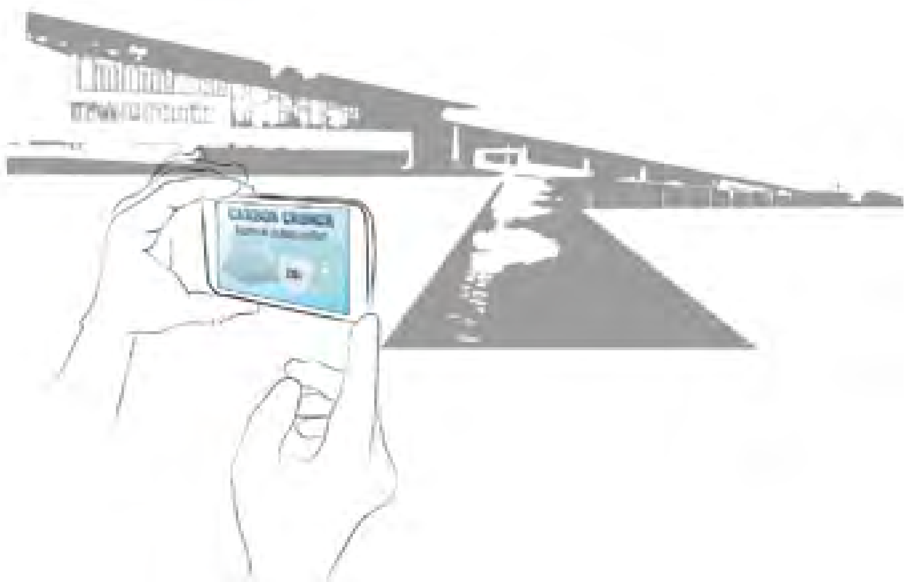

Figure 3. Visual representation of the game prototype, as seen on a smartphone

2.5 Data Collection

The 3D model, the drawing layout, and the material data for the Moesgaard museum have been graciously granted for this study by Henning Larsen Architects. As demonstrated in Table 1, the total GWP (unit= KgCO2e [Kilogram Carbon Dioxide equivalent]) data for a variety of building materials, including the materials used in the museum, is derived from three sources, namely, Ansys®Granta Selector (Granta CES, 1994), Inventory of Carbon and Energy (ICE V3.0) (Hammond and Jones, 2019) and the Embodied Carbon in Construction Calculator (EC3) database (The Carbon Leadership Forum, 2019). This complete database is used for game development. For the service life of building material, we have used the default values derived from Tally® Revit Application (KT Innovations, 2020). The cost values have been adopted from various online retailers. Details of online retailers are shown in Table 1.

Building Assembly	Ranking	Material	Cost/unit (USD/unit)	Mass (Kg)	Service Life (Years)	GWP Intensity (KgCO2e/Kg)	Total GWP (KgCO2e)	Life-Cycle Cost (USD)
Ceilings A	Better	Seamless Gypsum Ceiling	55363	150035	40	0.31	46361	83045
	Base	Portland Cement Stucco	27682	249965	60	0.46	114734	27682
	Worse	Perforated Metal Ceiling	553633	463314	60	13.90	6437297	553633
Doors B	Better	Wood	553633	17661	30	0.86	30231	1107266
	Base	Steel	332180	22954	50	2.46	67750	398616
	Worse	Aluminum	442907	14311	30	5.85	167719	885813
Floors B	Better	Engineered wood plank	166090	15964	50	1.48	24622	199308
	Base	Granite Tiles	138408	327862	50	0.74	299774	166090
	Worse	Carpet	55363	20774	10	8.00	966363	332180
Glazing A	Better	Monolithic Sheet	622837	77932	40	1.44	155373	934256
	Base	Double Pane Air-Filled	1204152	102613	40	1.63	250890	1806228
	Worse	Triple Pane Air-Filled	1494810	155360	40	1.75	407819	2242215
Insulation A	Better	Cellulose	1457439	167936	60	2.83	458284	1457439
	Base	Mineral Wool	2072603	259100	60	3.80	984581	2072603
	Worse	XPS	244617	43682	60	74.35	3273940	244617
Structure A	Better	Plywood Joist	50131	86433	60	0.68	58861	50131
	Base	Aluminum Joist	604844	241938	60	5.65	1366948	604844
	Worse	Steel Joist	524942	690713	60	2.46	1699153	524942
Window Frame C	Better	Plywood	10136	17477	40	1.48	51798	15206
	Base	Vinyl	55882	37647	30	2.83	213082	117788
	Worse	Aluminum	48060	19224	45	13.90	356288	64081

GWP: Global warming potential, XPS: Extruded polystyrene, KgCO2e: Kilogram Carbon dioxide equivalent
References for GWP database:
A= Ansys Granta Selector, B= Inventory of Carbon and Energy, C= Embodied Carbon in Construction Calculator
Reference for retail cost:
D= homeadvisor.come, E=fixr.com, F= grainger.com, G=homeguide.com, H= costowl.com, I= window-guide.com, J= lowes.com, K= homedepot.com

Table 1. Statistics and information used in Carbon Crunch.

3. CARBON CRUNCH GAMEPLAY FRAMEWORK

Any visitor to the museum can enter the game either through the downloaded application on their smartphone or by accessing the web version. In scenarios where smartphones are not readily available, the museum may provide a usable screen device. Details of target users are explained below.

The users would need to scan a marker through their phone to embark upon the digital twin journey. Upon entrance, they are given the opportunity to learn more about embodied carbon through intuitive graphs and charts, as shown in Figure 4. The player gets a sustainability primer on the difference between operational and embodied carbon, an explanation of GWP, and the significance of good material choices. The player is further introduced to the rules of the game. Distributed through different spatial locations are floating and glowing cubes, called 'Zero – The Information Halo' (Figure 5 and 6). The distinctive title of the cubes resonates with the end goal of the game, which is to reduce the embodied emissions as much as feasible. Each face of the cube holds a different set of information on embodied carbon that the players can browse through by rotating the cubes. The cube is also the main scoreboard, where the final score is displayed in the form of trees felled or planted (Figure 7). This is based on the fact that trees sequester over 30 Kg CO2 each year on average, approximating at 39.4 Kg CO2 per tree/year (Kendall and Gregory McPherson, 2012). The visualization in the form of a tree makes it easier for the player to comprehend the impact.

When pointing the smartphone to different building assemblies, an augmented button prompts the user to click for details. On clicking the button, the player is given three material options to choose from. To make the game challenging, specifications on the cost (in US dollars) per Kg and the service life (in years) are also provided. The user must account for trade-offs, a practice that architects and construction professionals grapple with within the design process. On choosing a material, the player is led to the next screen, which shows how the material performs compared to the other two materials. The player can see the GWP (in KgCO2eq) for the respective material, translated into the carbon sequestration through a tree.

Figure 5. Visual representation of the game interface on starting the game. The game shows the user a map to find 'Zero-The Information Halo.'

Figure 4. Visual representation of the game interface on a smartphone upon game start. The user is provided an option to learn more about embodied and operation carbon emissions

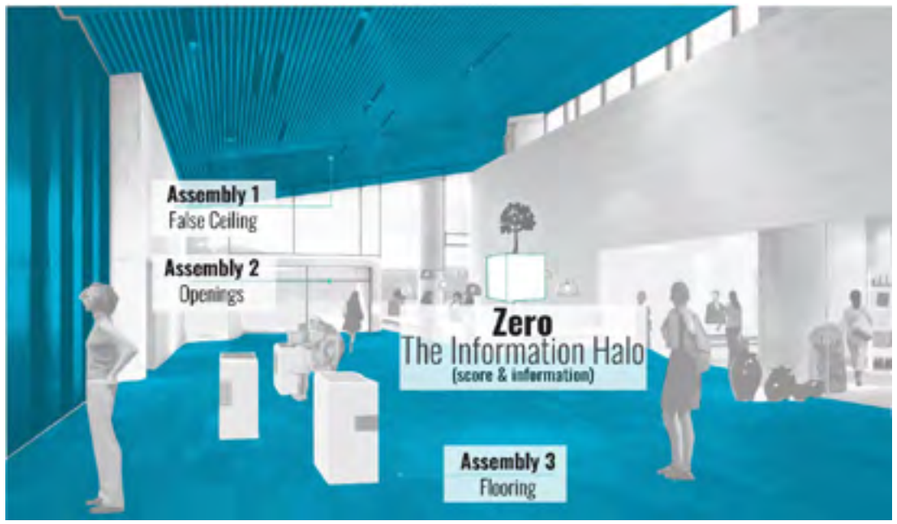

Figure 6. Visual representation of different game components, including 'Zero – The Information Halo' and recognized building assemblies like false ceiling, openings, and flooring

Figure 7(A-D). Visual representation of the gameplay. A) Each visible assembly is highlighted. B) Assembly selection. C) Results tab. D) Final score

Figure 7A highlights each visible assembly with a button; Figure 7B appears when the user selects one of the assemblies. Here, they have to choose a material for the respective assembly. In the illustrative example of a window frame, the options to choose from are aluminium, plywood, and vinyl, each accompanied by their cost and service life. Figure 7C is the result tab in the game interface that highlights the GWP value and the resulting score in the form of equivalent trees planted or felled. In this particular case, the user has chosen plywood with a GWP of 70 kgCO2e and plants 8 trees in the long term, making the player a winner. Figure 7D shows the final score displayed on 'Zero,' which keeps updating as the game proceeds and the user moves on to other assembly choices.

The scoring strategy has been adopted to highlight the difficulties of arriving at a carbon-positive scenario. Adding each material increases their aggregate GWP due to individual contributions. However, materials like timber actually help sequester carbon, which can lower the GWP figure. Using materials with high embodied carbon or material intensity, like reinforced concrete, will swiftly increase the building's total emissions. Such materials have a severe impact on the final score, and the player will be able to understand which materials are more environmentally friendly.

Similarly, a player can go to different locations in a public space or building to study each material and attempt to reach zero trees felled or even a positive score. In this game, paradoxically, a diminutive score, which highlights that fewer trees are felled, makes you the winner. The algorithm suggests that reaching a positive score, suggesting planted trees, is extremely difficult for a building. In an open space, however, if the green spaces with existing or proposed trees are taken into consideration for the carbon sequestration by accounting for the stored carbon stock, a positive score shall be easier to attain (Gülçin and Konijnendijk, 2021)

4. OUTLOOK AND FUTURE WORK

Already in the Anthropocene epoch, we are at a brim of an ecological disaster. Mass education is necessary to improve the deteriorating environmental condition. Our visual game, Carbon Crunch, provides an opportunity to stimulate the audience of any public space through deep-seated realization. This can catalyze action and drastically improve the individual's learning curve, thus providing a holistic approach to mass education.

4.1 SCOPE OF EXPANSION

The pilot project is an enclosed campus building with limited access to the public. Still, this project is applicable for expansion to other landmarks in a city, including open, semi-open or enclosed spaces.

The primary repercussion bearers from this game are the architects, designers, material manufacturers, developers, and builders. Engaging society with an interactive game, which highlights the importance of each material used for the built realm, can guide sustainable practices. For example, non-experts can transform into informed home and property buyers and conscious shoppers. Inspiration can spur the creators of tomorrow's sustainability solutions. American city and state policies are seeing a tremendous rise in environmental policies (Koźluk and Zipperer, 2014). But the rise needs to be accelerated to meet the climate goals. Through Carbon Crunch, we aim to start a movement rooted in the ordinary citizen and ultimately pressure governments and corporations to take significant steps in this direction.

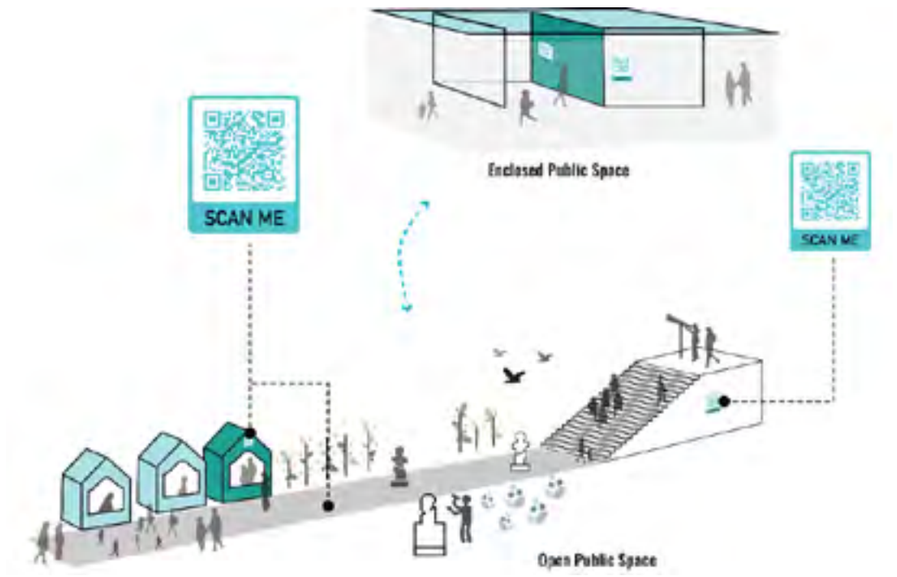

Figure 8. An illustration highlighting the scalability of the game across all public spaces: open, enclosed or semi-enclosed.

4.2 Future work

Carbon Crunch currently uses trees to measure the final score to convey the significance of material choices. However, studies have shown that citizens respond better to urgency when the trade-offs are presented in economic units (Poortinga et al.,2018). Therefore, the scoring framework can be revised with this consideration.

A carbon tax is a fee that companies and organizations pay to balance out emissions. 40% of the countries worldwide have adopted this tax in some form (Metcalf and Weisbach, 2009). To demonstrate its ramifications to non-expert residents, this concept can be explored in the game.

Furthermore, studies from Europe show that people are most worried about the affordability of energy, with 40% reporting being extremely worried (Poortinga et al.,2018). The game can be expanded to include the energy consumption for heating, cooling, and artificial lighting, along with the associated costs.

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CONFLICT OF INTEREST

Kritika Kharbanda and Jakob Strømann-Andersen are currently employed by Henning Larsen Architects. All other authors declare no conflict of interest.

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Taking Sustainable Tourism Planning Serious - Co-Designing Urban Places With Game Interventions

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ABSTRACT

Though stakeholder involvement as participants in academic research is a well-known and widely practiced procedure to enhance the research field of tourism planning practices, more 'freshly energised' approaches within the broader field of social sciences are called for. This paper introduces 'serious gaming' as an innovative tool for multi-method qualitative and quantitative research to enhance tourism research. This paper introduces 'serious gaming' as an innovative tool for multi-method qualitative and quantitative research to enhance tourism research. Based on an interactive computer-supported turn-based board game, multiple players are invited to focus on a specific problem in a given context (i.e., destination planning). Being recognized as an interdisciplinary and co-creative research methodology that is widely accepted for stakeholder participation in fields like marine spatial planning and urban planning, the suitability for tourism will be discussed in this paper.

The study demonstrates how serious gaming is a disruptive and transformative method to understand stakeholders' attitudes and changing beliefs systems of tourism planning. It can be finally said that serious gaming provides a powerful platform for local, national, and international stakeholders to engage in new forms of collaborative and social learning through simulation, role-playing and deep system thinking.

KEYWORDS

Tourism Planning, Participative Methods, Serious Game, Game Intervention

1. INTRODUCTION

Latest developments in tourism destination planning are becoming more challenging and complex. While the whole tourism ecosystem is trying to adapt to changing environments such as digitalisation, climate change and the global pandemic, destinations in small need to quickly learn to adapt how the 'new' normal may look for their destination (Ateljevic, 2020). Tourism destination planning demands a close consideration into the most urgent questions to address sustainability, inclusion, and equality. So far, an appropriate response to these new challenges is without much inspiration and seems partially overwhelming to handle by those responsible. As the development and implementation of policies addressing the complexities of tourism is not a tourism-only problem (Koens, Postma & Papp, 2018), but more inclusivity needs to shoulder a complex mission that is embedded in a variety of national and international networks. From a Western-European point of view, Mata (2019) suggests a more inclusive governance that builds the bridge to a wider policy structure to handle tourism in the city and be prepared for disruptive challenges. These approaches require cooperation between multiple city stakeholders, many of whom do sparsely communicate or do not even know of each other's existence (Koens et al., 2018; Waligo et al., 2013).

2. A CLAIM FOR PARTICIPATIVE METHODS

Considering the shortcomings of current mechanisms, innovative, creative methods need to be introduced to break through deadlocked government arrangements, silo mentality, and barriers of cooperation to persist the status quo. New methods have proven to facilitate stakeholder engagement, perspective taking and most importantly, create trust in a destination (Beritelli, Bieger & Laesser, 2007; Russo & Scarnato, 2018; McCabe, Sharples, & Foster, 2012). This also implies that to establish tourism more deeply as an integral part of city development, the continued effort and knowledge of practitioners as well as research is required to facilitate this paradigm shift (Fayos-Solà & Cooper, 2019; Koens et al., 2018; Lalicic & Weber-Sabil, 2019). To remedy the situation, approaches within the broader field of tourism sciences are needed in order to expand and grasp the complexity of destination planning processes in light of the problems at hand (Wilson & Hollinshead, 2015; Lalicic & Weber-Sabil, 2019).

2.1 SERIOUS GAMING FOR TOURISM PLANNING

This paper presents 'serious gaming' as a disruptive intervention method that is ambidextrous as it can dismantle assumptive frameworks that exist in destination planning among stakeholders and co-construct new knowledge about the complexities inherent to the domain of destination planning. The concept of serious gaming arose from experiences with military strategy gaming (Abt, 1970), which has migrated into education and business since the 1950s. Since the notion of information and communication technologies (ICT), the concept has developed into a substantial industry branch and research field (Crookall, 2010, Mayer, 2012). In doing so, serious games make use of i) technologies of games and ii) the principles of play to achieve objectives that are valued not for their intrinsic value (i.e., merely for the sake of entertainment), but for the extrinsic value achieved by the consequences (i.e., learning about a problematic). Players' willingness to engage in play and suspension of disbelief provides voluntary conditions for learning and change of beliefs (Mayer, 2012). Overall, the aim of a serious game session is to create more awareness and understanding of the underlying topic among the players (Keijser et al., 2018).

The principle of serious gaming relies on a computer-supported game that caters for 15-20 players gathering around a physical game-board and computer-visualized screen (Mayer, 2012) and lasts between two to three hours with three to four game turns. So far, the method has been used to facilitate stakeholder engagement in complex context, provide opportunities to deepen mutual understanding, and explore new ideas in fields like maritime spatial planning (Mayer et al., 2013; Keijser et al., 2018) or urban development (Poplin, 2011). In tourism, the concept of gaming was recently introduced in the context of tourist experience design (Xu, Buhalis & Weber, 2017) or as an innovative education method (Adukaite et al., 2017).

We illustrate how serious gaming can be applied to facilitate a deeper dialogue for tourism research in regard to contemporary destination planning. Throughout 2017 and 2018, a computer-supported board game specifically aimed at sustainable urban tourism planning was developed and beta-tested in January 2019. Further game sessions with six cities took place moderated by the same team. The cities varied in terms of number of inhabitants, geographical position in Europe, tourism infrastructure and tourism challenges. In total, 55 players representing various stakeholders in the destinations (basic profile: age average 39 years, 60% women) joined the game sessions.

2.2 RESULTS FROM A SERIOUS GAME SESSION

The aim for the players in the serious game sessions was to develop a sustainable strategy for their city under the premises of an influx of tourists into the city and a shortage of tourism infrastructure with continuous game turns. Players were required to collaborate with each other in order to develop and implement sustainable solutions by interacting with the game elements such as the digital game dashboard, tokens, the game board, and policy cards, presented in Figure 1. The game play was centered around the physical game board, which represented a simplified versions of various areas of the city in which the game was played in players got assigned to different roles belonging to specific stakeholder groups (i.e., sectors of mobility, accommodation destination marketing, and attractions) which we asked them to choose different than the role they had in real-life (Mayer, 2012). During the game turns, player groups interacted on the physical game board suggesting different planning proposals (e.g., adjusting infrastructure) or proposing policies. The tourism infrastructure (i.e., landmarks, entertainment parks, hotel buildings) were represented by 3D miniatures (see Figure 1), where the policy cards were represented in card-form related to each player role (i.e.. 'Increase a type of hotel in the city'; 'Make buildings CO2 neutral'). To pursue those actions, the teams negotiated with each other and interpreted values represented on the digital dashboard displaying the competing values of sustainable urban tourism (Koens 2005). After each game turn, the players explained their implemented actions and policies, and which values they expected to change on the dashboard. Previous and current values were visualized on the dashboard (see Figure. 1) and served as interpretation together with the facilitator.

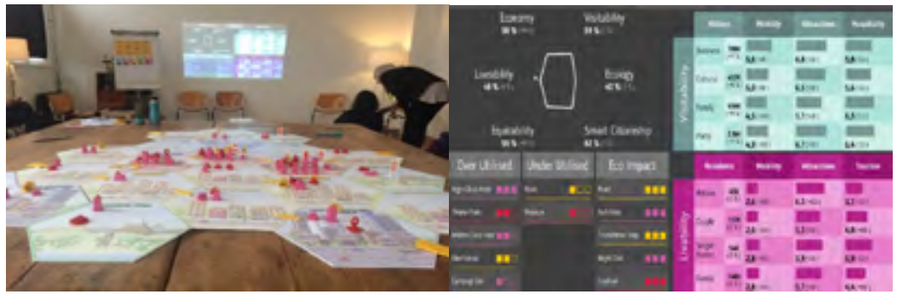

Figure 1: Visualization of the game board, tourism infrastructure miniatures and dashboard

Significant observations of the sessions indicate that the players could easily associate with the given game situation and immediately discussed with the other groups to develop a sustainable tourism strategy. All players were eager to learn and ask questions about the game interface to make informed decisions. The dashboard was actively used to encourage players to reflect on their decisions and adjust where necessary. For example, after observing the altering dashboard, a player called for more engagement among the other groups and pinpointed that more collaboration is needed during gameplay. Interestingly, across all game sessions, players realized relatively quickly that collaboration with other teams was a central focus to work towards a common goal and future of their destination. Observing the playing behaviour revealed that, even though players predominantly tried a pro-active approach to collaborate, some actions where not fully aligned, or their outcome was unclear to the players. Often, players pursued their own ambitions, which regularly resulted in short-term solutions as opposed to developing a long-term strategy, which reflects to some extent reality (Beritelli et al., 2007).

Thus, preliminary results of introducing serious gaming into sustainable tourism planning can be summarized in the perspective practical implications i) providing a tool that facilitates a high level of cooperation and collaboration between stakeholders, and ii) the nature of gaming provided space for creativity, exploration and testing of different scenarios, iii) players appreciated the possibility of making mistakes and learn from them; iv) players had the possibility to change perspective by taking on different roles, and v) players understood that tourism planning processes involve a high level of complexity, collaboration and that solutions need to be prioritized based on available resources.

3. CONCLUSIONS

From a methodological perspective, the tool is resourceful, as it allows various formats of data collection during a game session. In doing so, researchers have the possibility to create a holistic picture of the effectiveness of serious gaming on stakeholders' engagement levels in tourism planning throughout a three-to-four-hour game session. The methodology allows for qualitative and quantitative data collection before, during and after the game play. Indubitably, for serious games to reach their full potential for sustainable tourism planning, game developers need to work closely with an interdisciplinary team of tourism professionals and tourism researchers to develop a suitable representation of the tourism ecosystem. Researchers and practitioners are encouraged to view destination planning as an evolutionary learning process, which starts at the individual stakeholder level, but soon requires the collaboration among all stakeholders within the destination and urban planning level.

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Mind Games

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ABSTRACT

This paper describes the preliminary stages and the theoretical and methodological inspiration for the design of UrbanCraft, a gamified activity based on Kevin Lynch's mental maps and aiming at enhancing youth participation and inclusion in urban co-design and governance. This activity draws on previous local experiences on participation and social inclusion, held in the Southern Italian city of Palermo, in an attempt to mix urban studies, serious games and artificial intelligence methodologies. In this experiment, we designed a gamified activity conceived for nine- to twelve-year-old primary and secondary school children, due to our previous cooperation with several primary and secondary schools in Palermo. Overall, the goal of this proposal is to adapt Lynch's notions of imageability and public images to a serious game and lead the players to an enhanced spatial awareness of their neighborhood and the entire city. Although UrbanCraft is still in its early design stages, the existing network of public institutions, research centers and schools provides a fertile ground for developing the project.

KEYWORDS

Mental maps, youth participation, serious games, NLP, Palermo

1. MAPPING NEIGHBORHOODS: PREVIOUS EXPERIENCES AND FUTURE PERSPECTIVES

Starting in 2013, the city of Palermo hosted a project aimed at involving students of primary and secondary schools and increasing their social awareness of the role of neighborhoods and communities in the contemporary city, with particular attention to participation and the active involvement of young people in the processes of urban co-design. This project, called 'La scuola adotta e progetta il quartiere' (The school adopts and designs the neighborhood) merged the more technical themes of urban planning with the qualitative approach characterizing most social sciences (Figure 1). Thanks to a memorandum of understanding with the Municipality of Palermo, several innovative activities related to the 'adoption' of neighborhoods were carried out (Picone, Schilleci, 2020).

Public spaces had a pivotal role in the project. Its final goal was to redesign several public spaces close to the schools involved in this experience. Young people were led to imagine a renewed function for those public spaces they perceived as abandoned or misused.
From a theoretical point of view, the project drew on the relationships between urban studies and education studies. In Italy, in addition to the well-known work of Tonucci (2005), the most recent contributions to this field have been provided by Malatesta, 2015 and Giorda and Zanolin, 2019. Similar approaches are common in other European countries: see Deinet (2017) for the German-speaking area (with a very interesting analysis on the relationships between pedagogy and urban planning) and Dickens (2017) for the United Kingdom.

Figure 1: Poster of the final event of the Palermo project in 2017.

Throughout all the project, mental maps—as theorized by Lynch (1960) and later revised by Gould and White (2002)—played a key role in helping schoolchildren to express their ideas on the spatial organization of the neighborhood, on what it lacked and needed (Figure 2). Mental maps were used as tools for the support of participation (Picone and Lo Piccolo, 2014; Pánek, 2016) and often linked to the development of qualitative cartography, especially qualitative GIS (Cope and Elwood, 2009).

Figure 2: Mental map of the Arenella neighborhood in Palermo, drawn by a 12-year-old student of the Sileno school in 2014.

However, mental maps can be more than simple tools providing qualitative data to insert in a GIS framework. Mental maps—especially when employed with young people—can also inspire a playful approach to urban planning (Poplin, 2011). This consideration, along with the cooperation on other projects based on serious games (Spotorno, Picone and Gentile, 2020), brought the authors of this paper to the idea of designing a serious game.
To the best of our knowledge, there are no games explicitly focused on Lynch's mental map and the processes behind its realization.

For this reason, in this paper, we present a proposal of an urban game relying on artificial intelligence methodologies designed to support children in the co-construction of a shared mental map. The proposed game, which we are tentatively calling UrbanCraft, will support a collaborative knowledge-building process, facilitating the negotiation of subjective points of view related to the perception of public spaces, which is the core of Lynch's discourse.

The idea behind this proposal is to stimulate a shared exploration of how spatial elements relate to each other and to analyze their functions, leaving their 3D graphic representation only as the final step of a process that is primarily cognitive and social, rather than strictly architectural.

From this point of view, the shared mental map that is the output of the co-design process supported by the game can represent a valuable starting point for the graphic representation process of public spaces.

2. SERIOUS GAMES FOR PARTICIPATORY URBAN DESIGN PROCESSES

As highlighted in the literature (Redondo et al., 2020), there are several examples of serious games used to facilitate citizen participation in urban design processes (Majury, 2014; Tan, 2020) or to educate/encourage young people to participate in the design of public spaces (Westerberg and Von Heland, 2015; de Andrade et al., 2020).

Broadly speaking, two main types of serious games can be identified:
- Games for fostering the comprehension of public systems dynamics, like cities;
- Games to facilitate the architectural design of spaces.

The first category of games includes all those experiences in which construction and management games such as SimCity have been adopted to facilitate the understanding of decision-making processes at the basis of public administration management.

The second group comprises all those experiences that rely on the possibilities offered by some games to provide a graphical (generally 3D) representation of public spaces. Within this group, some experiences leverage the realism of the virtual representations produced by the system (IAAC, 2021), often exploiting the possibilities offered by tools such as 3D-visors, that enhance user experience (Fonseca, 2020).

On the contrary, when the games have a more explicit educational goal, the realistic representations are replaced by simplified representations like block worlds, typical of some game environments such as Minecraft (Majury, 2014; Westerberg and Von Heland, 2015; de Andrade et al., 2020).

A notable exception to this broad classification is the experience gained in the Play the City project, in which the role-playing technique typical of games such as Dungeons & Dragons was adopted to generate creative processes of co-design of spaces (Tan, 2020).
Artificial Intelligence methodologies have been successfully used in serious games (Westera et al., 2020) and at the same time have been also proposed to support collaborative urban planning processes, for example to understand the emotional state of citizens, using sentiment analysis, as well as to facilitate data categorization and reasoning by exploiting semantic/cognitive models (Meza et al., 2021; Urban et al., 2021).

Intelligent virtual agents have been used in simulation games to recreate real world scenarios where players (citizens or policy makers) can explore the effects of administrative decisions (Pilato et al., 2011).

To the best of our knowledge, there are no serious games exploiting AI to support children in the construction of shared mental maps, as Lynch describes them. Hence our proposal of a still-to-be-fully-developed serious game, UrbanCraft.

2.1. URBANCRAFT

The goal of our serious game is to support school children in the collaborative creation of a shared mental map of their neighborhood. The game will foster the production of a map according to Lynch's model, starting from the individual student's perception of the space around them. These shared mental maps are what Lynch used to call public images: "Each individual creates and bears his own image, but there seems to be substantial agreement among members of the same group. It is these group images, exhibiting consensus among significant numbers, that interest city planners who aspire to model an environment that will be used by many people. Therefore this study will tend to pass over individual differences, interesting as they might be to a psychologist. The first order of business will be what might be called the public images, the common mental pictures carried by large numbers of a city's inhabitants: areas of agreement which might be expected to appear in the interaction of a single physical reality, a common culture, and a basic physiological nature" (Lynch, 1960, p. 7).

The game is accessible through a simple graphical interface, where the student can build an abstract spatial representation by selecting and placing items from an inventory.
A virtual assistant facilitates the process of collaborative building of the map, by providing explanations and exploiting semantic modules to analyze the students' activities. The activities concern the shaping of the neighborhood (or district, in Lynch's terms) with the items picked out from the inventory, and the description of the inserted items by choosing and setting features tags and by annotating the items with words or sentences. The semantic modules allow the virtual assistant to refine and merge the students' contributions in a shared mental map.

3. ENVIRONMENT AND GAME MECHANICS

The student accesses an inventory composed of a simplified version of the typical mental map concepts. It is simpler than the graphical differentiation proposed by Lynch, since only three basic shapes are displayed in the inventory:
- Circles, representing Nodes and Landmarks.
- Lines, representing Paths.
- Squares, representing Districts and the related Edges.

The choice of avoiding the explicit distinction between Nodes and Landmarks, and between Districts and Edges is motivated both by the need to provide greater freedom to the players in the interpretation of the elements to be selected and by the will to not overburden them with a bunch of information.

Moreover, the students can select specific instances (see below for a few examples) that characterize the area of interest from the inventory. The teacher/tutor could list these specific instances in the setup phase of the classroom activity.

The student can characterize the elements with feature tags and textual descriptions. Feature tags are considered from spatial, social or functional points of view and allow to capture what Lynch calls imageability, "that quality in a physical object which gives it a high probability of evoking a strong image in any given observer" (Lynch, 1960, p. 9).
Examples of physical features can be shape, dimension, color, arrangement, building type. Examples of social features can be utility, importance, popularity, pollution, pleasantness, dangerousness. Each feature has a proper icon representing it. Examples of functional tags are play, walk, meet, sit, listen.

Students can provide a value for each feature, and that value will influence the appearance of the element in the map. They can also choose among the features displayed in the interface or create new ones, by selecting the value type.
Apart from explicitly giving a connotation to the elements by setting or creating features, students can also provide a textual description. Their choices will influence the graphics of the map and will at the same time feed a semantic network that will constitute the structured knowledge base of the virtual assistant.

The user can 'play' with Lynch's elements to build the map in a playful and fun way, according to a specific goal proposed by the school teacher. A classic example is to invite students to describe the path that leads them from their home to school, as well as the main urban features (i.e., landmarks) they can find along this path.

Using a real-time approach, the students working on their assignment will see items entered by their classmates appear on their map.

Through this real-time integration, supported by both the virtual assistant and the teacher, students will be challenged to find new connections between these elements or improve their description of the elements.

3.1. THE VIRTUAL ASSISTANT

A virtual agent assists the students in the creation of the map. It provides suggestions and explanations by displaying messages on the interface, and supports the process of refining and merging the contributions of the students. It exploits Natural Language Processing (NLP) modules that analyze the available knowledge to (1) put in relation the activities made by the different users, contributing to the definition of the shared map, and (2) detect meaningful concepts and the presence of emotional content in the textual descriptions.

The agent's knowledge is composed of a symbolic component, represented by a semantic network and a semantic vector space. The semantic network represents the conceptual representation of the neighborhood that emerges from the students' activities (it is updated from time to time with the different choices made by the students).
The semantic vector space is a sub-symbolic representation of the district created by means of a data-driven methodology by the analysis of:

- Textual objective data about the place (e.g., information extracted from a GIS system);
- Documents describing the element of the district.

It is well-known how semantic spaces make it possible to obtain a 'sub-symbolic' representation of natural language elements, such as words, sentences, and documents in a high-dimensional vector space. According to the so-called 'geometric metaphor of meaning,' elements close in the space can be considered semantically similar (Landauer et al., 1998; Sahlgren, 2006).

After a pre-processing of the text (removal of punctuation, reduction of words to their lemmas), the descriptions of the map items are mapped in the semantic vector space and compared according to their distance.
Such a choice allows to capture the associations between the different textual descriptions and clarify the relationships between the information entered by the students. Consequently, the agent can propose suggestions to refine the map (e.g., for merging elements).

Moreover, with the support of ad hoc lexicon and the information codified in the semantic space, the agent searches for the presence in the text of nouns that can be associated to strategic elements of the neighborhood, and of verbs that can be associated to the main city activities.

This analysis allows the agent to better identify the typology of the items and the relations with other elements of the neighborhood that were not depicted by the students. If the result of this analysis leads to an interpretation shared by many students, the agent can suggest a refinement of the map, by making explicit a distinction between Nodes and Landmarks and reshaping Landmarks with a triangle to be compliant with Lynch's traditional graphical notation. If the analysis leads to few subjective interpretations, the agent can highlight them to open a discussion in the class (for example to clarify the point of view of students and let the class decide whether a change must be performed, for example the introduction or removal of an element on the map).

Moreover, a sentiment/emotion analysis module searches for the presence of emotional content in the text to estimate the emotional relationship between the individuals and the urban space.

The identification of a shared emotion associated with a place is obtained by combining the characterization of the items performed by the students setting the feature tags with an emotional connotation available in the inventory and the results of the sentiment/emotion analysis module.

The items in the map will be then colored according to the emotions they evoke most strongly in students (Figure 3).

Figure 3: Sketch of the game interface.

4. CONCLUSIONS

Although UrbanCraft is still in its early design phase, we are quite certain of its ability to be introduced and used in primary and secondary schools. Given the previous cooperation with several local schools and the existing network with the Municipality of Palermo and its council members, our goal is to test UrbanCraft in 5 to 10 schools next year. Naturally, the impact of (hopefully) post-Covid regulations will have to be taken into account and will determine the kind of experimentations we will implement. In any case, we believe that Lynch's approach to subjective spatial perception can become an essential tool for gamifying the school children's notions of neighborhoods and cities and empower them as active citizens, by involving them in all the stages of participatory techniques aimed at urban decision-making processes. There is still a lot of work and implementation to do, but we believe UrbanCraft could easily become a powerful tool to be used in all primary and secondary schools, since it will be extremely easy to adapt it to several local contexts outside of the specific case of Palermo.

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Gaming As A Key Approach For The Recovery Process Of A Public Space: The Case Study Of The Old Chemical Plant ‘Chimica Arenella’ In Palermo

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ABSTRACT
This poster describes the FORGE (FactOry of uRban GamEs) project, a proposal that our research group launched in partnership with the Municipality of Palermo (Italy) and other local stakeholders in 2019.

FORGE will be hosted in what was previously a chemical plant (the former ‘Chimica Arenella’) and is an open factory designed to collect needs and to generate interventions for urban Innovation. The four key terms we have used for the project are urban, game, factory and participation. In fact, FORGE employs a participatory methodological model based on the concept of game, aimed at supporting social and economic development through a platform for participatory codesign. FORGE also plays a key role in fostering social inclusion, becoming a ‘participation hub’ and an urban center for the whole city.

Gaming as a key approach for the recovery process of a public space: the case study of the old chemical plant ‘Chimica Arenella’ in Palermo

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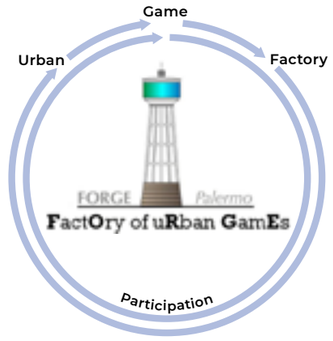
The Arenella district is named after a seaside borough along the narrow strip of land between Monte Pellegrino and the sea. The seaside town of Arenella was born at the end of the 17th century around the Tonnara Florio. After 1860, the village becomes an industrial area with the establishment of the 'Chimica Arenella' (Arenella Chemical Plant) and a series of other facilities, including a few stone quarries and other activities related to the naval industry. Furthermore, the Chimica marks the passage from an economy strongly linked to fishing to an industrial one.

The Chimica Arenella complex today looks like a set of empty spaces and buildings that, unable to tell the story of their past, seem deprived of their future.
This condition of aphasia, far from constituting a limitation, can instead be the starting point for its regeneration and reopening to the neighborhood and the city.
The marked contrast between its historical background and the present suggests the redevelopment of a once productive area. Therefore, this area has been selected for a renewal project.

Participation
Two focus groups have been an instrumental experiment to conceive co-design participatory processes.

Identified issues and suggestions:
- Accessibility of the area and necessity to restore the access by the sea;
- Game dimension as a mechanism of social inclusion and economic development;
- Interest for the enterprises in a facility provided by FORGE;
- Virtual reconstructions allow to make visible what no longer exists or is inaccessible.



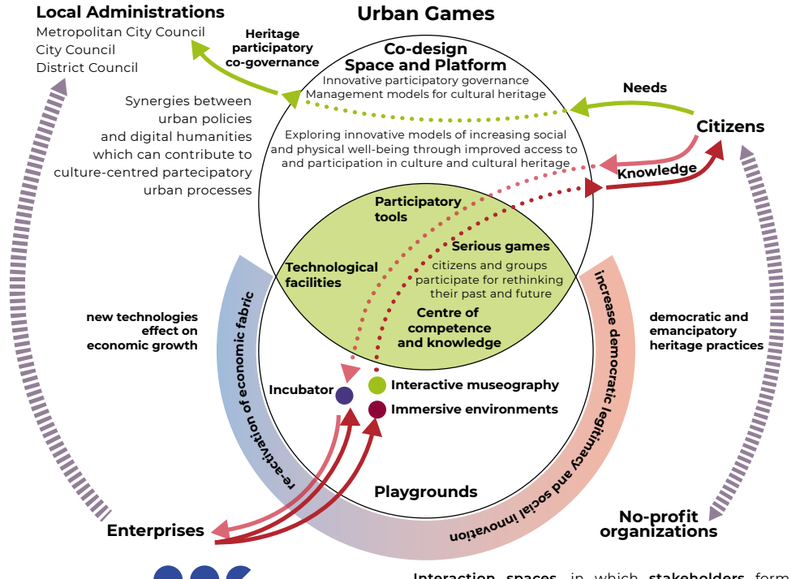
This 20th century factory in disuse becomes a ‘factory’ for the new millennium, a fluid space collecting interdisciplinary skills, speaking the universal language of games, and cooperating to create new development opportunities.

FORGE is an open factory designed to collect needs and to generate interventions for urban innovation.
It is a laboratory where the citizens, under the coordination and coaching of qualified staff, are called to ‘identify problems’ and ‘contribute to solving them’ through an open campaign of challenges and city emergencies launched in the form of a ‘call for ideas’ and a ‘call for solutions’.

FORGE becomes a fluid space in which scientific, technological, and entrepreneurial skills cooperate to create new forms of active citizenship aiming at the recovery of an industrial archaeology area.

A technological and competence infrastructure, an augmented environment with innovative technologies available to economic operators (i.e. incubator).

FORGE employs a participatory methodological model based on the concept of GAME, aimed at supporting social and economic development through a platform for participatory co-design. FORGE plays a key role in fostering social inclusion, becoming a ‘participation hub’ and an urban center for the whole city.



PUBLIC PLAY SPACE SYMPOSIUM

Interaction spaces, in which **stakeholders** form **public-private-people partnership** (4Ps), prototyping, validating, and testing of new technologies, services, products, and systems in **real-life context**

sketches by Sandro Giacomarra

Stakeholder Participation For Eindhoven Knoopxl

The Netherlands

Micheline Hounjet
Sanna Laumen
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Royal HaskoningDHV

ABSTRACT
The Eindhoven project KNOOPXL includes municipal plans for redevelopment of the city centre around the train station. Together with stakeholders within the area, the municipality aims high for the integration of blue-green solutions within the plans. Due to COVID19-restrictions the stakeholder involvement mostly happened online. With the combination of 2 interactive tools, ideas for blue-green solutions within the area were collected and public-private collaboration discussed.

The first session was an introduction into the topic of climate adaptation and different viewpoints from public and private parties. It addressed the need to combine public and private spaces to allocate blue and green solutions. For this purpose we developed a serious game on the topic within the 3DExpo online environment.

The second session was a practical, collaborative modelling exercise and used to find the best locations for blue and green solutions in order to create an integral and improved Rail Station area. In this session we used the collaborative modelling tool for resilience strategies STAIN.

Both sessions resulted in discussions, understanding and results in a short amount of time. The second session also produced valuable ideas for the further development of the area and ways to collaborate.

PROJECT - Stakeholder participation for Eindhoven KNOOPXL

Royal HaskoningDHV
Micheline Hounjet, Sanne Laumen, Sanne Bogers

Brainport Eindhoven is growing and the international project KNOOPXL includes municipal plans for redevelopment of the city centre around the train station. Together with stakeholders within the area, the municipality aims high for the integration of blue-green solutions within the plans.
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The second session was a practical, collaborative modelling exercise and used to find the best locations for blue and green solutions in order to create an integral and improved Rail Station area.

During the first stakeholder workshop the 3DExpo Climate Adaptation Game was played.
The game uses five questions that need to be discussed and answered. They range from issues like heat-island effects, drought and flooding to collaboration guidelines.

Participants liked the fact that they could discuss with each other and learn from different viewpoints.

For the second workshop the tool STAIN was used as a collaborative modelling exercise. The municipality first drew their plans for the area in the tool and explained it to the other participants. The different stakeholders started to design additional green and blue solutions and shared the plans they already had for the area that could be upgraded by combining them to the other plans and ideas.
The result was labelled as an exercise result and will not be used as an actual plan, but it did result in interesting ideas and locations for a blue-green KNOOPXL.

64 Ways Of Being

Australia

Dr Troy Innocent
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ABSTRACT

Melbourne is transformed into a playable city through an inventive blend of live art, game design and public art. People and place are connected at locations across the city via augmented reality encounters capturing different ways of being. These experiences reimagine Melbourne's identity as expressed through its creative, linguistic, cultural, social and urban diversity.

Games draw people into playful, imaginative ways of being. Live art brings people into experiences that are situational and happening now. The relational nature of public art feeds critique and speculation on the built environment. Bringing these three disciplines together creates a unique opportunity to work with the city as playful, creative material.

Over a three-hour experience traversing the centre of Melbourne, players enter a laneway portal, follow a companion, play amongst fields of creatures and animated beings, make music with street art and hear stories about place.

In this first journey, nine ways of being are mapped via emotional cartography – each augmented reality artwork is named via words from multiple language that speak to feeling and place – forming an encyclopedia of experience that maps the multiplicity of moods and memories that make up our collective lived experience of being in cities.

64 WAYS OF BEING

SEE YOUR CITY THROUGH NEW EYES

64 Ways of Being
augmented reality art experience 2021
Dr Troy Innocent / one step at a time like this / Millipede

keywords: *urban play, augmented reality, public space, live art, game design*

You're on Elizabeth St, you're listening to a story about how water used to flow here down to the Yarra, you see eels swimming in amongst the trams, cars and people. But actually you're in the privacy of your own phone playing a game. It's not a game you can play anywhere, it's happening now, here, to you – you're playing the city.

In 64 Ways of Being, Melbourne is transformed into a playable city through an inventive blend of live art, game design and public art. People and place are connected at locations across the city via augmented reality encounters capturing different ways of being. These experiences reimagine Melbourne's identity as expressed through its creative, linguistic, cultural, social and urban diversity.

Games draw people into playful, imaginative ways of being. Live art brings people into experiences that are situational and happening now. The relational nature of public art feeds critique and speculation on the built environment. Bringing these three disciplines together in a location-based augmented reality game creates a unique opportunity to work with the city as playful, creative material.

64 Ways of Being is a free augmented reality art experience through which players see their city through new eyes. The platform has been developed with the support of a Creative State Commission resulting in a platform that supports unique journeys through public space.

The project and first journey through the Melbourne CBD was launched in April 2021 after two years of development involving collaboration between artist gamemaker Dr Troy Innocent, live arts collective one step at a time like this and game developer Millipede.

Across three acts, the Melbourne CBD journey starts on the steps of Parliament and ends with a contemplative walk along the Birrarung. Along the way, players enter a laneway portal, follow a companion, play amongst fields of creatures and animated beings, make music with street art and hear stories about place.

The evocative soundtrack mixes music made in Melbourne and by indigenous artists with fragments of narrative and poetry to create a score for the player as they move through diverse urban environments. Each track is triggered by the players location and is timed to match the ambience, architecture and sense of place as players walk through the city.

In this first journey, nine ways of being are mapped via emotional cartography – each augmented reality artwork is named via words from multiple language that speak to feeling and place – forming an encyclopedia mapping the multiplicity of moods and memories we experience through the collective lived experience of being in cities.

The experience is delivered via a unique blend of live art, game design and public art that explores the cultural, linguistic, creative and urban diversity of the world through urban play. Each augmented reality artwork is created in response to each unique location through place-based research and community consultation.

Further journeys are planned – mapping 64 ways of being in Melbourne and beyond. The platform has been developed to support new experiences at new locations, in each case creating a bespoke soundtrack and augmented reality art experience that responds to the urban character of each place.

iOS / Android app

https://www.64waysofbeing.com/

@64waysofbeing

PUBLIC PLAY SPACE
SYMPOSIUM

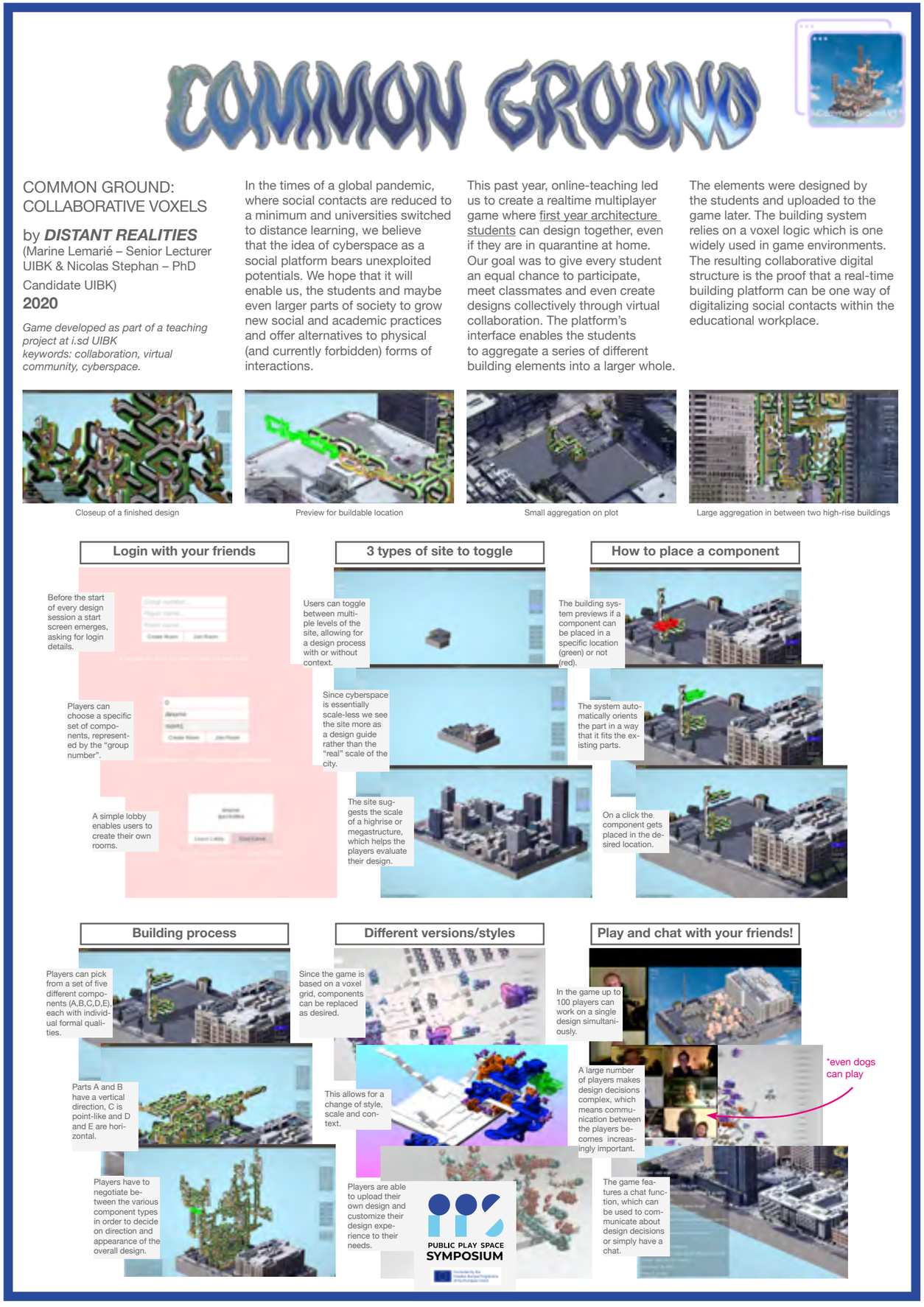
Common Ground: Collaborative Voxels

Austria

Marine Lemarié
Nicolas Stephan
Distant Realities

ABSTRACT
In the times of a global pandemic, where social contacts are reduced to a minimum and universities switched to distance learning, we believe that the idea of cyberspace as a social platform bears unexploited potentials. We hope that it will enable us, the students and maybe even larger parts of society to grow new social and academic practices and offer alternatives to physical (and currently forbidden) forms of interactions.

This past year, online-teaching led us to create a realtime multiplayer game where first year architecture students can design together, even if they are in quarantine at home. Our goal was to give every student an equal chance to participate, meet classmates and even create designs collectively through virtual collaboration. The platform's interface enables the students to aggregate a series of different building elements into a larger whole.
The elements were designed by the students and uploaded to the game later. The building system relies on a voxel logic which is one widely used in game environments. The resulting collaborative digital structure is the proof that a real-time building platform can be one way of digitalizing social contacts within the educational workplace.



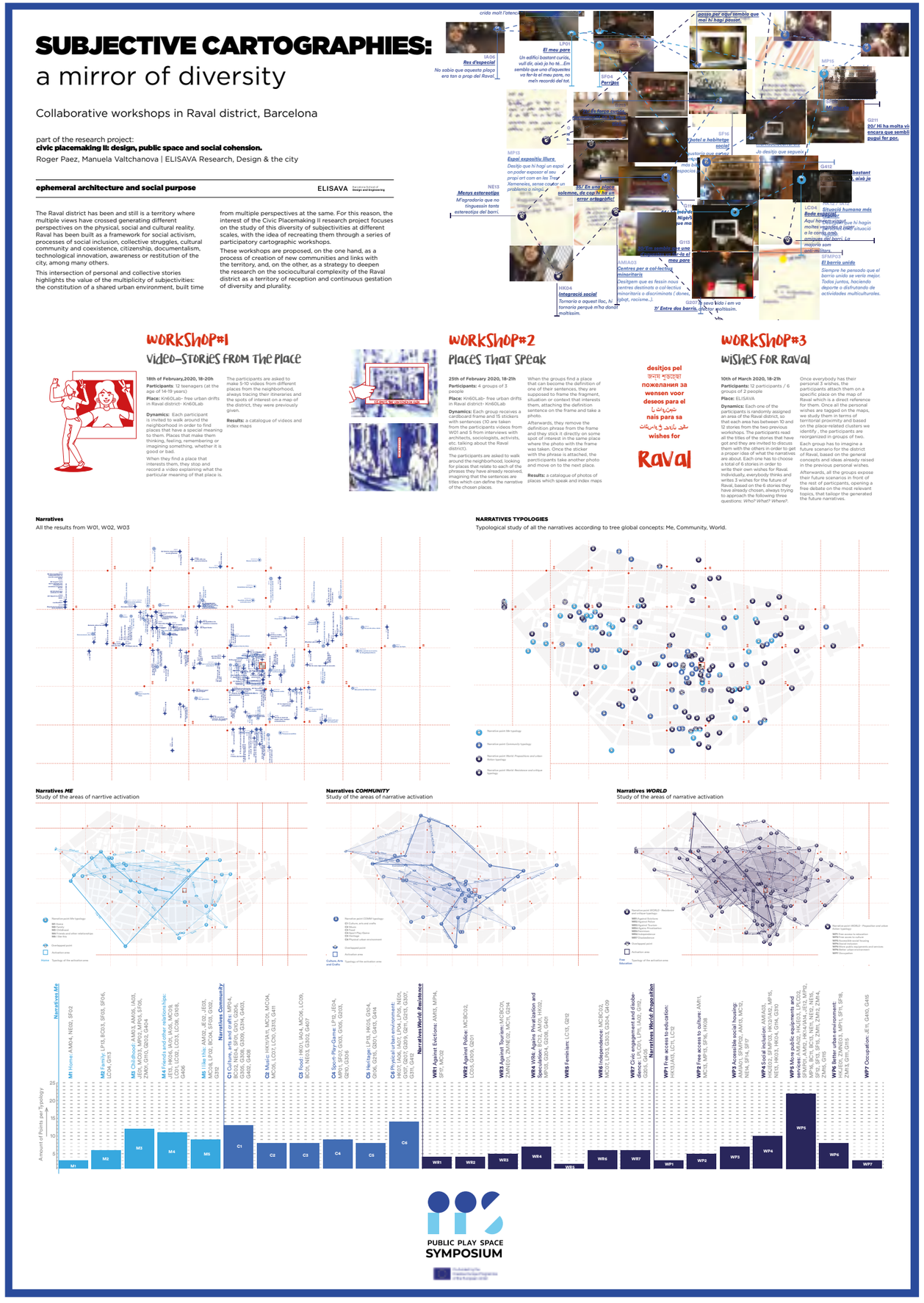
Subjective Cartographies: A Mirror Of Diversity

Spain

Roger Paez
Manuela Valtchanova
ELISAVA Barcelona School of Design and Engineering

ABSTRACT

The Raval district has been and still is a territory where multiple views have crossed, generating different perspectives on the physical, social and cultural reality. Raval has been built as a framework for social activism, processes of social inclusion, collective struggles, cultural community and coexistence, citizenship, documentalism, technological innovation, awareness or restitution of the city, among many others. This intersection of personal and collective stories highlights the value of the multiplicity of subjectivities: the constitution of a shared urban environment, built from multiple perspectives at the same time. For this reason, the interest of the Civic Placemaking II research project focuses on the study of this diversity of subjectivities at different scales, with the idea of recreating them through a series of participatory cartographic workshops. These workshops are proposed, on the one hand, as a process of creation of new communities and links with the territory, and, on the other, as a strategy to deepen the research on the sociocultural complexity of the Raval district as a territory of reception and continuous gestation of diversity and plurality.



Sprites Of Meadowlands Urban Game

Slovenia

Mateja Rot

ABSTRACT

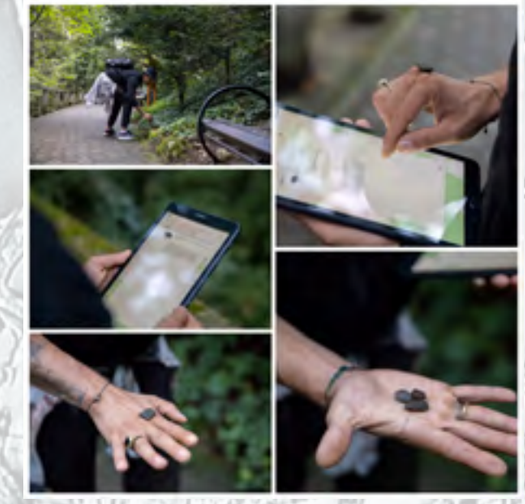
Sprites of Meadowlands is composed of two parts. Step 1 of the game is a geolocation-based app in selected green locations. In step 2 players are invited to share their visions and action steps for the planet on a contributory augmented audio platform. The platform acts as a depository and interactive map where players can upload their stories/visions and planetary actions as well as listen to other players' contributions.

I believe that this game serves as good alternative participatory practice: a tool to raise awareness of some of the most pressing challenges, interact and create meaningful bonds within our immediate environment and propose tangible solutions.

Sprites of Meadowlands acts as a supportive environment for community action that is co-created within safe(r) space. I hold space for diverse participants so they feel comfortable and motivated to co-create and share their experiences through play and active embodied listening/speaking via the platform. In response to the pandemic, I envisioned a project that is very much based on physical proximity of spaces and our embodied experience of diverse spatial configurations. Now more than ever it is essential to begin re-establishing the connection with our surroundings, the environment we inhabit and I believe that games can facilitate this process in meaningful ways.

SPRITES OF MEADOWLANDS

urban game by Mateja Rot



Sprites of Meadowlands addresses the exploration of hidden green spaces. It starts with a walk and all the details that can characterize the morphology of the garden. The players are invited to participate in a game designed to activate a specific urban location, a garden or park. Playing with what is hidden and what is shown, the project questions your perception of reality and social practices in the city.

KEYWORDS

contributory augmented audio platform, participation in public space, embodied experience

The game has two parts: a geolocation-based app which the players use to play in physical location and a participatory, location-based platform to envision future world scenarios.

year of realization: 2020

program: Open Access - Experimenting with Performance Art and Transmedia

PUBLIC PLAY SPACE SYMPOSIUM

Play For Dignity

Austria

Markus Zorn
Mumtaheena Rifat
Robin Eskilsson

ABSTRACT
Collaborative work, especially in socio-economically and spatially segregated urban areas, successfully implementing co-creative methods can be challenging. The potential of using serious games in development practice has proven to be a valuable addition to existing collaborative processes. However, many challenges and potentials in implementing gamified methods leave much room for further research.

“Water you thinking about?” is a prototype for a game to collaboratively explore how water is used, and how it is connected to everyday-life. The game was co-designed with students from Chalmers University of Technology (Sweden) and the University of Pretoria (South Africa), as part of a Diploma Thesis project. During an iterative process, which involved several other games and playful activities, the game was tested and used to generate data for urban projects, as well as build trust and relationships between local children and facilitators.

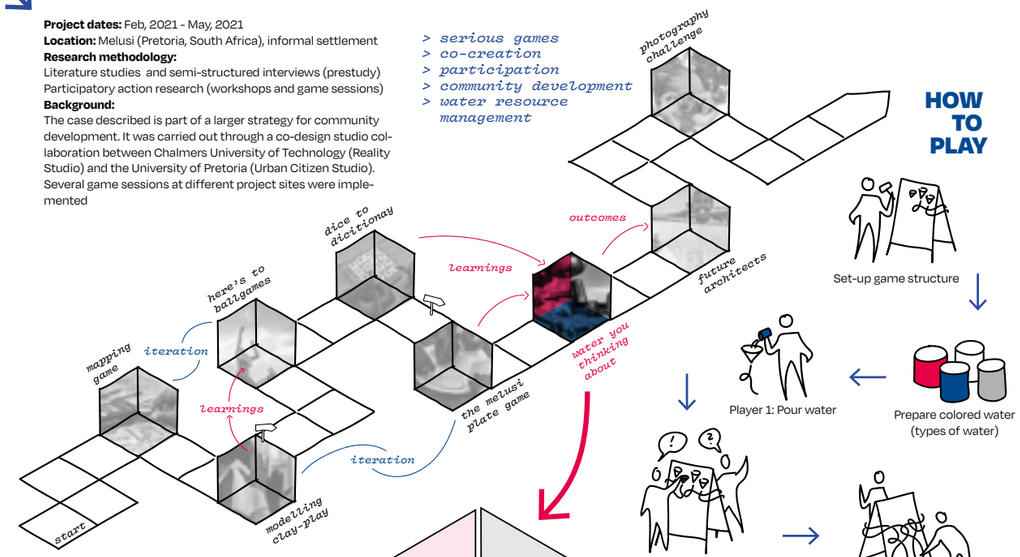
Although the game was specifically designed to meet certain project development needs and according to some local restrictions, its implications can be applied to broader fields, such as water-resource management, methods for community development, and gamification & serious games. Further research needs to be done, to fully unfold the potential of games, such as “Water you thinking about?”

WATER YOU THINKING ABOUT?

dimensions of a water-infrastructure game as a placemaking tool for intercultural co-design processes

Project dates: Feb, 2021 - May, 2021
Location: Melusi (Pretoria, South Africa), informal settlement
Research methodology:
Literature studies and semi-structured interviews (prestudy)
Participatory action research (workshops and game sessions)
Background:
The case described is part of a larger strategy for community development. It was carried out through a co-design studio collaboration between Chalmers University of Technology (Reality Studio) and the University of Pretoria (Urban Citizen Studio). Several game sessions at different project sites were implemented

> serious games
> co-creation
> participation
> community development
> water resource management



HOW TO PLAY

Set-up game structure

Prepare colored water (types of water)

Player 1: Pour water

Player 1 & 2: Communicate


Player 2: Choose destination bucket (water usage)

socially related implications

AIM OF THE GAME
Establish relationships among player and between participants and facilitators. Enjoyable game session will encourage active participation in future workshops.

PREPARING THE GAME
Co-building the game structure and setting up the game builds trust and increases inclusivity.

PLAYING THE GAME
Observing and interacting with players during the game provides further insight in relevant matters.

GAME OUTCOMES
Relationships established during the game serve as a valuable foundation for active participation in the future.

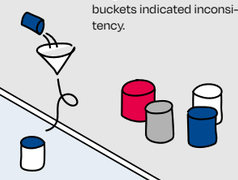
playing the game itself

AIM OF THE GAME
Get colored water, representing different kinds of water (drinking water, rain water, etc.), from one side of the structure, into according buckets on the other side.

PREPARING THE GAME
Setting up the game (little wall structure, pipes, funnels, colored water) to get the game ready to play.

PLAYING THE GAME
Competitive and collaborative elements will keep excitement and team-spirit alive respectively.

GAME OUTCOMES
Nicely separated water in the different buckets will show consistency in water usage, brown water in all buckets indicated inconsistency.



implications for placemaking facilitators

PREPARING THE GAME
A simplified version of a water management infrastructure is built, opening up the opportunity for conversations about local water infrastructures.

AIM OF THE GAME
Collect data about how the community uses water and what role it plays in everyday life.

PLAYING THE GAME
Reflecting on real-life activities related to water usage and creating an iteration with the game.

GAME OUTCOMES
Reflect on outcomes (pictures, quantitative data, etc.) to inform the project development.

MAIN TAKEAWAYS

The immediate engagement of participants indicates greater commitment towards water management issues.
The game provides an innovative and creative alternative to conventional approaches to community development. As a fun and social engagement it encourages active participation.
Furthermore, an iteration of playing this game can evoke valuable reflection on water usage.

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PUBLIC PLAY SPACE
SYMPOSIUM

Interactive And Community-Based Strategies For The Co-Design Of Public Space

SECTION 2

POKEMON GO AS A PRODUCTIVE COUNTER-SPACE

Nick van Apeldoorn
Breda University of Applied Sciences

Jeroen Hollander

ABSTRACT

Pokémon Go is a GPS based, augmented reality game in which users track and catch Pokémon with their smartphone in the real world. Our position is that the addition of a virtual layer like Pokémon Go in physical spaces changes the usage of the space and we give examples of how this changes.

Pokémon Go triggers to make use of the absolute space but different than ever before, players interact with each other but less with the environment off-screen. It triggers emotions, inclusion of other players because they share the excitement, but exclusion of non-players that they meet in this conflicted space.

Where Pokémon Go is played, two kinds of lived space are created by players and non-players. These spaces can be lived differently than conceived by experts creating counter-spaces that can lead to undesirable situations. Pokémon Go has shown the opportunities of influencing the behaviour of people by augmented virtual reality. This is a chance for creating applications that can bring the conceived space more in balance with the lived space of the users and non-users of augmented reality. It can lead to changes in space by bringing the fabric of cities more in balance with the augmented world.

KEYWORDS

Pokémon go, Augmented Reality, Absolute Space, Counter Spaces, Productive Spaces, Virtual Layer

1. INTRODUCTION

2016 is a highly interesting year in which the interplay between technology and cities made a considerable step in integration. We are talking of course about Pokémon Go. Pokémon Go is a GPS location-based, augmented reality game in which users track and catch Pokémon with their smartphone that are virtually superimposed onto physical, real world surroundings (Serino, Cordrey, McLaughlin, & Milanaik, 2016, p. 674).

Since the influence on daily life by the virtual layers will get bigger in the future it is highly relevant to investigate how it changes space, the behaviour of people and how space should be conceived. Serino et al (2016, pp. 675-676) and McCartney (2016, p. 1) show that Pokémon Go could contribute to cure loneliness, depression and creating a healthier lifestyle, qualities that are much needed in today's obese, individualistic society (Klaczynski, 2008, p. 59; Scott, Ciarrochi & Deane, 2004, pp. 143-144). On the downside players of Pokémon Go caused traffic accidents (Isaac, 2016; Price, 2016), trespassed, congested public spaces and gangs used it to draw and rob players (Serino et al 2016, pp. 675-676).

Our position is that the addition of a virtual layer like Pokémon Go in physical spaces changes the usage of the space and can create counter-spaces (Wilgenburg, 2016, p. 56; Leary, 2009). Therefore, augmented virtual reality is positioned in a broader scientific context by answering the research question:
How is Pokémon Go positioned in space and how can created counter-spaces be turned into productive counter spaces that contribute to society in health and socially?

By using two contextual approaches the challenges and opportunities that will come with virtual cities are described. This essay positions virtual reality in space as described by Harvey (2007) and identifies counter-spaces according to the spatial triad from Lefebvre (Laery, 2009). These approaches are complementary because Harvey enlightens the difference between the real and virtual world and the triad shows the effect of these differences that could lead to counter-spaces.

The research question is positioned in a conceptual model (Figure 1). Two kinds of absolute and relative space are shown: the created space by experts of the real world and the created virtual space planned by game-developers in the real space. The lived space of the players is formed by the real space and the planned virtual space. They live in both relational spaces. The non-players are only living in the same real space. Dependent on the situation both lived spaces can alone or together lead to productive or counter-spaces as explained in the continuation of this paper.

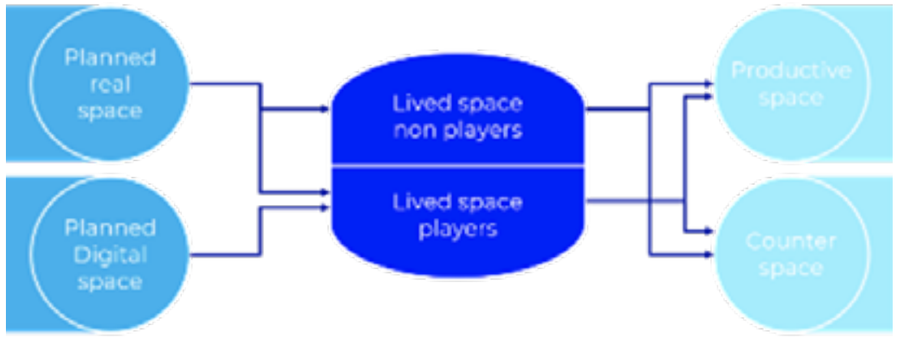

Figure 1: Conceptual Model of Pokémon Go in real and virtual space (Apeldoorn & Hollander, 2016 - Based upon Lefebre, 1991)

2. ABSOLUTE, RELATIVE AND RELATIONAL SPACE

What is the position of Pokémon Go in the absolute, relative and relational space and how can it help us to understand the impact of (future) augmented reality now and in the future? The absolute space is objective and independent from the observer. It is objective, static, measurable and for everybody the same (Harvey, 2007, pp. 282-283; Dijst, 2016, pp. 38-41). Relative space focuses on relative positions and speed and is depended from the observer. Relational space does not exist outside processes that define them, they emerge from relations between entities and is context depended. It comes into existence through a process of interconnection of heterogeneous elements (Harvey, 2007, pp. 282-283; Dijst, 2016, pp. 38-41).

Pokémon Go would in our opinion, opposite of Wilgenburg (2016, p. 15) exist in the absolute space. Independent of the game player is a world present that is measurable through GPS that cannot be changed by players; it's for every player the same. It exists even if you don't play it but it's only visible in a virtual space through a smartphone. In the relative space people move, talk and exchange information, like where certain Pokémon are and where to catch the most and are convinced to walk several miles. People get excited, triggered to talk to other players and are competitive (Serino et al, 2016, p. 675; Harvey, 2007, pp. 282-283). In relational space people make plans to meet up, go out and think of the virtual world even if they are in the same absolute space. They are more connected to other players than with people who are maybe closer absolutely but are not involved in the virtual reality (Serino et al, 2016, pp. 675-676; Harvey, 2007, p. 282-283).

Together these three dimensions create space. Pokémon Go triggers to make use of the absolute space but different than ever before, players interact with each other but less with the environment off-screen. It triggers emotions, inclusion of other players because they share the excitement, but exclusion of non-players that they meet in this conflicted space. The dissociation of players with non-players and the environment off-screen creates challenges, but the socialisation and exercise qualities are intriguing. The use of virtual reality also could create a chance to influence the use of real spaces in a positive way.

3. COUNTER-SPACE

The introduction gave a few examples of how space is used different from the conceived one, Lefebvre would describe them as counter-spaces. A counter-space occurs if there is an incoherency between the conceived space developed by experts and the space of representation, the lived space of the users of cities. By living in their environment they associate the space with images and symbols (Leary, 2009, pp. 192, 195).

In environments where Pokémon Go is played, two kinds of lived space are created (Figure 1), one by the players of the game and one by the non-players. Both of these lived spaces can conflict with the conceived space, which can lead to a counter-space. And because they both live next to each other in the same real space, they can conflict as well. Like in Kijkduin, a neighbourhood of Den Hague. Here was a run on Pokémon, which were virtually positioned in the dunes. This led to destruction of the dunes and nuisance to other visitors to the area (Blom, 2016). The use of games like Pokémon Go could for instance also lead to dangerous situations in traffic. A risk that could become bigger with the fast development of augmented reality games.

In the future, planners could use augmented virtual reality to bring positive effects on

the use of the real space. Not only by changing a game, like the municipality asked the developers of Pokémon Go to do in Kijkduin (Blom, 2016), but also by developing applications that try to influence positive behaviour. Of this, an interesting example exist about the police in Veenendaal. They asked Pokémon Go to position extra Pokémon in quiet neighbourhoods during the holidays to attract players, which they hoped would deter burglars (Verlaan, 2016).

Pokémon Go is an example of how our world is getting more dynamic because of the increasing real and digital mobility of people. In that world the places where people reside are not the only place they have social contacts. It is important to study all their activities to learn from their social mobility (Van Kempen & Wissink, 2014, p. 101). The activities of players bring them together in their neighbourhood but also worldwide. With augmented virtual reality applications it is possible to influence behaviour of people. It is thinkable that applications could be developed, which influence people's behaviour and their social mobility, so spaces are more used as they were conceived. On the other hand, it might be necessary to adjust the real space to the activities initiated by the virtual space. Like in Augsburg, where they placed LED-lights in the sidewalk so smartphone users would not cross the street when the traffic light is red (Volkskrant, 2016).

Developers could stress that the activities of users and non-users in the real world are more balanced and not suffering each other. In that case the counter-spaces would not appear. By disrupting the status quo in the real space, by adding a virtual space, the existing relationships and the lived space of the real world might be influenced positively and create productive counter-spaces. Which could lead to an open city with creative social and economic development (Shields, 2013, p. 347).

On the downside, cybercriminals are active in a lot of networks including phishing, malware and money laundering. It is not unthinkably, that if the opportunities arise, they will try to use augmented virtual reality to increase their criminal activities (Leukfeldt, Kleemans, & Stol, 2016, pp. 2, 7, 17).

4. CONCLUSION

We can conclude that Pokémon Go is not only present in virtual space but also in the real space. Because of the activities players develop initiated in the virtual space but realised in the real space as well, these activities affect also the non-players. Because of these activities the figures in Pokémon Go are present in the absolute, relative and relational space virtually and real, resulting in exclusion of non-players.

Real spaces can be lived differently as conceived by the experts creating counter-spaces. Which can lead to undesirable situations. Pokémon Go has shown the opportunities of influencing the behaviour of people by augmented virtual reality. This is a chance for creating applications that can bring the conceived space more in balance with the lived space of the users and non-users of different augmented reality layers. It can also lead to necessary changes in real space. By bringing the infrastructure of cities more in balance with the changing virtual world it is conceivable that this contributes to a more liveable city with productive counter-spaces. But the use of augmented virtual reality can also bring negative use of space because of criminal activities. Planners, governments, application-developers, but also society should be aware of this when developing and using applications.

Virtual reality can change how cities are used with many positive effects by creating productive counter-spaces and a more social and healthy society, but there are also risks involved which should be identified and anticipated. Gotta catch'em all!

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Hexpods. New Paradigm: Reprogramming Public Space During Covid-19

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ABSTRACT

There is no doubt that Covid-19 has massively affected not only how we behave as individuals but also how we handle proximity in all the different spaces. As a result, one poses the question of what we could do to give a regular use to these sites while following the safety measurements and restrictions due to the pandemic, and at the same time, what kind of appropriate places should be designed for the crisis that are flexible enough to change with any unpredictable event.

This proposal aims to provide a shift in paradigm to prevent unforeseen circumstances while preserving the essence of what we know as "public spaces." Our team selected "Carrer A", an unused long corridor of "Zona Franca" as a starting point for the designing exploration. In the first step, we pre-selected various activities performed in Barcelona. Then, we recreate the zone in a smaller scale and deployed hexagonal pods along the site. The HexPods offer an infinity of uses, for example, temporary housing and small gatherings that can be accommodated to fulfil all the safety protocols imposed by the current pandemic.

In parallel, the structural design of HexPods does not only work under an elevated train rail but to any other existing structures that can be found in Barcelona. Its flexibility in terms of placement is limitless. With HexPods the perception of how we use public spaces is being re-invented putting our safeness out of danger. This idea adapts the public space to the current situation and shows that public spaces are not obsolete and can be constantly renewed.

KEYWORDS

New Paradigm, Public Space, Digital Tool, Co-Design.

1. INTRODUCTION

The digital revolution, together with the environmental, economic, and social challenges that the planet and our cities face have now been altered and, in many cases exacerbated due to the Covid-19 pandemic. These new challenges encourage citizens to develop new practices in the public space which should be based on the already existing data of the cities (open data) and also obtained with digital tools from the massive data in the territory. This will guarantee an effective and responsible decision making by professionals and municipalities.

The Covid-19 pandemic has tested the entire city infrastructure and especially it has completely distorted the idea that we had about the use of public spaces. As users, we stopped thinking about it as permanent spots where we could go massively to perform outdoor activities next to the whole community. Now fear has made us abandon these spaces to escape from the crowds bringing with it a great damage to those who base their work on these businesses such as, cultural expressions, street sales, fairs, meetings, and traditions that now have been canceled. Cities have sought solutions by painting boundaries or using barriers to distance people, nevertheless, these norms have caused the complete loss of the collective essence.

2. FROM THE PERMANENT, SIMULTANEOUS, AND COLLECTIVE TO THE INTERMITTENT, SUCCESSIVE, AND PERSONAL.

One of the most critical aspects of the global impact of this pandemic has taken as setting our most successful invention as society: the cities. During the last year, we have collectively gone through a drastic change in our space-time that forced us to get connected from our rooms to the various world spheres using our screens, microphones, and cameras. This sudden transformation allowed us to share world-widely a degree of intimacy that we have never seen before, but above all these facts, when the effervescent effect of hypercommunication is finished, we will be moved from the online world losing at least three phenomena that distinguished real spaces from virtual ones: the permanent, the simultaneous and the collective.

Three concepts that have undoubtedly defined our urban experience from generation to generation have been reverted because of one accidental situation; the city, as a collective idea for organizing flows and times to perform social activities using public space, has stopped, it has been suspended. There could not be a better definition, since we actually think that in the future the old systems will be back again. It is paradigmatic how many of the values that coherently were thought to manage all the urban planning have vanished out of the blue. As a result, there is a great uncertainty on part of the municipal administrations when making decisions.

The physical space has mutated to a new paradigm where the intermittent, successive, and personal prevails. People move quickly through public spaces without stopping to enjoy them, it has become a mere step to get to a safe place. We also find hundreds of interventions where paintings or limits are drawn with the intention of maintaining a safe distance between people. Nonetheless, the biggest change is the privacy that inhabitants see in public spaces, these are no longer places of encounter and collectivity, they are sites of isolation where personal activities are developed.

HexPods is an urban tool that allows a safe use of public spaces. In addition, it provides a physical way to perform a variety of activities giving back the sense of the public space and its usefulness.

Figure 1. Change of paradigm in the public space. (Cadena, 2020)

3. METHODOLOGY.

The project proposes a methodology that is divided into two moments:
The analysis of the site and the obtention of massive data on the current conditions of the public spaces due to the Covid-19 pandemic that will generate a decision-making model taken from the user and the territory (bottom-up model).
The implementation of a flexible, sustainable, and programmatic solution that meets the new conditions to ensure the user's safety and restore the attributes and opportunities that the public space provided to the community.

4. ANALYSIS OF THE PLACE.

The analysis is based on the capture and visualization of the data of the city. For this project, we chose the city of Barcelona. During last year, it presented a highly detrimental phenomena to its social structure. The public spaces of the city center, especially its squares, are now empty, several are fenced off and the fear and desperation of the citizens can be seen.

First, the municipality's open data (Open Data BCN) from the year 2019 was used to generate a series of cartographies that helped us understand the conditions of the city's public space before the pandemic. This process was performed using GIS tools and the findings are the following:

- More than 20% of Barcelona's urban territory is public.
- There is 11 km2 of public space in the urban territory of Barcelona.
- The set of parks and gardens in Barcelona has an area of 2784 hectares.
- There are 1.4 million trees in the entire area of Barcelona.
- In the urban area, there are 437 species, 310,000 trees of which 35,700 are only located in parks and gardens.
- "Plaza Cataluña" is the largest square in the city with 30000m2

From this analysis and also by doing several visits to the most representative public spaces in the city such as "Plaza Cataluña", "Plaza Spain", "Arc de Triomf", "El Forum", "La Rambla" and "Barceloneta beach", it was possible to know the most relevant activities that inhabitants performed in the public spaces before Covid-19, these were: business kiosk, rest and recreation sites, sports, cultural expressions, events and tourism. Most of these activities have been restricted due to the pandemic and despite restrictions has been eased thanks to the sooner start of the vaccination process in early 2021 and the citizens awareness about the virus, people still do not feel safe enough to return to normal. These activities are the ones the project will seek to bring back.

In the second stage of the analysis, using data obtained from the Open Data BCN and the Spanish National Institute of Statistics (INE) year 2019, a Covid-19 vulnerability and risk index was generated for the city of Barcelona. A series of indicators are drawn and, according to the World Health Organization (WHO), they should be considered to measure the risk of contagion, these are: population density, urban activity, economic status, vulnerable population, land use and urban configuration. The parameters will be normalized from 0-10 to compare each census section of the city. A table with the analysis is provided below:

SITE	ECONOMIC STATUS	POPULATION DENSITY	VULNERABLE POPULATION	LAND USE	URBAN ACTIVITY	URBAN CONFIGURATION	VULNERABILITY INDEX
Ciutat Vella	3.78	3.20	8.67	1.91	3.94	2.16	**3.94**
el Gotic	4.03	2.19	8.51	2.00	3.66	3.00	3.90
el Raval	3.62	4.13	9.03	1.82	3.64	1.24	3.91
la Barceloneta	4.05	3.03	7.85	2.04	4.61	2.13	3.95
Sant Pere	3.64	2.54	8.90	1.87	4.07	3.07	4.02
Eixample	4.43	2.87	4.59	2.06	4.57	6.89	**4.23**
Gracia	4.23	2.63	3.70	2.17	5.08	6.35	**4.03**
Horta-Guinardo	4.51	2.51	2.97	2.31	4.90	4.24	**3.57**
Les Corts	4.16	2.53	2.63	2.12	4.88	7.82	**4.02**
Nou Barris	4.69	2.80	3.55	2.06	4.61	2.32	**3.34**
Sant Andreu	4.50	2.78	2.61	2.44	5.23	4.29	**3.64**
Sant Marti	4.52	2.49	3.61	2.08	4.49	4.35	**3.59**
Sants-Montjuic	4.31	3.26	4.34	1.96	4.35	3.95	**3.69**
Sarria	4.07	1.93	2.57	2.12	4.98	8.37	**4.01**

Table 1. Covid-19 vulnerability in the Barcelona Districts index. (Cadena, 2020)

It can be identified that the areas with the lowest risk of Covid-19 infection are those close to large open spaces such as parks and squares, most of which are located at the outskirts of the urban areas of the city. On the other hand, in the center is located the greatest risk of contagion; it has a large number of strengthened and narrow places, and public spaces such as squares have been closed, confining people to tight streets. This information helps us to identify the sites where the project can be executed.

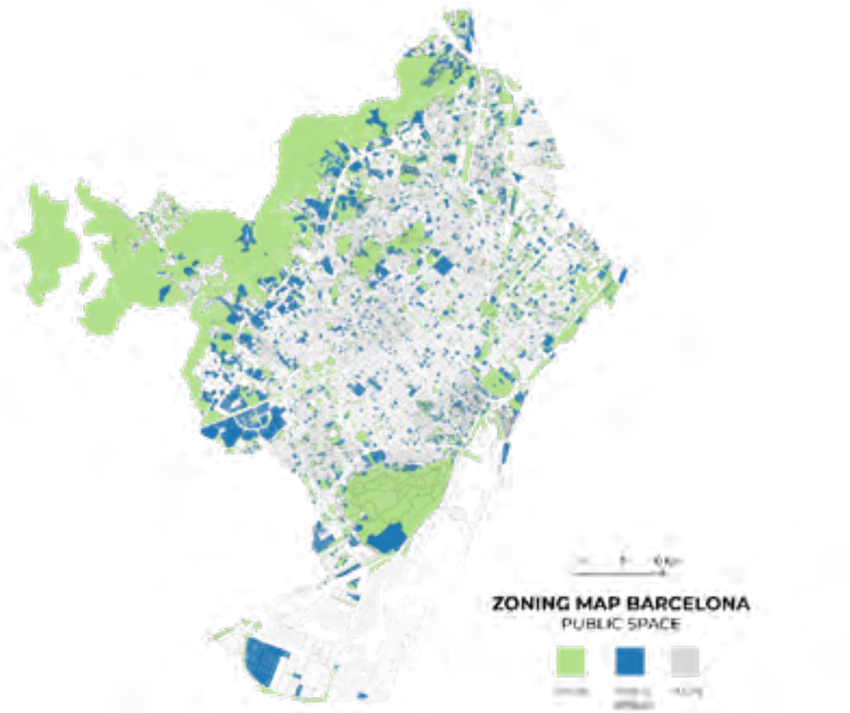

Figure 2. Map of public spaces in Barcelona. (Cadena, 2020)

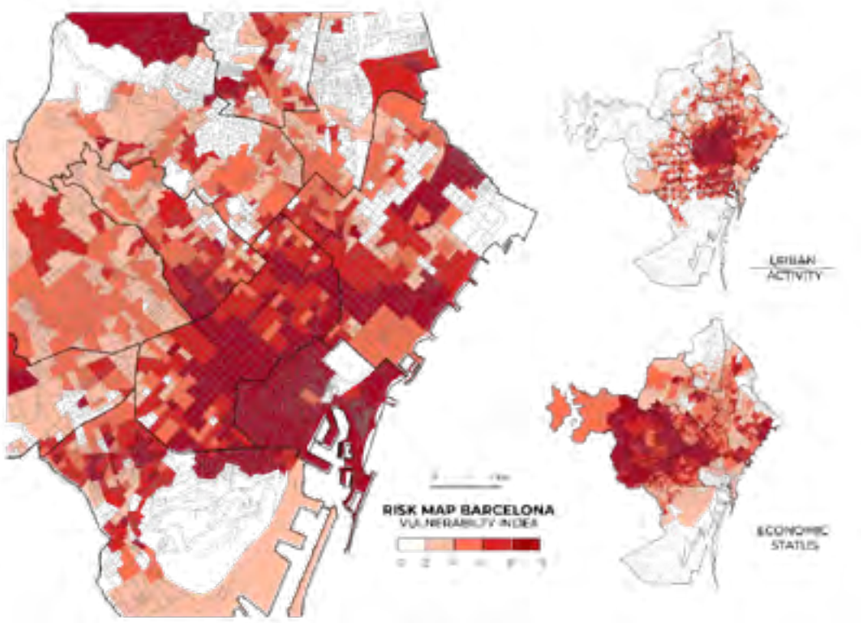

Figure 3. Covid-19 vulnerability index. (Cadena, 2020)

Finally, the third moment of the analysis consists of understanding the current characteristics and the use of public spaces during the pandemic. In order to do this, an information compilation was carried out in three of the iconic points of the city: "Arc de Triomf", "Barceloneta" and "MACBA". Using real-time videos and the digital tool Yolo3 with a Python programming code it was possible to create an object detection to analyze the characteristics of the use of these new public spaces. The process is described below:

1. Recording in motion: On June 18, 2020, the recording was established in 3 study sites. Different videos of about 3 minutes were recorded in the morning, afternoon, and evening. Here the dynamics of the public space, the number of people, means of transport, urban furniture and shopping bags were clearly noticed.

2. Digital recognition: Using the object recognition tool, the digital analysis of images and videos Yolo3, and a series of codes developed in the Python program, a complete database of the number of people and objects in the trajectory was obtained.

3. Data analysis: The data set that was obtained (CSV file) was used in massive data analysis and visualization programs such as Rhino + Grasshopper and Excel.

4. Visualization: Graphs were made to create a general understanding of the situation of public spaces in Barcelona city.

5. Design: With the analysis and visualization, municipalities and professionals can propose solutions and regulations adapted to the real conditions of the territory.

Use this link to see the entire analysis: (86) Rhythm Re-design: Analysis - YouTube

Thanks to this study it was possible to determine two categories of use: static and dynamic. Thanks to the results it was possible to observe that in the three cases the dynamic activities such as walking, running, and cycling exceed the static ones like sitting, taking pictures, eating, meeting, and talking. Thus, a considerable change was found in the conditions of use that the public space had in Barcelona. In addition, the highest number of people around the area was detected during the afternoon, reaching an average of 30 people per minute in spaces that commonly accumulated hundreds. According to INE data, there was a reduction of 60% in the use of public spaces in the city borders in the last six months in 2020.

5. HEXPODS DEVELOPMENT.

The project is a series of curtain-type elements that are placed over spaces currently unused by inhabitants (squares, overpasses, bridges, etc.). The aim is to prefabricate a series of modules in a flexible, sustainable, and programmatic way that will allow people to carry out activities in the public spaces without worrying about possible contagions. It will generate new opportunities, so that the economy of hundreds of people which is currently affected can return to normal. In addition, it provides safe spaces to foster art, culture, and recreation to revitalize urban life in the historic center.

For its implementation, a hexagonal pattern is used, this allows to make groups that optimize the space without generating waste. In addition, it has a standard shape easy to replicate that minimizes time of construction. Four types are proposed: personal (1-2 people), in-between (3-5 people), group (6-10 people) and dynamic (1 person). The first three types are static, the dynamic modules facilitate movement and physical activity in short distances. The movement is generated by rails.

Figure 4. Visualization of the dynamics of public space during COVID-19. (Libunao, 2020)

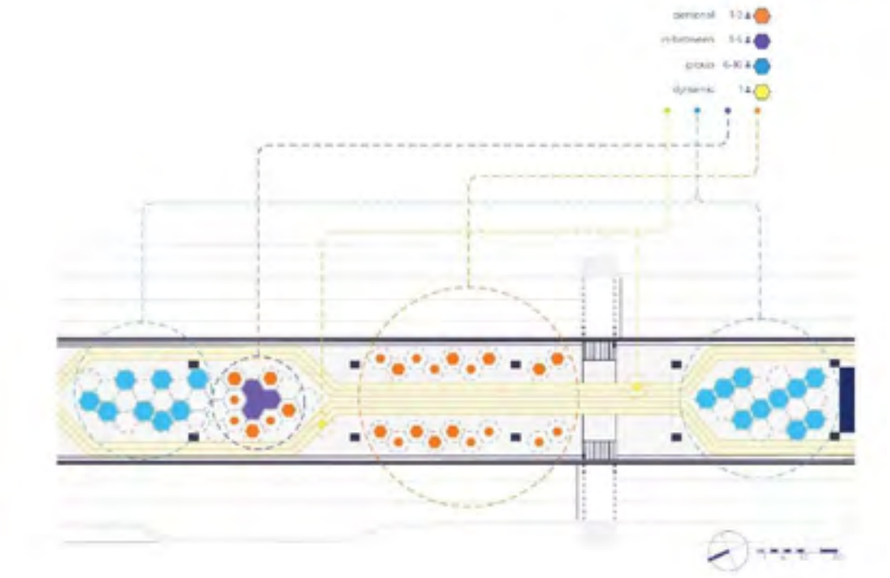

Figure 5. Types of HexPods groups and deployment. (Libunao, 2020)

The program of activities in the Pods are the same that were identified in the previous analysis, it is a catalogue of experiences that offers the users the pleasure to enjoy the spaces that were abandoned. The pods provide security and privacy for personal activities such as sitting, eating, working, and can even be used as a temporary dwelling. Also, their hexagonal shape allows to join them to perform activities in small or large groups such as coworking, playing, exercising, going to festivals, concerts, exhibitions and putting business kiosks. The pods generate different levels of coverage that gives the possibility of having a safe relationship with others.

The proposal seeks to produce a module that can be replicable in various unused contexts of the city, especially in places whose surroundings bring great attraction and lead to agglomerations. For this exercise, 4 examples of its deployment are done in contexts such as: overpasses, disused covered spaces, parking lots or subway levels, and also in open public spaces to facilitate static activities.

To implement the project in the public space, it is necessary to ensure that the community is involved in its design and construction. The modules are made from a simple corrugated rod structure and an enveloping textile, which makes it easy to afford. The supporting structure is made of metal tubes anchored to existing urban structures such as bridges, overpasses, slabs, or any element where it can be suspended. In this project, the most needed resource is the commitment of inhabitants and the municipality because they have to take the risk of adding new ideas to the city, they must see it as a laboratory to experiment. The size of the modules varies according to the place they are deployed, but in all of them the minimum recommended height is 2.30m.

The Pods add a new value to the spaces where they are set. They not only allow to perform a great range of activities. In fact, they also offer a variety of technological solutions to optimize the user's comfort. There is digital communication using an app that allows to control the level of coverage needed for the activities, lighting, and all the sound and Wi-Fi systems are powered up by the base structure that carries energy to the different Pods. Finally, its material guarantees the correct ventilation and protection against solar radiation.

In order to help the user's experience an app was designed. Its interface enables not only the use of Pods, but also allows the municipality to measure the impact and justify the cost of project's implementation. The app allows the user to book a Pod or a set of Pods depending on the activity they want to develop. In addition, people can register to the different activities that the municipality promotes on the site such as events, concerts, exhibitions, and fairs. The data and experience of each user will be recorded in the system to make a responsive project to the different requirements and problems.

6. RESULTS

This project is a research that proposes a methodology to generate solutions in public spaces during a period of pandemic (new paradigm). The result is not only about the deployment or construction, it wants to raise awareness about the characteristics that any solution proposed during the pandemic should have. Initial research on the new conditions of public space gave the following results:

- Activities in the public space decreased by 60%, but movements from points A to B went up considerably. This means that the static or permanent activities were replaced by the dynamic and temporary ones.
- New activities and forms of urban life have emerged in public spaces: temporary, successive, and personal.
- The restrictions and limits that have been set in spaces that bring a lot of attraction such as, squares or parks, are neither enough nor easy to understand.
- Due to restrictions on automobile use, pedestrian mobility has increased.
- Spaces in disuse, abandoned or where the probabilities of contagion are high have simply been closed.

Figure 6. HexPods catalogue activities. (Libunao, 2020)

Figure 7. Adaptability of the HexPods proposal. (Libunao, 2020)

Figure 8. Performance and constructive system of the HexPods. (Libunao, 2020)

Figure 9. App HexPods. (Cadena, 2020)

The proposal shows how a simple element can completely change the dynamics of the space generating a catalogue of activities that the user can perform. The main characteristics of the proposal are: replicability, flexibility, temporality, use of technology, use of sustainable materials, added value to the space and citizen participation.

The pandemic has generated a new paradigm of public space, as a result projects must respond to new conditions. In the case of HexPods, the first idea is intermittency because thanks to the use of a digital platform, the user can book his time inside the modules and also know what the flow of people is attending the different activities. The second one is successiveness, since it is based on a concept of social distancing generated by a hexagonal pattern that restrict the space depending on the activity. And finally, it is personal; even if collective actions are performed, each family, couple or person has its own defined space.

A solution that recovers spaces in disuse and makes them useful and safe for inhabitants, but the vision goes beyond Covid-19 times; adaptability must be constant, visions about all infrastructures that has been set in pandemic has spent resources from the population, thus they have the obligation to be easily adapted to continue to be used. This proposal promotes the replicability of it in various parts of the city, this is because the abandonment of spaces is a constant that has been going through many years and not only now. We have to start seeing public spaces as a means to improve the citizen's quality of life.

The metrics that will be used to measure the impact of these new proposals are: number of new activities in the public space, time of use, generation versus energy consumption, number of users, number of events, concerts and exhibitions, number of sales establishments, total sales, profits generated by the proposal versus cost of execution and number of contagions (user notification). All these metrics are generated and evaluated through digital applications.

7. CONCLUSIONS

Covid-19 is presented in the project as an opportunity to understand how important is to have a responsive city and public space. This term is used to define the action of rapid analysis, evaluation and response to any phenomenon that arises. The project is based on this concept; it starts from the implementation of a methodology for analyzing the conditions of the population through data to the design of a solution that claims the value of public space.

According to the results and global trends studied from the literature review, here are the recommendations related to public space:

- Promote physical activity: consider more actively the regularization of the use of green areas and communal public space, instead of keeping them closed as many cities around the world has done.
- Reuse of disused spaces: Not only to encourage the use of public space with innovative solutions such as HexPods, but also to increase health infrastructure in times of disaster.
- Master Plans: Innovative design and revision of Public Space Master Plans that determine and enforce compliance with public space indicators per inhabitant. The coefficient has to be defined not only in terms of quantity (m2/inhabitant), but also by proximity to places of residence, transportation stations and collective facilities, thus there is going to be an understanding of public space as a binding system for urban design and real estate development.

Figure 10. HexPods Activities. (Cadena, 2020)

Figure 11. HexPods Adaptability. (Cadena, 2020)

- Mix of uses: Public space must offer a great deal of activities to make it attractive and useful for people. In times of pandemic, the most important thing is to do activities together with safeness against contagion. There has to be proposals in districts, neighborhoods or colonies that guarantee multiple uses of public space generating a compact and accessible city.
- Proximity urbanism: Promote proximity urbanism that reclaims the neighborhood scale. It is a key concept for the municipality to make proposals that cover many of the needs of inhabitants. If long distance movements are reduced there will be a lower risk of contagion and propagation.
- Tactical Urbanism and Participatory Design: Design and implement quality public spaces based on participatory and collaborative design processes where communities are part of the entire project cycle: from the analysis of conditions through data to the construction of responsive solutions that adapt and respond to the changing needs of the community. This creates an environment of collective action between governments and villagers.
- Incorporate TICS: Take advantage of the TICS potential in the control and measurement of urban activities as a basis for the adoption of zonal or metropolitan anti-Covid-19 regulation measures. It has been concluded that the more real and immediate information is obtained on Covid-19 conditions, the more effective are the measures that the municipality can provide.

To give back the right citizens have to enjoy the public space, to use creative proposals with a high degree of technology to guarantee use and access to new opportunities, social inclusion, productivity, and security. Definitely, this new paradigm of public space is not permanent; thus, the coming back to a new normality has to be only strengthened by experience.

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Rocking Cradle: Interactive Urban Furniture In Pursuit Of Environmental Attunement

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ABSTRACT

As extreme climate actions intensify, questions of public space will increasingly elide with those of planetary ecology and the boundary-challenging expansiveness of ecological flow. This paper posits a design process that seeks to incorporate issues of place and community with those of material ecology and habitat. It outlines a project development pathway that attunes its collective designers and those who encounter the project's outcome to a highly localized entanglement of human culture and environment. The paper describes a project called "Rocking Cradle," a vessel that acts as nursery planter for nascent seedlings, teeter-totter that provokes play, and mechanism for promoting stewardship between a community and its urban biome. The cradles are urban furniture 3-d printed out of granular material that collect water, rock back and forth, provide seating, and inspire the imagination. The project is ongoing, but pursues a paradigm of urban play that is inclusive in its development and eventually inclusive in its function for both human users and vegatative life.

KEYWORDS

Ecology, Attunement, Play, Advanced Manufacturing, Stewardship

1. INTRODUCTION

Urban play offers immense opportunity as a vector of curiosity and provocation of intimacy between humans and objects/landscapes. In the vast, interwoven complexities of global climate change, inequitable economies and the inequitable distribution of resources and health-impacts that cascade from them, accelerating communication networks, and renewed opportunity for a reimagination of infrastructures and manufacturing streams, cities and the objects of urban and landscape design act as relays, modulators of all of these flows. Never has the need been more pressing for these objects and landscapes to make evident, draw forth, attune us all to the forces that shape them, so that we all may be empowered as agents to act within and upon these flows. Play is a powerful vector of just such engagement. This paper offers a precedent - one that continues to actively unfold at the time of publication - for how urban play can intertwine itself with communal discourse and environmental consciousness. The project is called “Rocking Cradle.”

Ecology works across boundaries imposed by social and political systems. Yet historically, large-scale ecological relationships have been disregarded within the making of architecture and its objects. Global landscapes are used as an extraction resource, rather than a source of embodied material connectedness within the manufacturing processes of our environments. Modernist design thinking, inherited from the era of industrialization, has been largely co-opted by ideologies of capital that organize social systems according to biases of political and economic engineering, rather than allow equitable access to resources. Arising from entanglements of landscape abuse and the impact on human and non-human well-being alike, here, the large-scale maps below serve as a guide to visualize dynamic shifts of soil contamination in reaction to climate, thus illustrating the reactivity of hidden conditions of soil quality relative to slopes, surface water runoff, combined sewage outflows, and lead exposure. Multi-modal and multi-scalar mapping are essential steps in visualizing and making tangible the invisible ecological and social forces shaping a context, placing them on a plane that allows designers and participants to operate upon them. The maps consider guidance in revitalization and emergence of new forms of urban gardening in the neighborhood. As we grow food in this contaminated soil, we precipitate landscape to body-contamination pathways. Rocking Cradle intends to offset this cycle while using the body as a device for land stewardship.

The project will deliver three to five 3-D printed art pieces made from granular material such as sand and pulverized construction waste as well as bioplastic binding agents. Each will be sealed with a bioplastic resin to ensure longevity. They will be installed at a new tree nursery on a vast post-indu for the duration of that temporary site’s use. This process will identify partners within the community who will take on permanent stewardship of the pieces as the tree nursery site transitions to another use. The objects will enliven their context with opportunities for play, conversation, and participation, transforming it into a destination for communal interaction.

2. PROJECT CONTEXT

Our design process began with unpacking site ecology, using a historical lens to reveal entrenched challenges and potential opportunities for a community-based design. Hazelwood Green was a small undeveloped residential area until railroads were built through the site in 1861; and Jones and Laughlin built their first factories on site at the turn of the century. By the 1930s, J&L built a mill to provide ammunition manufacturing for World War II. The sky was constantly overcast from the heavy smoke of the factories.

An additional mill was built in 1943, which later became a steel rolling factory. By-products of steel manufacturing include Slag, Dust/sludge from gas purification, Mill Scale (oxide coating), Iron oxide, Iron sulphate, Metal oxide sludge, Steel Shavings and fillings, Ferric chloride, Zinc, Tar, Benzene and Sulfur. All of these wastes weren’t controlled in the 1930s-40s, creating problems in soil conditions and river life. Wastewater from coking, which historically took place on the site, is highly toxic and carcinogenic: it contains phenolic, aromatic, heterocyclic, and polycyclic organics, and inorganics including cyanides, sulfides, ammonium and ammonia. Uncovering deep-rooted environmental conditions gives us a fuller picture of the existing site, and helps us engage with contemporary community concerns to better understand design potential. Today, the vast terrain once occupied by mills and concomitant infrastructure is being redeveloped by a consortium of non-profit groups and private developers. Much of the energy surrounding potential development focuses on the tech renaissance of the city of Pittsburgh. These functions and economic forces often leave out, undermine, and gentrify the existing. adjacent, underserved residential community, one that has been negotiating these panoply environmental challenges for decades.

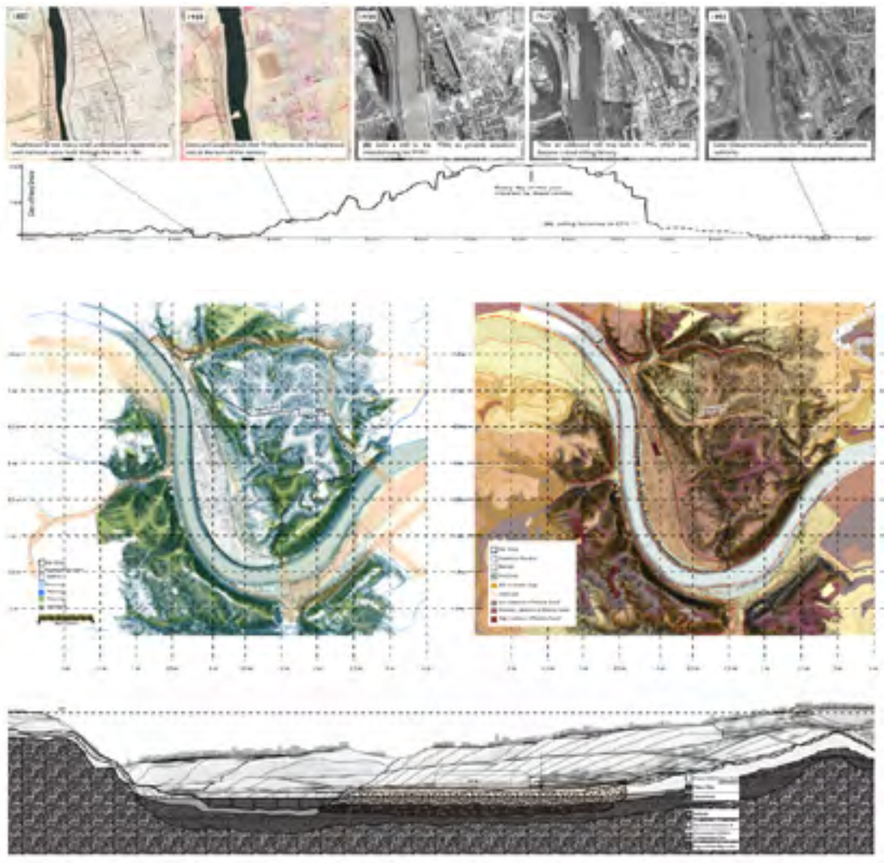


Figure 1: The timeline above shows the history of visible air pollution mapped to the site and a map of soil contamination in the Hazelwood area of Pittsburgh, illustrating underground conditions - soil quality relative to slopes, runoff, combined sewage outflows, and lead exposure -coupled with the design strategy of rocking vessels for community nursery.

3. PROJECT GOALS

A collaboration between academics in the field of architecture, robotics, material science, as well as community activists and artists, the project seeks multiple interconnected goals. Foremost among them is to strengthen meaningful interconnections between stakeholders in the region, including community residents, municipal agencies, development entities, cultural groups, and academic institutions. This will support a longer term march toward inclusive development in Hazelwood, and toward a shared vision of the region's future by promoting empathy, engagement, and listening.

The project also seeks to enhance strategies for sustainable site management. Environmental degradation is entrenched above our heads: air pollutants at above average concentrations; below the surface: shallow, contaminated topsoil, 15 feet of deeply polluted construction debris, and groundwater that starts 20 feet down; at our feet: stormwater that carries toxicity with it. The 3d-printed pieces provide a starting place, out of and above the polluted landscape, for plants that can help clean the air and soil through bioremediation.

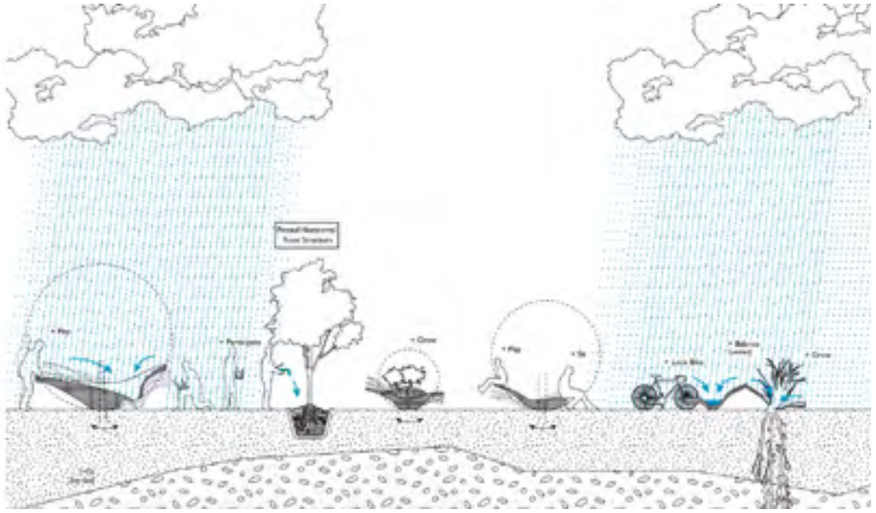
Fostering ecological consciousness and a sense of stewardship for the region's healing landscape is the best path to provoke sustained local action that unites progress on issues of global climate change and local health and equity. The nursery presents an opportunity to grow plants that will contribute to cleaner air and safer soil. However, sustainability is as cultural as it is physical. We hope to highlight the transformative potential of these plants by encouraging stimulating and playful dialogue about their growth and biological processes as they are cared for on the site. In this way, the project can build capacity for the community to talk about spaces for pollution defense, uptake, and potential remediation in their own spaces and in the public realm.

Lastly, the project seeks to amplify voices within the community especially as they relate to the Hazelwood Green development and issues of economic and environmental justice related to the forces driving that development and to the site's industrial and historical legacy.

4. DESIGN METHODOLOGY

The discipline of architecture has always embraced the production of the object as a vehicle to design innovation across scales. The work discussed here engages the application of design within the processes of naturalisation, projecting technological and ecological characteristics into a form of connectedness, or attunement, that exists beyond the body itself.

The act of cradling as an act of design and production of the object simultaneously carries signs of care and violence. There is an apparent need for disruption of our technologies of making, in order to naturalize humanity after it humanized nature to its breaking point. "Do you think that the soul first shows itself by a gnashing of teeth?" asks Fabry of Helena as she pushes for RUR robots to carry more and more resemblance to humanity, to have a soul. The ever so increasing emergence of embedded computing, sensing and bio-technology is concurrent to the discussions on post-humanism, discussions that often parallel the history of science-fiction. This seemingly familiar narrative engages the projection of technological evolution, poetically spatializing the demise of human existence. Simultaneously, the work speculates about convergences of synthetic matter and social realities of our actions, admitting that the prediction of a future is futile, just as any singular solution that is scalable to the planet. Technologies



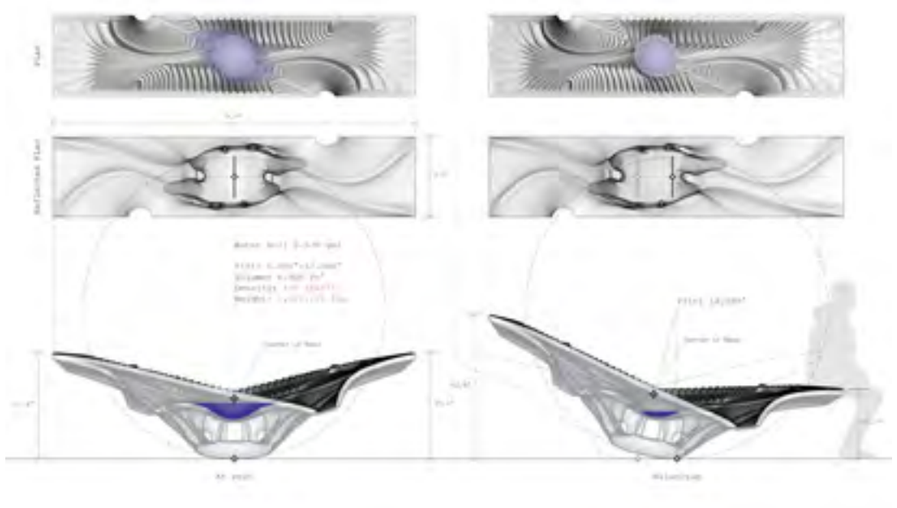


Figure 2: Form study relative to plant growth. Prototypes of half-scale and quarter-scale vessels tested for balancing behavior, water collection capacity, and biomass support.

of making parallel the evolution of human thought on the environment. They are a critical toolset that enable the production or demise of particular cultures; mediate communication with the environment; sense and validate the invisible; create tangible effects, new spatial intelligence, and affective qualities. This work argues for the design of objects to engage processes of making and embrace the disruptions that carry significant consequences into our political landscapes of collective living.

Rocking Cradle aligns structural and ecological potential with a desire to integrate landscape awareness, its history and presence directly into the architectural form, behaviour, and experience. It provides an opportunity for traces and voices that typically would find their way onto public surfaces to be embedded and carried more permanently with the object itself. The layered operation of shaping also allows for collective adaptation of the form, carving of messages to communicate growth. These objects (Figure 4) support human-land-seedling-hydrology-community engagement, while connecting the past with future.

5. MATERIAL AND FABRICATION

Rocking Cradle acknowledges that it has no origin in new matter. Arising anew from this anthropogenic, ossified landscape as a product of our industrialization, it nurtures potential futures within its corporeal past, marking historical traces of its territory within a new development and fertilizing ecologies within its body.

Rocking Cradle is a material prototype rooted in ongoing material-technology research that proposes a novel cradle-to-cradle design process manufactured directly out of local construction waste and earthen materials. Linked to the site's history of development and pollution patterns deeply-rooted in its current environmental conditions, Rocking Cradle proposes an installation that conceives of a nursery as a community space. In the nursery, the cradling vessels draw new awareness between nurture and play, yet carrying those traces of violence enacted onto the landscape through the actions of gentrification and pollution.

The body of the vessel is a porous, stone-like surface 3d-printed from granular matter that becomes a substrate for exchange, projecting the present into the future while using materials from its industrial past. Rocking planters are conceived as a balanced object, integrated into the upcoming landscape, to function as urban furniture, water collection devices, and planters for native species. The body of the vessel combines shaping strategies of volume and surface figuration, achieving a balancing behavior in combination with complex patterning that enables the rocker to become a substrate for ecological processes, attuning to the dynamics of biomass growth.

The role of shape-factor plays a central role in formation of the body of the cradle, combining structural and ecological behaviour of a material resourced from granular waste-streams. This is done by engaging computational shaping techniques relative to a component's strength, structural flow, and overall ecological potential, coupling surface water pathways with planting strategies while using minimal material mass. The workflow is situated in a body of research positing that the embodied energy of recycled construction waste offers cues relative to volume to surface distribution of the composite material through the use of additive manufacturing.

Shaping strategies consider the lifecycle of construction from a cradle-to-cradle perspective. Cementitious materials such as concrete, because of the volume used, are some of the greatest contributors to the global increase of the CO2 levels. Two interconnected strategies are employed here to subvert this status quo: reducing construction waste by using the material in binder-jet manufacturing, and reducing the overall volume of the material used through material-specific shape-sensitive component design. By advancing the additive manufacturing of earthen and cementitious materials, CO2 constitution can be significantly reduced. This framework shifts issues of manufacturing into a framework of ecological design, simultaneously considering design on coaction to reduction of CO2 levels, as well as waste stream offset from industrial landfills.

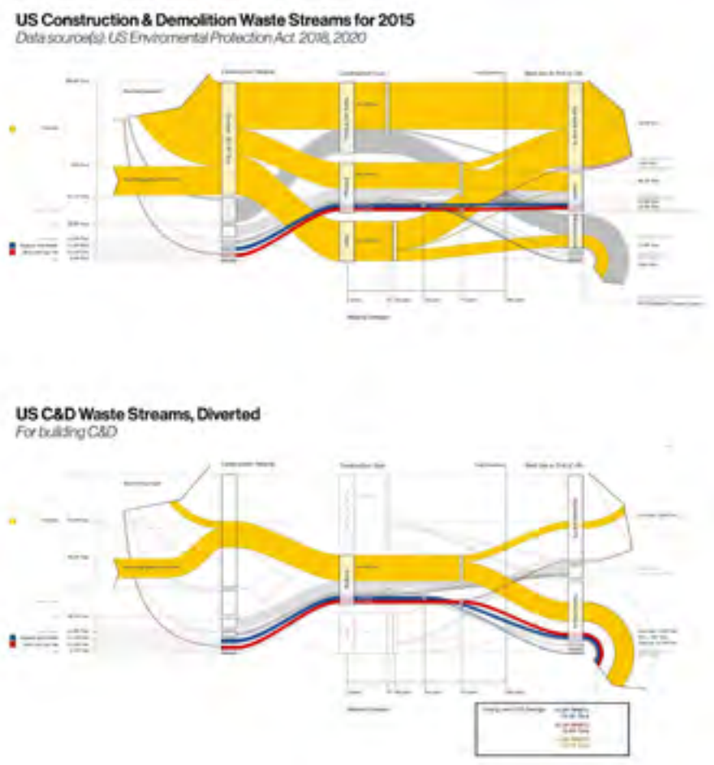


Figure 3: Waste stream analysis and potential for diversion of granular construction waste from landfill through repurposing via binder jet 3d-printing.

6. CONCLUSIONS

As extreme climate actions intensify, questions of public space will increasingly elide with those of planetary ecology and the boundary-challenging expansiveness of ecological flow. This paper posits a design process that seeks to incorporate issues of place and community with those of material ecology and habitat. This project represents an ongoing effort to build a template for project development that promotes awareness of the entanglements between modes of production, socio-economic contexts, environments, habitat, human health, and poetic experience.

Holistic Real Data-Driven Decision Support Tools For Integrated Building-Landscape Regenerative Design Process

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ABSTRACT

In recent years, real-data collecting and data mining techniques have been used to enhance digital architectural and landscape design tools, as well as analyzing of design projects, but have rarely been able to create generalizable tools to support design thinking in collaborative platforms such as BIM. On the other hand, decision-making on the large-scale socio-technical complex context of future cities, requires a transition to robust model-based interfaces. The next generation of architects and landscape designers must be able to take advantage of the integration of current evolved data-driven technologies into a single design platform, thereby anticipating and managing the challenges facing built environments, in a more realistic and effective interdisciplinary and collaborative communication. Creating decision support systems for public urban spaces in interaction with building blocks (as subsystems of a city) is a tool for managing future changes of a city, with a participatory and bottom-up approach. In this research, we discuss the necessity and how to integrate building and landscape simulation tools to support decision making in the early stages of the design process and by introducing a general structure of the two on-going Ph.D. studies, we have tried to create an overview for other researchers in this field.

KEYWORDS

Decision Support System, Collaborative Design, Public Mid-Scale Spaces, Integrated Design, Real Big Data

1. INTRODUCTION

With the increasing growth of urbanization in different societies, cities (as a complex system), more than ever, welcome the landscape and public urban spaces (as subsystems) in shaping the structure of the city in combination with building blocks. Due to Continuous rapid changes in urban communities in the 21st century, the design of urban spaces and buildings has now become a middle and large-scale socio-technical complex issues; Designers have to identify and meet multiple stakeholders conflicting needs and values, along with project goals and regulations (such as economic goals, sustainability values, urban regulations, etc.) within a single design. In addition, they must identify and optimize the communication between many parameters, which alone can have a great impact on the final performance of the built environment, and unfortunately, identification of these huge parameters in Complex systems theory, with today's ordinary possibilities and limited human intellection - which Simon calls "bounded rationality" - are impossible.

Accordingly, continue of using current tools and methods has made our interventions for changing and improving the built environments, "less fruitful interventions" (if not negative interventions), that are far behind the speed of change in societies.

Therefore, we need to be equipped with more powerful methods, tools, and strategies to understand the relationships of the elements of different subsystems of a city (Such as buildings and public spaces), and as a result, more comprehensive interventions to modify and improve bio-human-natural spaces in a collaborative relationship, which is in fact, the vision defined in more comprehensive recent sustainability paradigms like Regenerative Design, that (Naboni, 2019) well describes it this way: "Regenerative design (RD) is aimed at enhancing human life and natural ecosystems in a partnered relationship and growth and co-evolution of them together, through comprehensive interventions. Because in this approach, different measures to promote human health and natural ecosystems are not separate issues from each other and we should be able to imagine common patterns and programs for them".

1.2. NEED FOR HOLISTIC COMPUTATIONAL TOOLS FOR INTEGRATING BUILDING-LANDSCAPE DESIGN

At present - and in line with sustainability requirements over the past 40 years - many tools for environmental simulations and building performance simulations, have emerged and developed separately. These tools, with simplified methods, based on hypothetical data and influenced by linear problem-solving approaches and also evaluation systems requirements in preliminary sustainability paradigms (such as green approaches), Consider the environmental landscape elements and public spaces of a city and buildings, within discrete boundaries that make it impossible for us to imagine and predict the quality of future urban spaces, despite the speed of current complex developments.

Now, knowing that the correct understanding of today's urban spaces and their function, depends on the perception of landscape design and architecture as an interconnected whole, the continued effective life of this field of knowledge depends on access to holistic interdisciplinary modeling tools to integrate modeling of buildings and Mid-scale urban environments around them. Models through which architects and landscape designers, can be aware of the connections and impact of their design scenarios on each other, and based on Local Big data, predict and manage the changes in urban spaces in integration with residential spaces, and make their own decisions more responsibly toward other subsystems (on both micro and mid-scales).

Fortunately, rapid advances in data mining and artificial intelligence technology, provide unimaginable knowledge just over a decade ago, deepening our understanding of the world (Gerdo, 2021) and giving us more power to deal with complex systems such as the city, Within the framework of complex systems theory, as well as understanding how to enter the regenerative sustainability paradigm. Now, we are faced with how to take advantage of this huge potential that technology has given us. The next generation of architects and landscape designers must be able to take advantage of the integration of current evolved data-driven technologies into a single design platform, thereby anticipating and managing the challenges facing built environments, in a more realistic and effective interdisciplinary and collaborative communication.

In this regard, in the High-Performance Architecture Labratory of Tarbiat Modares University, in the form of two Ph.D. dissertations (Architecture - Landscape Architecture) and with a unique perspective, we are pursuing theoretical and practical frameworks for the development of these tools with the mentioned nature. Our goal is to develop AI-based Integrated Design Decision Support Systems (DDSS) to support designer's decisions in the early stages of architectural and landscape architectural design, based on real data from the experiences of existing examples (existing buildings-existing urban spaces) and in a participatory platform for the effective presence of all project stakeholders.

In the following, we have a brief review of the experiences and shortcomings of related research in two sub-sections: landscape design digital tools and High-performance building (HPB) design digital tools, and then we express our ideas for how to integrate the tools mentioned in a single context and the challenges ahead.

2. STATE-OF-THE-ARTS IN LANDSCAPE AND HPB DESIGN DIGITAL TOOLS

2.1 LANDSCAPE DESIGN DIGITAL TOOLS

Research efforts in recent years have led to many advances in computer tools, improving the quality of research-led design (lenzholzer et al, 2013), better understanding the social performance of the built environment, ultimately leading to significant changes in our understanding of How people use public space in cities (Schlickman, 2020). Currently, many studies, including (Elif Serdar. S, Kaya,2019, chen2018, Zhang & Bowes, 2019) are examining how to use environmental and behavioural simulation tools to solve their problems. Also, through various tools such as Python-based ML libraries such as PyTorch, sci-kit learn, Caffe, TensorFlow, Keras, and visual programming languages (VPL) and graphical user interface-based scriptings (GUI) engines such as Grasshopper, Dynamo, Kismet and Marionette see the widespread use of computing tools in the landscape.

They are an intermediary technology between the individual human experience and the projected perspective that reconstructs the design process of these decision-making systems. After several years of developing tools suitable for non-programmers, the design space now increasingly feels the need to integrate a programming environment into such tools. Recently, we have witnessed research efforts to change the language and syntax of landscape design, which attempts to convert using "codes" as a syntactic language and exploratory process, as a common language in landscape architecture and to promote new systems for designing environments (Cantrell &Mekies, 2018).

(Chris Reed2018) introduces the emergence of two approaches to landscape design research: ecology, and the emergence of productive and participatory modeling tools in professional offices. Based on this, he has studied the three scales of using participatory and productive modeling techniques in conceptualizing and constructing performance-based urban landscape and form. He argues that responsiveness, flexibility, and adaptability inherent in the dynamics of complex dynamic systems can be accomplished in many ways through productive and participatory modeling tools.

Landscape architects have dealt with GIS, geo-design, and mobile data over the past decades and have always sought to collect relatively large sets of physical, economic, and social data (Cantrell and Mekies, 2018). They have also sought to exploit the potential of automated design methods, much of which has been left to speculation and theory.

Although an in-deep knowledge of the urban landscape and public spaces (and the elements in it) as an independent design subject has emerged over the decades, there is still a shortage of decision support systems (DSS) in the digital design space, which is developed specifically for the subject of landscape design. (Trovato et al, 2017). Major tools made -due to the need to focus on large-scale projects in the urban landscape- were related to support tools for planning (PSS). Recognizing the potential of DSS for mid-scale issues such as landscape, which can be an important factor in guiding the designer's steps towards making more sustainable decisions at the beginning of the design phase - as well as complementing PSS - requires further study.

Know, the critical need of landscape architects, is to achieve simulation tools based on meta-algorithms that in an integrated real-data-based platform, be able to automatically generate and analyze different scenarios to help expand the designer's thinking and decision-making from the early stages of the design process. According to this, the following three challenges were identified as the main challenges in this area:
1- Lack of transparency in how to integrate environmental design simulation tools.
2- Lack of development of appropriate data-collection methods for the formation of data-driven decision support tools (except GIS) in the digital context of progress
3- The only solution to the problem is to rely on the current building information management (BIM) methodology (Robledo2018).

2.2. HIGH-PERFORMANCE BUILDING (HPB) DESIGN DIGITAL TOOLS

In the field of architecture, however, we are witnessing more efforts in the field of supporting designer decisions in the digital space, especially in the early stages of the high-performance design process, which (although not with a single goal and vision) seek to upgrade Building Performance Simulation Tools (BPST) and their Applicability in the design process. Numerous complementary methods, techniques, and tools are being developed in this regard (Purup, 2020).

The main focus of current research in this field, is to build surrogate models (or metamodels), developing based on the output data of simulation tools, to overcome the shortcomings and difficulties of direct integration of tools in the design process, using artificial intelligence algorithms. (Westermann, 2019). using these surrogate models within design drawing tools can predict the REAL-TIME environmental performance of designer concepts (e.g., YOUSIF, 2021) and eliminate the need for dependence on simulation tools and expertise. This is a very good technical development, but it is only part of the overall puzzle of developing decision support tools and of course the core of these tools.

Meanwhile, a small body of research (such as Jusselme, 2018 and Nik-Bakht, 2020) has attempted to introduce the structure of exploratory methods and semi-automation systems to automatically generate and analyze diverse possible scenarios -based on the designer concept- in the compromise between sustainability goals. Compared to the initial optimization and complementary methods for BPSTs, they provide new knowledge - in non-specialized language- in the solution space to the designer and others, guiding and encouraging them toward making sustainable decisions during design stages. But they still have shortcomings especially in relying on current software. Therefore, it can be said that two important issues remain as the main challenge in this category:
1- Current research relies on hypothesis-based data from existing tools. The specific systematic mechanisms by which real data from actual buildings and public spaces affect the designer's cognition are still unknown.
2- These methods do not have the full support of the design process in the context of digital tools and the necessary compatibility especially with BIM methodology.

3. INTEGRATED BIM-BASED MID-SCALE DECISION SUPPORT SYSTEMS FOR REGENERATIVE DESIGN

In general, what is considered in a DSS as a management tool -from the branch of management- is the production of knowledge for its user. Hence, what is expected from a DSS as a holistic integrated architectural and landscape design process tool, is to generate knowledge for the designer based on the basic information of the concepts drawn by the him/her. The only digital platform in our current tools that allows data to flow throughout the life cycle of a project is Building Information Modeling (BIM) Methodology. Hence, the only platform and common language for creating this integration through holistic modelling tools is the BIM platform.

To develop integrated DSSs in Regenerative paradigm, we must be able to implement three big steps: "Ability to extract big amounts of data (tabular, visual, semantic, etc.) under environmental, social, physical and economic sectors", "Connect this digitized environment to various ML frameworks in high-efficiency paths", and " Enable the entry of many existing samples into this process in an open and accessible environment".

With this vision, we are now developing a real data-based modelling system, from several urban mid-scale public spaces in Iran, including several gardens and building arounds. In this system, we have used several sensitivity analysis engines (to identify key performance parameters in different sub-sectors), the intelligence control system, and a dedicated energy-economy analysis engine, that in interaction with a core meta-model (a surrogate model trained with existing real-data), explores the co-evolution of problem-solution round trip process with "feedback loop".

For collecting data, we have used state-of-the-art data collecting techniques including computer vision and web-crawling. We used computer vision to analyze physical-behavioural patterns (in three dimensions). Computer vision has been used to analyze behavioural patterns in urban spaces in small number of studies, including (Schlickman, 2020), but how computer vision data is used in the early stages of the design process is questionable. Our research team used computer vision output data in the early stages of the design process as neural network training data, and by converting them into concept graphs (based on graph theory) created a semi-automation system in the landscape design process.

On the other hand, using new web data collecting technologies such as web crawler, we have created libraries that automatically provide the physical and economic data of local materials to feed system algorithms and as a result, while the system is able to analyse real-time environmental performance of design concepts, it generates alternative design scenarios based on actual data (rather than hypothetical simulation data). We can therefore claim that the system performance predictions are much closer to the existing reality than the results of current simulation tools and on the other hand, by guiding and encouraging the design team to use life cycle economic environmental analysis - without the need for such manual analysis - our system helps to strengthen the goals of the circular economy.

4. CONCLUSION

In this paper, we explain the basis and reasons for the need for integrated and collaborated data-driven DSSs for use in simultaneous architectural and mid-scales landscape urban design processes. After a brief review of the advances and shortcomings of current tools for achieving the vision of Regenerative sustainability, we turn to the general methodology, steps, and methods required to achieve these systems, and presented our two on-going Ph.D. studies as an effort for prototyping of such tools. Our innovation is in adopting the concurrent methods we have used, for data collecting data mining, and the needed workflow for developing of these Design DSSs. Efforts to develop DDSS for mid-scale landscape projects (urban public spaces) facilitate public space change management and ultimately city change management as a large-scale system and accelerate the growth of landscape's theory and computing tools.

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Labirinto Urbano: Ludification As A Form Of Civic And Urban Communication Towards Inclusion

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ABSTRACT

Taking advantage of ludification theories and applied research practises, connected with public play space with a strong impact in the 21st century, we apply these ideas to urban and civic contexts with the aim of promoting a communication process about public space towards inclusion. Based on the concept of unitary urbanism this paper will show an historical understanding of the playful city that culminates in the project Urban Maze [Labirinto Urbano]. The aim is to contribute to a critical playful environment that take advantage of the developed concepts.

For that purpose, we will use an arts and design-based research methodology that explores the concept of ludification and civic media. In this context, the process started with a first stage research connecting the state-of-the-art with a civic game prototype for future implementation in the Portuguese central city of Almeirim.

The intersection between games, philosophy, urbanism, and activism was developed to generate a creative response to identified problems, namely a great lack of accessibility in the current urban design. Therefore, the project aims to be a form of playful communication for all its inhabitants and government officials in charge to make the problems of urban accessibility more visible, and successfully solved.

KEYWORDS

Ludification, Urbanism, Civic Media, Locative Media, Serious Games

1. INTRODUCTION

Demarcating itself from gamification (Zichermann and Cunningham, 2011), ludification is a more comprehensive concept, which holistically analyses culture and its daily manifestations through the lens of play (Dippel and Fizek, 2017). It consists of acts of play, playfulness, appropriating the world and its structures to make them more ambiguous, with imminently creative or disruptive potential. As Sicart points out, it is like a glue with the ability to aggregate various contexts, "situations, behaviours, and individuals, extending play to an attitude of being in the world" (Sicart, 2014, p. 25). It is present in several of the last century artistic manifestations, such as, for example, Situationist International (SI), Fluxus, and hacker culture, among other possibilities. It spread in the 21st century where an aesthetic of play has the strength to emerge towards a playful language (Flanagan, 2014).

It is based on these premises that Zimmerman proclaims this century as the "ludic century", with play and games becoming a form of socio-cultural organization (2013). In this sense, its systemic aggregation value will be able to replace the information experience offered by linear media (2014, p. 20). This approach leads philosophers, academics, artists, and game designers to a broader and more comprehensive considerations regarding its applicability. Jane McGonigal (2011) following question, "what if we decide to use everything we know about game design to fix what's wrong in the world?", proposes an integrated world where the real and the fictional were merged for a better future. This question was a starting point for the current exploratory research by action, aiming to rethink gamification, game design and its mechanics, as performative media for a civic and ethical purpose.

2. RESEARCH BACKGROUND

In the 19th century, the flâneur appears as an urban cultural figure in Paris, making use of walking as a way of being in the world, practicing what Honoré de Balzac called "the gastronomy of the eye" (Balzac, [1829] 2014, p. 48). Walter Benjamin, based on the literary explorations of Charles Baudelaire, pointed out the flâneur as an artist, a detective and investigator of the movements of modern life (Shaya, 2004, p. 47). Later, the SI movement makes use of these principles and puts them in the light of playful and resistant thinking, giving rise to the dérive as a psychogeographic procedure (Debord, 1955). Guy Debord proposes "withdrawal" and the creation of situations as a challenge to our interpretation of urban space and in this way helped to cultivate an active engagement with the city. Establishing an interface with reality to restore the social bond (Bogdanov, 1989).

In this historical transition, to a path of "playful/poetic" language (Huizinga, [1938] 2003, p. 40) in urban society (Lefebvre, [1970] 2003, pp. 165-180), the stalker group/Osservatorio Nomade de Roma, suggested a collective transformation that subsequently, according to Lorenzo Romito, will change the nature of the places.
A more recent example, awarded best design of 2020 and Beazley Design of the Year 2020, is the project of architect Ronald Rael "Teeter-Totter Wall". Installed in between the slats of the border wall that separate the USA from Mexico (figure 1). This alternative playground, typical of critical play, gives rise to a type of meaningful communication for the inhabitants, for the place and for the world (Bankare, 2019). The author claims that "It was an idea about inequality, equality, balance and the idea that actions on one side of the border have a direct consequence on the other side. This project shows a different narrative of the borderlands as a place where grandmothers, moms and kids live every day and can be connected despite the oppression of the wall. (Staff, 2021)".

Figure 1. People play with seesaws on the border of the United States of America and Mexico, Ronald Rael, 29/07/2019, Sunland Park. Source: https://boingboing.net/2019/07/30/children-from-mexico-and-the-u.html

These groups, creators of "Locative Games" or "Urban Games" (Flanagan, 2009, p. 197) are noteworthy, but we should also mention Blast Theory collective contribution with projects like "Uncle Roy All around you" (2003) or "2097: We made ourselves over" (2017). These projects were also capable of making the connection between the online and the offline world with the location-based component as mediation. Other relevant projects, to mention just a few, are "Chromaroma" (Warman, 2011) developed on the London Underground, "Snap-Shot-City" (Shaw, 2006) and "Mapscotch" (Flanagan, 2007).

2.1 JUSTIFICATION

It is at the intermediate (M) level (Lefebvre, [1970] 2003, p. 80), public space, that projects like these make their intervention, agreeing with the general notion of "soft urbanism" (Alfrink, 2014, p. 534). Fundamentally, there is "an invitation to use public space as a forum for human interaction and expression developing democratic values" (Konyalian, 2016) as proposed by civic media (Zuckerman, 2017).

Ephemeral, locative games physically delimit the "magic circle" (Huizinga, [1938] 2003, p. 27), but they have the capacity to reinforce the community spirit. The personal and collective dimension is strengthened due to the sharing of an "exceptional situation, to share something important, to move away from the rest of the world together and to reject the usual norms" (Huizinga, [1938] 2003, p. 28). One of the fundamental characteristics of playfulness resides in its capacity to perpetuate the "magic" beyond the time of the performance creating a living shared memory.

3. LABIRINTO URBANO [URBAN MAZE] RESEARCH METHODOLOGY

Based on this background research it was essential to apply the revised literature and test its consequences in a practical ludic project. Therefore, the methodological process used an arts and design-based research process to create a solution for an identified problem in the city of Almerim in Portugal, the lack of urban accessibility.

Then, based on these findings, a playful experimental project was carried out as an answer to the identified problem.

3.1 RELEVANCE AND OBJECTIVES

Almeirim, has the dimension of 222.1 km2 and has 22847 inhabitants, making a value of 102.9 of population density – concerning 2017 PORDATA available data. The population density reached its maximum in the year 2013 and since then it has been falling (blue line, figure 2). Almeirim is thus in a situation of loss of inhabitants.

In a contrary movement are the values of the total dependency index, which grows every year. Comparing the two lines in figure 2 it is possible to see the convergence.

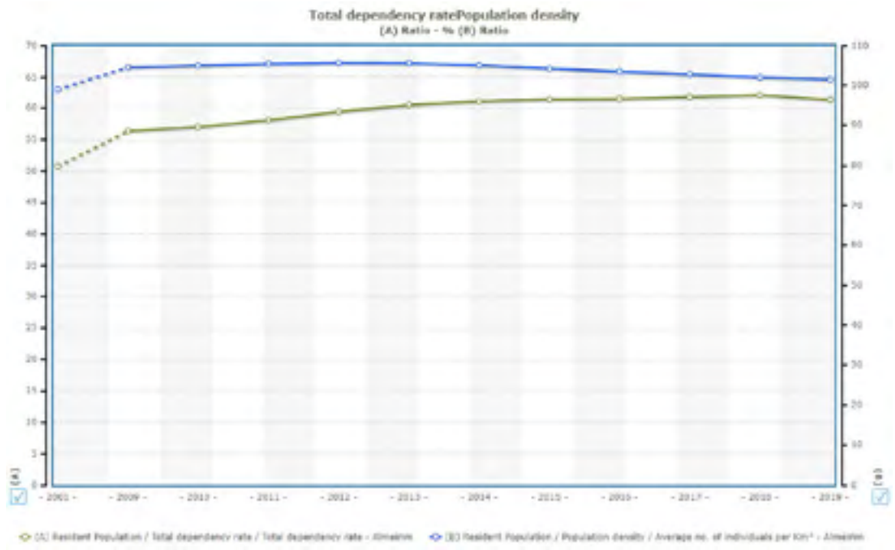

Figure 2. Graph comparing total dependency index and population density (2001-2019), Tiago Mindrico, 22/05/2021. Source: https://www.pordata.pt/

With population density decreasing and the total dependency rate increasing, regardless of the underlying socio-political reasons, it means that Almeirim will need to be increasingly prepared for issues of accessibility, urbanism and civism. It will therefore be inevitable to look for ways of social innovation, that is, new ideas that bridge the gap between social need and the creation of social relationships or collaborations. Generate innovation that is both good for society and that impels the ability of its inhabitants to act (Murray, Caulier-Grice and Mulgan 2010).

Based on these conclusions, there was a need to look at the city in the light of accessibility and urban mobility. Below, are 3 representative images of what was found throughout the city.

These images reveal different problems where accessibility is at stake for everyone who wants to walk around the city. Blocked sidewalks with trash bins, electricity poles, lamp posts, etc ... Having seen this, it made sense to intervene artistically on this issue.

In this context, the "Labirinto Urbano" project is as a first step for reflection and communication between citizens and the city itself. The goal is to start an abstraction process from the game and then offer a survey of the city's structures.

Figure 3. Rua dos Aliados, Tiago Mindrico, 13/03/2019, Almeirim.

Figure 4. Rua do Pinhal, Tiago Mindrico, 14/04/2019, Almeirim.

Figure 5. Rua dos Aliados, Tiago Mindrico, 14/04/2019, Almeirim.

With several objectives associated, the main, and the most direct, is the one that provided the basis for its development, which is making more visible problems of accessibility in the city of Almeirim. At the same time, the project invites participants to wander the city streets, practicing a playful, collective or individual "drift", towards any geographical point of their daily lives.

3.2 THEORETICAL/CONCEPTUAL FRAMEWORK

The players establish a route and from that moment on accepted roaming the Almeirim streets according to the Urban Maze game book of rules that is in the kit - the kit experiment, which was produced manually, consists of: 1x Rules Booklet, 5x Ariadne Threads (MDF board with five pieces of cotton thread), 1x Scratch Card to use in case of victory (figure 6).

Figure 6. Urban Maze Game Kit, Tiago Mindrico, 01/06/2019.

From that moment on, players will have to follow the highway code scrupulously, which was used as a basis of support for the set of rules. It is only allowed to walk on the sidewalks and cross the road in the proper places, the crosswalks. If there is no crosswalk in the field of vision, the possibility of crossing the road is perpendicular to the sidewalk. No changes were made to these basic rules of civil behaviour, as the idea is not to question the law, but to use and reinforce it, using it as a critical voice for the problems already described in the city of Almeirim.

The idea of a labyrinth arises from the moment when displacement, called mandatory, is impossible. At this point, a playful layer is added. Instead of the passer-by having the flexibility to avoid the obstacle that she/he finds obstructing his passage, she/he is obliged to go back and find a new path towards her/his goal. This game mechanics applied to locomotion in the city creates a sense of maze because now requires mental reconfiguration of the city from the navigation strangeness that is offered by playful environment. The game in this case uses a direct appropriation of the world and its structures, making them more ambiguous and with new capabilities. Opposed to traditional notions of travel and tour, participants can discover their city from a different perspective. Just as it was proposed by the SI concept of "dérive".
In addition to the mandatory step back on the path, as soon as the participant encounters an obstacle, she/he is also bound by the rules to leave a cotton thread tied to that same object. These cotton threads are called "Ariadne threads".

This way of symbolizing a process brings a new communication component to the project, it is at this stage that it becomes public. After signalling the obstacle, the player backs off in search of a new route, knowing that his mark has stayed there. This thread, in addition to satisfying one of the main objectives of the experience, which is the signalling of obstacles, offers a multiplayer and co-op (cooperation) critical thinking perspective.

The multiplayer critical thinking perspective was developed as a means of communication experience to the experience itself and abroad. The first phase of communication, internal communication, serves to point out a common goal to solve the maze. It communicates to participants which paths have already blocked other people while informing them that there are other people participating.

The second stage communicates to the outside. It is not necessary to have been part of the performance to verify that the reality has been changed, since symbols are present in the world (figure 8). These symbols, even though they may not have a direct inference for those who have never been inside the "magic circle", demonstrate an attempt at communication that, when viewed repeatedly and in different parts of the city, will help in the interpretation of the message. The poetics of playing thus opens space for communication and social self-knowledge.

The victory card (figure 9) contains a scratchable area on the back with the indication that it can only be scratched at the end of the objective being reached. The message hidden on the card is as follows:
"Congratulations! You overcame your goal, you helped others, and you made visible the obstacles in the maze that many face every day."

Figure 8. Player, place an "Ariadne thread" on an electricity pole, as it blocks the path, Tiago Mindrico, 02/07/2019.

Figure 7. (CRIAL - Almeirim Children's Recovery Center) operational assistant placing an "Ariadne thread" on the pole during the Urban Maze experience, Tiago Mindrico, 25/06/2019.

Figure 9. Player scrapes victory card, Tiago Mindrico, 10/07/2019.

4. RESULTS ANALYSIS AND DISCUSSION OF RESULTS / FINDINGS

Some mechanics and details were left unexplained in this paper given the depth of the project, but as a conclusion, we could mention the happiness of all the participants or the growth of the community feeling about inclusion and participatory public space design. Interestingly, the city, since the "urban maze" started - June 1, 2019 - has been transforming itself.
Two practical cases will be presented in which the city has transformed itself to meet the goals of the project, namely, for example, in Bernardo Gonçalves street, the garbage bins were removed, and the pavement was finished.

In the next example, the modification is not so radical, but it can be considered as an effort and an acknowledgment of the problem by the municipality.

Avenida 25 de Abril, one of the main avenues of the city, saw the lamppost, which was blocking the sidewalk next to a crosswalk, replaced by another one, metallic, narrower, placed to offer more space on the pavement side (Figures 12 and 13).

Figure 10. Rua Bernardo Gonçalves after Urban Maze, Google Maps, Almeirim. Source: https://www.google.pt/maps

Figure 11. Rua Bernardo Gonçalves before Urban Maze, Tiago Mindrico, 13/10/2019, Almeirim.

Figure 12. Avenida 25 de Abril before Urban Maze, Tiago Mindrico, 07/03/2019, Almeirim.

Figure 13. Avenida 25 de Abril after Urban Maze, Tiago Mindrico, 13/10/2019, Almeirim.

5. CONCLUSIONS

It is conclusive that play is a dynamic tool to communicate the most varied values. Emotivity and subjectivity enter the field of communication, leading to an emancipatory experience different from linear media, with the potential to change the physical world and co-design the public space.

In conclusion, a playful culture with strong historical roots, when serving an urban society, acquires significant importance, as it offers new possibilities for the communicative act. The playful media with different forms of applicability, in this case ludification, can take on a critical voice, defined by the improvisation of everyday experiences to provide a significant performative act that is related to the civic and urban dimension.

The “Labirinto Urbano [Urban Maze]” project is part of this vision, developed as a contribution to assimilation and application of the theoretical bases presented.

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Time Uses, Space Design: Adaptable Use Of Spaces Based On Citizens Time Use

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ABSTRACT

In the future people will have fewer working hours and more free time. How is this going to disturb the pattern of daily life? What issues will the new urban policy tackle? What if we understand space in terms of time? How do cities accommodate the need for space and efficient use of time?

This paper explores data-based analysis of chrono spatial engagement of people in the city and how in the future cities could adapt to different uses of time with new technology. The project aims to bridge the gap between the future utilization of free time and available spaces in the city. The analysis is explored in Eixample district in Barcelona as a test ground for the methodology. It introduces a proposal of a dynamic system that will update itself in a constant feedback loop of time and space.

The project allows us to establish a framework for the generation and assignment of flexible spaces in the city according to the constantly changing needs of the citizens. It represents another tool for the promotion of the 15 minutes city, since it helps to use spaces in a more efficient and sustainable way, having more uses in limited spaces.

KEYWORDS

Freetime, Adaptability, Uses, Spaces, Needs

1. INTRODUCTION

Modern society is currently observing a dynamic change in a daily time pattern. The time devoted to work is decreasing mainly because of automation and technology that facilitate and shorten many processes. In a future society how the new time distribution will look like? What issues will the new urban policies tackle? What if we understood space in terms of time? How will public spaces be able to react and adapt to the new needs of spaces for leisure? Flexible and adaptable spaces might become a crucial resource in enabling a more efficient and sustainable use of time. Data and complementary technology could allow a new paradigm of space allocation in the city and help promote an active use of time and challenge existing spatial inequalities.

The layer of time has been already used in urban studies, mainly in aspects related with transportation planning (Kitamura, Fujii and Pas, 2021), urban land change (Seto and Fragkias, 2021) or real-time data (Townsend, 2010). Specifically, time use survey information has allowed to study gender inequalities in the use of time (Christer Thrane, 2000) and inequalities in the youth of vulnerable urban areas (Shann, M.H., 2001). In this research, the time use is being proposed as information to identify different archetypes with different time use. The identification of each archetype requires the analysis of the microdata of the Time Use Survey from the Spanish National Statistics Institute (INE, 2009-2010).

Time data could become a powerful tool to understand and plan cities, generating a spatial-temporal dimension that is based not only in a specific masterplan, but understand each map as a frame of a dynamic and complex reality.

2. RELEVANCE AND OBJECTIVES

This research aims to address a main question:

How can we adapt the uses of the limited and unused spaces in the city according to citizens' needs and therefore promote a more efficient and sustainable use of them?

The amount of data generated constantly, together with the new requirements of spaces and the increase of sharing economy in cities, opens plenty of opportunities to design cities in a different way. Proper data can give us information about the real-time need of space in the city, and at the same time, coworking or co-housing is changing the requirement and use of spaces. There are a large amount of unused spaces and also new needs on how spaces could be used. In fact, a more flexible use of time is also increasing the availability of free time, both for the less time used in commuting as well as new ways of work and conciliation professional and personal life.

3. METHODOLOGY

Our project is based on data of the Eixample District and considers current data, but also future trends that might modify both the citizens' needs and the availability of spaces. The methodology can be summarised in three main steps, cono carry out this project, the surbethe project follows a structured methodology.

- Firstly, data from the survey on the use of time (IDESCAT, 2011) has been used to generate different time patterns for specific archetypes, based on demographics and socioeconomics criteria.
- Secondly, by working with geo-spatial data, the spaces of the city have been classified in three main categories (work, live and play), and analysed in order to identify areas of the city that have potential for land use allocation. Public spaces are linked to the new space allocation and are considered also as a resource to address citizen's needs.
- Thirdly, a cross analysis allowed us to identify how the flexible spaces, both private and public, could be used for each of the archetypes' needs.
- Finally, a proposal for a "match-making" process has been defined for the automatic and flexible allocation of the spaces.

4. ANALYSIS AND FINDINGS

4.1 TIME USE DATA

The Time Use survey provides information on how the citizens of Catalonia and Barcelona are using their time. The data is segregated into many subcategories based on gender, age, type of activities among others. The survey is prepared every 10 years, allowing us to have comparative data to understand how the time use patterns are changing.

The analysis of the data allows us to identify how different archetypes are using their time. As per the Time Use Survey, the time uses can be categorised as following:

- Personal care
- Remunerated work
- Studies
- Home and family Work
- Volunteering work
- Social life and fun
- Sports and outdoors activities
- Hobbies and computer use
- Media
- Commuting or non-specified time

The distribution of time among each of this category will allow us to identify specific archetypes that will have specific needs and use of spaces (Figure 1).

Figure 1. Archetypes, use of time and space requirement (representation)

4.2 CATEGORIZATION OF SPACES BASED ON TIME USE

In order to generate and visualize geo-spatial data linked with the use of time, spaces have been classified into 3 broad categories (Figure 2.):
Live: residences, the most dominant on site, includes typologies from apartments to hotels.
Work: work Spaces, from administrative offices to industries and shops and services
Play: play areas such as parks and recreational areas. These are the main spaces here that we expect to see emerging in a society of free time.

Each of these categories have been individually analysed and broken down into subcategories in order to identify what are the spaces that can become available (Figure 3.). Each space will become flexible and ready to adopt a new function according to the needs of the surrounding community. The public space acquires a main role due to its capacity to connect different spaces and improve the overall livability of streets and shared spaces.

Some of these subcategories respond to current urban trends such as the reduction of parking lots, the increased demand for coworking spaces or the new cohousing experiments that are being developed in many cities, also in Barcelona (Habitatge Barcelona, 2020). Even if temporary, the impact of covid has to be considered in terms of reduction of commuting time and increase of more available time.

Figure 2. Land/time use distribution in Eixample District

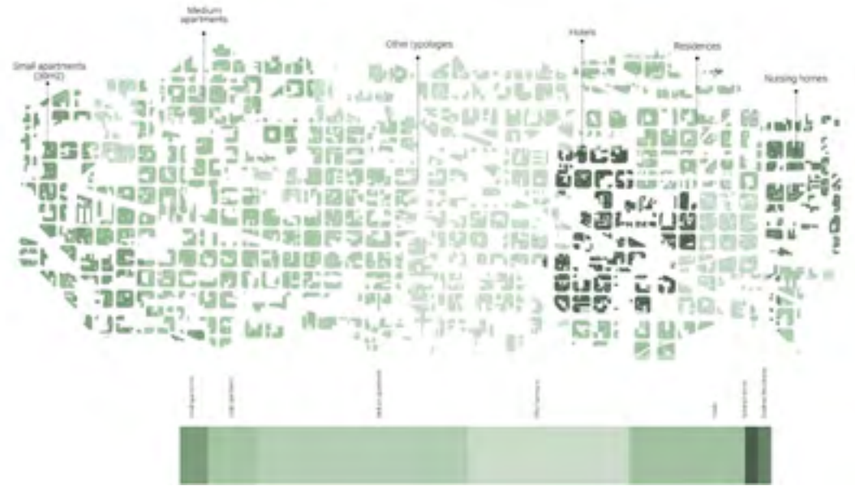

Figure 3. Live “land” distribution in Eixample

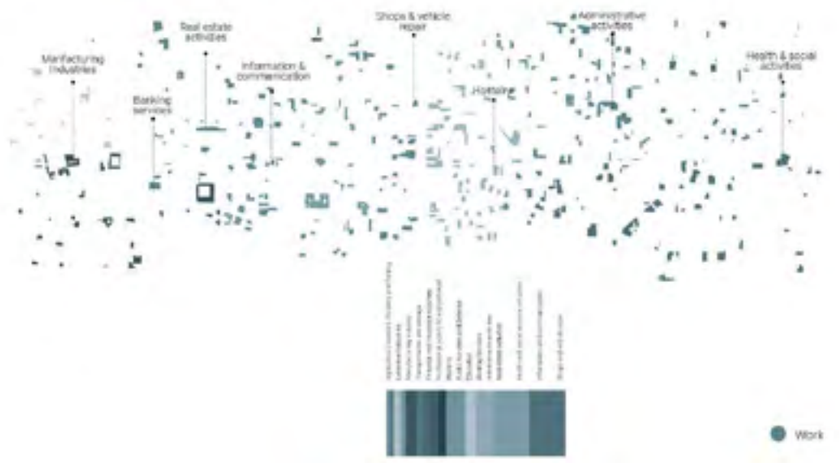

Figure 4. Work “land” distribution in Eixample

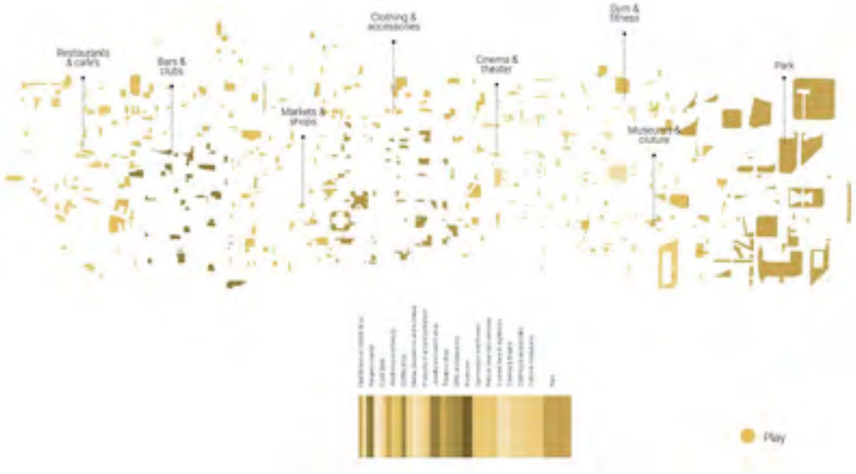

Figure 5. Play “land” distribution in Eixample

As per the land distribution considered, the live category includes the parks but not some roads and squares that might have been transformed into green corridors or pedestrian streets.

To better visualise the categories, each use has been represented as a barcode. The color helps identify distinct categories as live, work and play. The constant updating of bar code in terms of spatial uses will help analyse spaces across the city based on time. Finally the empty unused spaces are being visualised as empty bars (Figure 6.), showing the actual inefficiency in the use of space within a city.

4.3 MATCHMAKING AND THE CATALOGUE OF USES

Once the needs of the citizens have been identified as well as the available spaces to cover these needs, we propose a platform mainly initiated by the Public Administration to match them. The platform will work like a dynamic machine that will update itself with real time changes in future needs and available spaces in a constant feedback loop of time and space.

This platform requires the active role of the Public Administration and the citizens:

- Public Administration: receives or extracts information about available spaces and their period of vacancy. In regards to private spaces, there should establish an agreement with the owner of the space, using for example smart contracts or a policy that follows the characteristics of the Empty Space Plan of Barcelona (Barcelona City Council, 2012). In regards with the public spaces, the process would be more flexible, allowing the Public Administration to evaluate different requests and decide the most suitable option based on the community needs.
- The citizens: send information about potential needs of space. The platform could be used both by private citizens or also associations, allowing to merge available spaces with specific activities.

The platform aims to actively engage in allocating citizens' needs for time utilization within the spatial constraints of the city and work as a 'Matchmaker'.

4.4 SPATIAL IMPLICATIONS

By allowing this flexibility in time use means flexibility in space use. By creating a catalog of spaces in the city that are underused and on the other hand a typology of new potential uses the spaces can also be matched. This works by a number of steps:

- Citizens provide their suggestions and desires for the use of their free time and their preferred activity
- With the aggregation model the platform can identify the pattern of most desired spaces and activities
- The platform will identify areas in the city where these activities can be carried out based
- Provides the necessary communication to the space owners to also adapt their public spaces to their preferred temporal needs of their

Figure 6. Time barcode

Figure 7. Matchmaking

Figure 8. Schematic diagram of land use allocation

4.5 PUBLIC SPACE

This methodology not only provided adaptable solutions to underused indoor spaces but through this co-design platform citizens are given the chance to also adapt their public spaces to their preferred temporal needs of their neighborhood. In this sense, the streets, sidewalks, and intersections can allow for different activities to take place during different timings- from festivities to pop-up markets to playground and so on. The proposal also suggests here the reclamation of the cerda block interior for interventions that can be set up and dismantled easily.

By creating this link between the people who need the space with the people who have it, there becomes a constant feedback loop of interventions that make the city a more dynamic space for a future generation with more free time.

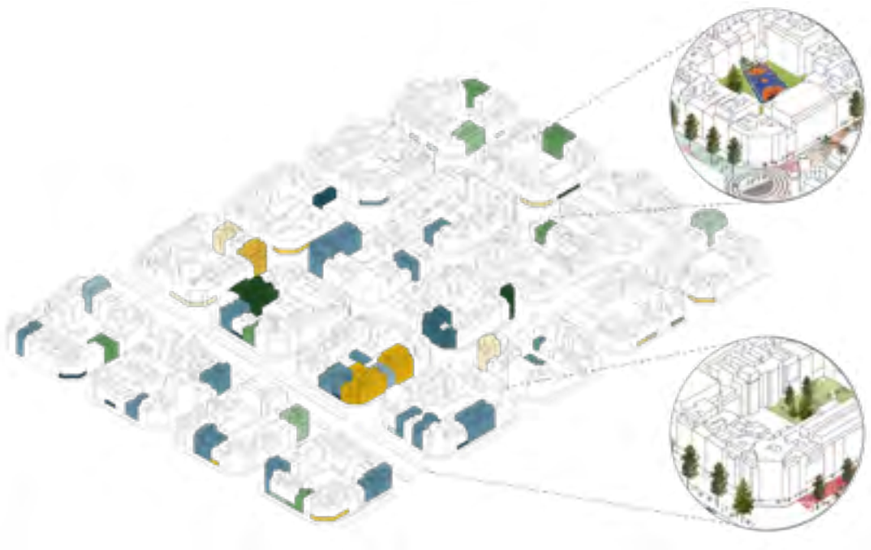

Figure 9. The repurpose of public space

5. CONCLUSION AND IMPLICATIONS

As per the research question of our project, the use of cooperation between Public Administration and the citizens in the identification and temporary allocation of spaces according to the time use pattern of different communities could represent a solution for a more efficient and sustainable use of time.

In fact, the project allows us to establish a framework for the generation and assignment of flexible spaces according to the constantly changing needs. Considering all the changes in terms of population structure, use of leisure time, and new ways of working and living, the current allocation of spaces, both public and private, can be allocated in a more efficient and flexible way. Basically, it reduces the quantity of unused space and provides space where is required, improving the quality of life of citizens.

This platform could become a powerful tool for the promotion of the 15 minutes city, since it helps to use spaces more efficiently, increasing the use of the spaces. It could also be easily replicable, following the same steps per different areas (time use data, unused spaces, Public Administration/citizens cooperation...), unleashing new opportunities for urban design and co-management models.

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Public Human Space- Adaptable Use Of Co-designed + Co-created By The User Based On Users Needs And Desires

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ABSTRACT

Cities are rapidly evolving. The importance of public areas has expanded as a result of this rise. This study seeks to analyse and develop the role that components such as co-creature, co-design and empathy play in this environment. Co-design is an alternative for all interested parties to participate in the design debate. People, city planners, legislators and designers are asked to take part in public space creation. Once each individual contributes to this process, with a different viewpoint on urban space needs, the interdisciplinary part of co-design becomes obvious. The combination of co-design and the public sector promises to serve communities very well. A reduction in Vandalism and urban alienation and an improvement in communal life can be among the beneficial results of this connection. The co-design approach nevertheless influences the roles played in the conventional setting by the individuals concerned and depends on the compromise of certain power structures.

KEYWORDS

Adaptability, Empathy, Human-Centric, Needs, Participation, Urban Interaction Design, Public Space, Co-Creation, Co-Design

1. INTRODUCTION

Human behaviour, emotions, and interpersonal relationships are assumed to be the result of mental processes that are impacted by the many elements of public places. These features might be physical, social, cultural, or sensory, and they all have the potential to impact people's behaviour and perceptions in public places.

Abraham Maslow, a behavioral theorist, established a few characteristics that are important in motivating individuals and steering them to behave in specific ways in a journal paper titled A Theory of Human Motivation. Maslow's Hierarchy of Needs proposes that physiological, biological, or aesthetic needs, the need for safety, the need for love and belonging, and the need for self-actualization, status, or esteem are the most important variables in motivating behavior.

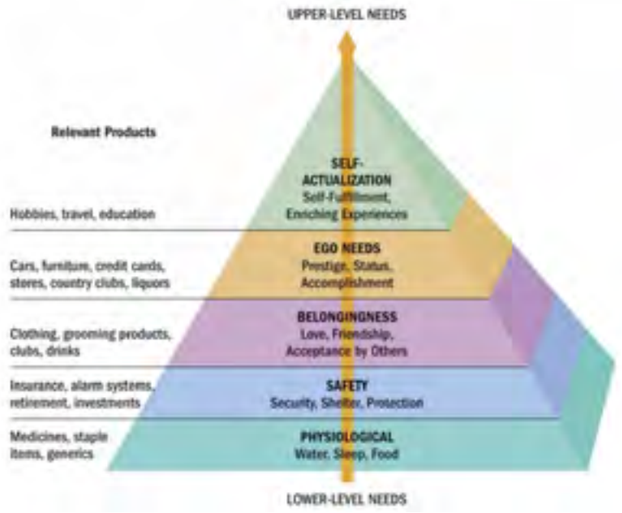

Figure 1. Maslow's Hierarchy of Needs Diagram (Abraham Maslow, 1943)

It is acceptable to hypothesize that certain aspects of human behavior can be influenced by the presence of physical and ambient features of public spaces, based on Maslow's Hierarchy of Needs and the link of these elements with the built environment. Buildings, pathways, terrain patterns, and other people are examples of physical aspects in public areas, whereas lighting, sound, and temperature are examples of ambient aspects.

Environmental psychology is a term used to describe the study of the intricate link that exists between humans and their surroundings. It is a topic of study that not only psychologists, sociologists, geographers, and anthropologists are interested in, but also planners, designers, and government officials. Environmental psychology investigates how people interact with their surroundings by looking at how their mental processes and behavior are influenced or influenced by their surroundings.

The quality of life and the built environment are the central concerns of environmental psychology. The planner, designer, and public authority's job in all of this is to improve human surroundings by establishing practical procedures, policies, and planning, design, and educational procedures that are sensitive to environmental psychology's findings.

Behavioral theorists and psychologists have hypothesized on several environment-behavior theories despite this. According to an examination of the literature, they can be summarised into five primary theoretical viewpoints. The following are some of them:

- arousal theory,
- stimulus load theory,
- behaviour constraint theory,
- adaptation level theory,
- environment stress theory, and
- perception or cognition theory

2. IMPORTANCE OF HUMAN CONNECTION

The majority of people have a desire and need to keep in touch with the rest of the world. Because they are capable of bridging that gap, public spaces are crucial. Public spaces, according to Carr et al., are vital not just for bridging this gap, but also for providing routes for movement, conversation, and a common ground for enjoyment and relaxation. The potential of public spaces to teach and provide knowledge is also vital, especially when those areas are essential in the city's history and inhabitants' social lives.

Throughout history, many public spaces have functioned as the epicentre of social life, allowing people to congregate and socialise, celebrate, play with their children, and perform economic, cultural, religious, and political activities.

Despite the changing nature of modern neighbourhoods and communities, public spaces are still an essential part of life because they provide opportunities for different people – young, old etc., to experience a variety of human encounters.

The street, in fact, is the most important thread in a city's fabric. It knits the city together as a city. Because they use and experience public areas on a daily basis, people have a strong emotional attachment to them. According to urban ideologies, the desire to improve one's quality of life has spurred the attention paid to the form of public places. This ambition has not always been realised, as evidenced by the modernist and postmodernist architectural influences.

Environmental specialists and public authorities, especially councils, recognise the importance of public spaces. They recognise how attractive, well built and maintained venues can build a feeling of community and provide economic benefits for the users who offer a range of opportunities. When these persons refer to the built environment as 'humanistic' or 'humanistic,' they show that they understand that the environment may have a key effect on the way people feel and experience their environment.

The complexity of the human mind and emotions are conveyed by terms such as 'feel' and 'experience.' In order to comprehend how people 'feel' and how people 'learn' the environment, the physiological and psychological processes of individuals must be understood. Maybe only then can a truly 'humanistic' environment be recognised when built environment specialists and public authorities understand how the environment affects people's conduct.

3. THE IMPORTANCE OF PUBLIC SPACE

"A good city is like a good party — people stay longer than really necessary, because they are enjoying themselves"
— Jan Gehl

Public areas are a major asset for our towns. They offer various possibilities to meet and communicate with the community. If public spaces succeed, they include the diversity of groups present in our cities and create a social place in which to take part.

Many elements contribute to a successful public place, several factors are:

3.1. THE ACCESSIBILITY OF THE SPACE

This includes how hospitable the space is and how people can comfortably enter the space. This includes access for disabilities and the opportunity to make everybody part of society through public space, regardless of their circumstances. A smart strategy to ensure access to public places is to give comfortable sitting so that people may enjoy a lot of space and rest for a long time.

3.2. THE COMFORT OF THE SPACE

This is the ability of people to be in the public sphere themselves. One of the best joys of going to a public space is to be totally expressed. This could mean meeting new people, getting back together with old acquaintances, taking part in space events or interacting with public art in space. These are all ways that persons in the public sphere can be comfortable.

3.3. CREATING SOCIABILITY

This topic of "sociality" in the public realm has been investigated by several academics of human geography. Essentially, it's about the relationships between the person and the place that individuals have in the public realm. This might include social networks created on the streets or in town squares. It is crucial that people have an opportunity to get to know new people in the public area since this adds to public space sociability. It is also a terrific way to get people together to have social activities in the public arena, such as music concerts or hosting movies.

4. CO-DESIGN FOR INTERACTIVE PUBLIC SPACES, PROCESS AND STRATEGIES

- Co-design has been used for the utilisation of artefacts and practises.
- Applied to the artefact design were the iterative co-design process which covers the phases of context investigation, participatory design, product design and prototype hypotheses.
- Co-design processes and field studies were carried out with actual users in real working environments via their daily routines to integrate the artefacts and practises to assess their impact in true working and educational contexts.
- The co-design framework was expanded into field studies that assessed the predicted added value of the artefacts by participatory design in construction pilots.

Figure 2. Co-Designing Process (Paul & Firoz, 2021)

4.1 DESIGNING PUBLIC SPACES

In addition of strategic concerns about the evolving and regulating of public spaces, balancing of space types throughout urban areas and ensuring rights and duties; planners also often provide for the regeneration of new public spaces and existing spaces at a more specific level. Therefore designers have the ability to set forth and apply defined principles for the kind of public spaces they want, via their plans, decrees, guidelines and policies or through discretionary discussions of development proposals through the regulatory process.

Although all public spaces are different and attempts are often based on little more than presumption and intuitive analytics to define universally applicable principles for "good" public space design, extensive empirical testing has revealed a number of key factors which may be important in the development of most public spaces.

- How public areas are clearly distinguished from private spaces to make them public.
- How the usage of public spaces help to make places for users attractive.
- How the facilities and features hosting can make spaces more meaningful.
- How to utilise the chance to maximise the potential for a positive public social environment.
- How to establish and preserve the balance of public space between vehicles, pedestrians and other users.
- How rooms may be made comfortable by their ability to promote safety and relaxation.

4.2. DELINEATED PUBLIC SPACE (CLEARLY PUBLIC IN THEIR USE)

The challenges of developing areas that are neither publicly nor privately used have been extensively studied in the urban planning literature. This has long been a problem in residential neighbourhoods, and while it is clear in certain commercial developments, other retail ventures may look overly exclusive and hence not totally public, or at least not available to everyone. The city's public and private spaces must be properly delineated, with the understanding that public areas in the wrong places might be more difficult than a lack of a public space. Instead, public places

are designed to make people feel welcome, welcoming, and visually and physically accessible, regardless of who they are or how they handle their property. Private leisure places, such as private or communal gardens, play an important and unique function independent from the city's public places. As intended, these areas of the city should be manifestly private, even when viewed from the public realm. It is not a negative segregation, as it is sometimes depicted in literature, but rather a positive separation between the city's private and public roles; the careful separation between which a key quality of effective urbanism represents.

4.3. ENGAGING PUBLIC SPACE (DESIGNING IN ACTIVE USES)

While the physical boundaries of outer public spaces are determined by buildings, terrain, or infrastructure, the land use of surrounding areas and streets that lead away from space will determine where they are: calm, soft, or vibrant. It is critical that we be realistic about what will and will not work in specific contexts at all times. It is obviously unrealistic to try to create a bustling commercial district in a quiet residential neighbourhood or a calm haven in a congested city centre. Despite criticisms of over-marketing and excessive consumption pressure on public space, much of the buzz associated with particularly active spaces will tend to be wrapped up in consumption activities of some kind – malls, cafés, bistros, markets, and so on – typically stimulating and enriching urban realm and welcoming users. If this is to be built, active uses in public space must be carefully established from the start so that users may live in and interact with it.

4.4. MEANINGFUL PUBLIC SPACE (INCORPORATING NOTABLE AMENITIES AND FEATURES)

Large studies of space users indicate that, rather than minor stylistic concerns about the intricacies of its designs or whether they are technically 'genuine' or not, people are mostly concerned with how they perceive space—good or unpleasant, engaging or repulsive, appealing or ugly. Locations grow increasingly essential over time as individuals engage and collect. Spaces can also become more meaningful if important historical or geographical qualities are integrated, allowing people to participate in additional amenities and functions. Large screens, band stands, kiosks, sports facilities, fountains, paddling pools, play equipment, skates, courses, amphitheatres, lighting displays, and so on might all be active. They could be active. They can also be casual, serious, or meditative, such as public art, sculptural furniture, memorials, monuments, pools of contemplation, flower gardens/screens, wifi hotspots, and so on.

4.5. SOCIAL PUBLIC SPACE (ENCOURAGING SOCIAL ENGAGEMENT)

How we build public areas can make them more or less favourable for all forms of social interactions, from major events and festivals to smaller and humble encounters and everything between them. Public areas are still the definitive locations of public discussion, protest, meetings, community experience, communication and the rich and varied social life of towns and towns rather than the public space retreat that some of them anticipate. Detailed observational work reveals that movement in public space flows largely from mainstream circulation corridors or "desire lines," directly throughout spaces, to active uses in space and vice-versa.

	Co-Creation	Co-design
Stakeholders' role	Creators	Information providers, creative thinkers, evaluators of new ideas
Designers' role	Coordinators, developers and providers of co-creation tools.	Facilitators, mediators.
Opportunities	Collective creativity, knowledge exchange, and social capital	Design creativity, engagement, reflection.
Challenges	Risk of non-reciprocal relations in which stakeholders feel instrumentalized	Balancing tensions and creating relationships of trust

Table 1. Co-Creation and Co-Design

Figure 3. Co-design Relationship (Paul & Firoz, 2021)

Figure 4. Values in Public Space (Kim, 2015)

Only a very tiny fraction of people will really stop within most locations fully integrated into the mobility network and engage directly with the place, while the majority will go on. However, high levels of moving will usually inspire high levels of space activity, and commonly occurs in the gaps between major movement lines and are attracted to and around major features and facilities with a maximum density of such events (and social meetings).

Individual spaces (if sufficiently wide) can also function as a series of discrete subspaces, each with a distinctive feature and purpose and meant to draw different types of users. It is as crucial to take into consideration the desired social outcome when creating public spaces and how physical space and its context support them or not. Although particular social results may never be guaranteed, it is doubtful that such outcomes will be effective.

4.6. BALANCED PUBLIC SPACE (BETWEEN TRAFFIC AND PEDESTRIANS)

The dilemma of traffic dominance is a persistent problem that still plagues many public spaces with serious societal repercussions. However, the solution must not prohibit all traffic. Instead, a delicate re-balancing of space is often necessary because transport and the pedestrians can share public space with one other harmoniously: giving cars with direct access to and between significant town centres and providing an animating background and public places with surveillance. This necessitates that the mobility and socialisation of pedestrians be given enough room; they are not caged or tilted, but are confident in their mobility and navigation; and in order to do this, traffic is suitably slowed down on roads that lead in and through public space.

4.7. COMFORTABLE PUBLIC SPACE (FEELING SAFE AND RELAXING)

Despite literary claims that public space is generally secure, security is, in fact, costly and systems tend to be pragmatically specified in order to match the needs of different forms of public space. While some locations that are very busy may require and have highly obvious safety, many do not. In the end, the purpose should be to make the users feel good and well-being and to use space in a relaxed and pleasant way.

Second, how well places are managed has an effect, with clean places often feeling safer and better maintained than unclean places. Finally, rooms should be relaxed with pauses and lingering options, such as high-quality, comfortable, and desirable formal and informal seats, restrooms, soft landscaping, and microclimate attention. Grass is popular during active maintenance activities because it is comfortable, flexible, and allows users to position themselves to take advantage of microclimate conditions. It also helps with relaxation, play, and social interaction.

Figure 5. Timeline of the Suggestive Design Process (Paul & Firoz, 2021)

4.8. ROBUST PUBLIC SPACE (ADAPTABLE AND DISTINCT IN THE FACE OF CHANGE)

Finally, the accomplishments of public spaces are dependent on the creation of places that are distinct, welcoming, and anchored in the local environment through effective design. This indicates, in the short term, spaces that may be used for a variety of purposes and activities, maybe at different times of the day, week, or year. In the long term, it means that changes in space usage or technology are successfully adapted to changes in locales. It will also contain architectural ideas that take into account the reality of public space maintenance routines and finances. available, with materials and features which may gracefully age and in a timeless way.

5. CONCLUSION

We examined the design of intuitive interactions in the burgeoning domain of interactive public spaces in this essay. The significance of public space are an integral aspect of the lives of people. It also identified major architectural philosophies and urban design that had an impact on the structure of the constructed environment and examined how everyone had realised the value of public spaces.

After researching how humans are affected by the environment. It talked about human behaviour theories and how individuals react to the environment and physical characteristics of public spaces.

In order to determine the level of public engagement encouraged and the role undertaken by the participants when they are working with the interface, we have developed an overview of works on urban environments. Each scenario fosters various levels of environmental expectations and leads to varied forms of crowd self-organisation and social interaction. We generated seven strategies to help create intuitive interactions in interactive public spaces. From our analysis. We spoke about the main goal and how they might be more efficiently employed to promote distinct public behavioural patterns.

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What Is Playmaking? The Power Of Video Games To Build Ways Of Inhabit That Cares

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ABSTRACT

We are witnessing an unprecedented ecosocial crisis and global urban trends suggest that, by 2050, 70% of the world's population will live in cities. It is in them where the greatest inequalities are reproduced and it is in them where we will have to fight the battle for the sustainability of life.

Faced with this global phenomenon that increases inequalities, another is happening: 40% of the world's population plays video games every day (and the trend is increasing). A video game, on the other hand, has the ability to unite people in the same space, time and place, regardless of their social conditions.

In the first part of this article we address how the views and biases of the professionals we design affect people's lives and we point out some key ideas to meet this challenge.

In the second part we present a new type of game, Playmaking, which hybridizes technology and the city in a playful way as an opportunity to promote more committed communities and create better spaces to live.

KEYWORDS

Playmaking, Placemaking, Serious Games, Citizen Card, Hybridization

1. INTRODUCTION. INSIGHTS WHEN DESIGNING

In the mid-twentieth century, New York City saw a decades-long confrontation between two ways of understanding and looking at the same city.

On one side was Robert Moses, an American civil servant who had direct responsibility for building New York City as it entered the 20th century. In their decisions, the road and the automobile took precedence over the use of public transport and many architects, urban planners and engineers of the time used these ideas to replicate them in their local territories. Moses noted these phrases:

"When you act in an overbuilt metropolis you have to fight your way with a butcher's ax"
"Cities are created for and by traffic."

On the other hand there was Jane Jacobs, a writer and journalist by profession, but also an urban planning theorist, socio-political activist and a resident of the city. She was the author of the book "The Death and Life of Great American Cities" (Jane Jacobs, 1960), where the consequences that the reconfiguration of cities would have by modern architects and urban planners were shown. From his activism, he publicly positioned himself against the opinions and ideas of Robert Moses and defended an argument that today is still totally transgressive: the defense of everyday life for urban design. Jacobs stated:

"Cities have the ability to provide something for everyone, just because, and only when, they are created for everyone."

This dichotomy would mark the future of the city of New York and would lay the foundations together with the ideas and currents of thought of other professionals (from Henry Lefevbre to Anna Bofill) of a new way of doing urbanism and of how cities and spaces built they can be generators of inequality.

This conflict is still present in society and in the different urban currents reflected in two ways of intervening in the inhabited space: large-scale urban plans, the dispersed city or office urbanism compared to the experimental actions of tactical urbanism, the near city or everyday city and participatory processes for common decision-making.

2. A NEW SPACE TO INHABIT: THE DIGITAL DIMENSION

With the arrival of the internet at the end of the 20th century, we began to inhabit both a physical space and a digital space and, as when we founded cities, we have had to organize and design the logics with which people want to interact digitally.

This organizational chaos of the abundance of data has been translated into a series of logics, rules and norms transcribed in what today we call algorithms. An algorithm is made up of a series of instructions or simple logical steps that are carried out to solve a problem. With it, the forms and rules with which we interact in the digital world are established and, as with the urban built environment, the digital space has an enormous and complex impact to quantify in our lives.

The American mathematician and activist Cathy O'Neil reflects these ideas very well in her TED talk entitled "The era of blind faith in big data must end", where she puts into crisis the social belief towards the objectivity and veracity of algorithms and its deliberate use as a marketing tool (TED Talks, 2017). So she adds that "algorithms are opinions that are embedded in code" and that can be used as an intimidation tool.

3. COMMON VIEWS AND CHALLENGES WHEN DESIGNING A HYBRID WORLD

At this point, we identify that the designed space (physical and digital) is not neutral and generates inequalities. In addition, the design is not impartial, but behind each design is a group of people subjectively shaping what the inhabited space will be like.

Thus, there are different views and biases inherent to our worldview through which these designs are traversed, in a chosen way or unconsciously. These views and biases are the result of the social determinants that cross and impact us directly and this correlation between the design of both worlds is increasingly present and subject to debate both by the professionals who design and by the users who travel them.

4. VIDEO GAMES AS A HYBRIDIZATION TOOL

At present it is interesting to observe the phenomenon of video games. A video game is made of code and, to date, the vast majority of them draw inspiration from the physical world to support their designs. That is why video games collect to a greater or lesser extent the problems and virtues of code design and urban design. From its use and access (unequal), to the intentional presence of values (positive or negative).

While it is true that historically many efforts have been made to introduce more realistic and dynamic cities in their designs, it is only a few years ago that the introduction of video games in the city has begun to be explored (COTEC, 2018). This round trip from the city to video games and, recently, from video games to the city, opens the doors of design to a new scenario: the real and conscious hybridization of both worlds.

This hybridization is currently possible, in part, thanks to the study of Smart Cities or the creation of technologies such as Augmented Reality (among other examples), but it would fail miserably replicating the same problems described at the beginning of this text, if it remained only in a technological gesture. At present and in the face of the ecosocial challenges we face as a civilization, the key lies in its implementation, putting people's lives and biodiversity at the center of design.

But in order to overcome the application of this technology in a sterile way and bearing in mind the social determinants that mark us as a society and as design professionals, this hybridization has a huge challenge ahead and an opportunity to build:

- Challenge: how can we minimize the inequalities that generate the bias with which we design?
- Opportunity: how can we contribute to build with our designs a better society that takes care of people and life on the planet?

5. VIDEO GAMES AND CITIES AS GLOBAL PHENOMENA

At this point, it is worth highlighting the global phenomenon in urban matters and in video games that we are witnessing:

- 40% of the world's population, or 3 billion people, play video games every day (AEVI-Asociación Española de Videojuegos).
- 55.7% of people currently live in cities. In addition, it is estimated that this percentage will grow to 70% by 2030 (Onu Habitat,2018).

On the one hand, video games have enormous potential to stimulate our creativity, improve our motivation or help us to commit ourselves in a different way to certain challenges that were previously difficult for us to achieve. In addition, video games are capable of uniting in the same space, time and place all the diversity of people, since regardless of who you are, what you are or where you come from, the important thing is how you play.

On the other hand, cities are spaces of inequity and it is in them where we will have to fight the battle for the sustainability of life in the face of current challenges such as climate change and inequalities (ecosocial crisis).

Technology, used from co-responsibility and with eco-social criteria, is presented as a great ally to combat the systemic crises that we face and videogames have proven to be the most successful link between the city and technology. In addition, both video games and cities are spaces for and for coexistence.

With these ideas, video games could play a fundamental role towards that very important ecosocial transition that we as a society have ahead of us to be able to inhabit and build cities and territories that they take care of.

6. A NEW KIND OF GAME: PLAYMAKING

Within the gamer world there are different types of games. From arcade-type games, through simulation games, to role-playing games (among others). In the same vein as previous reflections, game design has focused its efforts on how to introduce more real and dynamic cities within video games and is beginning to explore new ways of introducing video games in the city.

This hybridization between both worlds begins to be present in the ideas and reflections of some video game companies (Niantic or Geocaching) and urban planning studies (Play The City, Games for Cities or Espacio Lúdico), but the truth is that today it is a field entirely to be explored.

It is in this current context where a new type of game has a place that hybridizes not only the scene of the game (the city as a platform), but also its objectives: Playmaking.

Before explaining what Playmaking is, it is important to understand what Serious Games and Placemaking are.

Serious Games are games that have been designed for a purpose beyond just fun. They have become popular especially in environments such as education, health, or science and their purposes can be very varied. They are known because they help the people who play them to improve their commitment, make decisions in a much more efficient way, practice directly and without risks, facilitate learning, encourage creativity or improve the feeling of belonging to a community. In short, they are a fun and effective tool at the same time.

Placemaking is a design tool that helps us improve our territory, our city or our neighborhood through dynamics of citizen empowerment. It represents a change of approach in design because technicians take a secondary role and give that role of expertise to the community. Thus, it is understood that the community is the expert in its own territory, so that the technical teams have a facilitating role that encourages collaboration between the different social actors to discover what the needs and aspirations of these communities are. From here, a common vision of how that place should be is created and future conflicts are avoided because those decisions have matured together and mutual support networks have been created.

Playmaking is, therefore, the intersection between a way of doing urban planning, Placemaking, and a way of designing video games, Serious Games. We thus achieve a new way to improve our cities while having a good time, doing it in community and using the mechanical and dynamic techniques typical of video game design.

Figure 01. ¿What is Playmaking?

7. THE DIMENSIONS OF PLAYMAKING

Playmaking is made up of four dimensions: Territorial, Technological, Playful and Social.

Figure 02. The 4 dimensions of Playmaking.

These four dimensions already interact today, giving way to a series of practices both in the world of urban planning and in the world of video games. Next we are going to take a tour of all of them.

For example, the result of the interaction between Cities and Technology are technified cities. It should be noted that they do not represent the same as what is known as Smart Cities or Smart Citizens, which we will delve into later.

Figure 03. City + Technology: Technified Cities.

When we combine Technology and Fun we get the common video games.

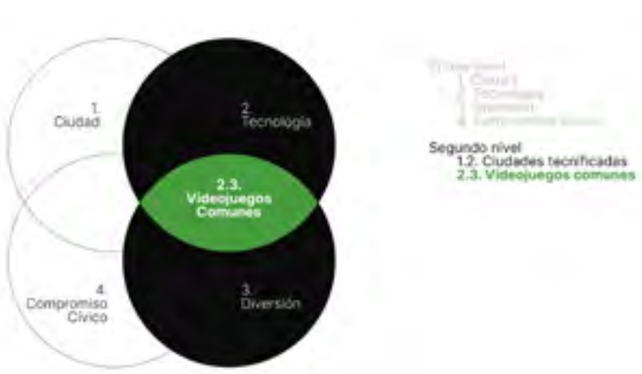

Figure 04. Technology + Fun: Common video games.

If we unite the sphere of Fun with the sphere of Commitment, we would find educational games.

Figure 05. Fun + Civic Commitment: Common Video Games.

In the union of Commitment and the City, we would find a space in which Participatory Processes or Placemaking as a design strategy could be mentioned as examples.

Figure 06. Civic Commitment + City: Participatory Processes.

In the same way, the interaction between the sphere of the City and of Fun would give way to design and Playgrounds or playgrounds in the public space.

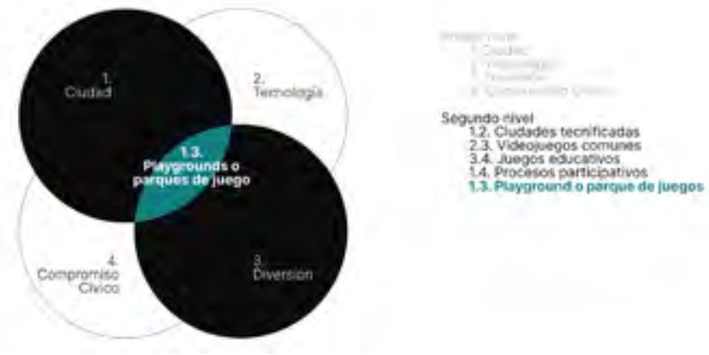

Figure 07. City + Fun: Playgrounds.

And finally, by mixing Commitment and Technology we would enter into Civic Data or Civic Data, which would basically represent the use of useful data in a public and open way to improve society.

Figure 08. Technology + Civic Commitment: Civic Data.

This is what happens when we mix two dimensions, but what would be the result of the interaction of three of them?

If we unite City, Technology and Fun we get Augmented Reality Games.

Figure 09. City + Technology + Fun: Augmented Reality.

If we combine Technology, Fun and Commitment, we get the Serious Games, named above.

Figure 10. Technology + Fun + Civic Commitment: Serious Games.

If we unite Fun, Commitment and City, we will have Playful Participatory Processes, such as the IAM Panel (Oficina..., 2019).

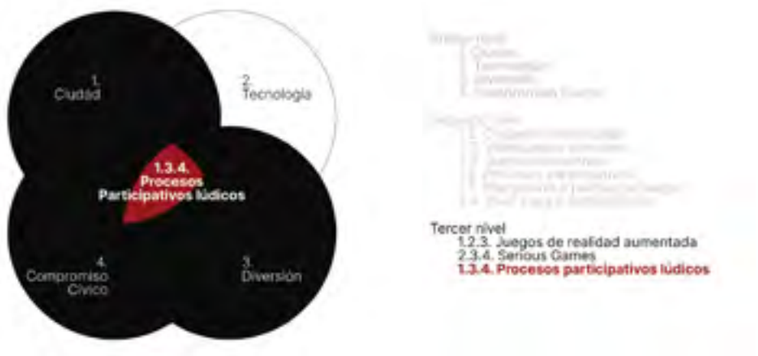

Figure 11. City + Fun + Civic Commitment: Playful Participatory Processes.

Finally, if we unite Commitment, City and Technology, we would be talking about Smart Cities and Smart Citizens, an emerging concept th98at promotes sustainable urban development from these three dimensions.

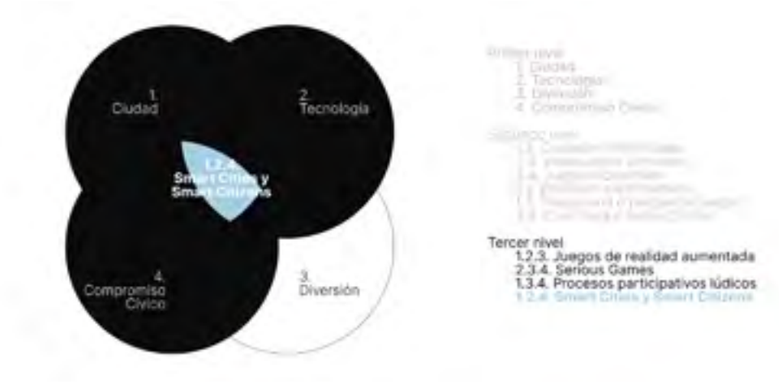

Figure 12. City + Technology + Civic Commitment: Smart Cities and Smart Citizens.

The Playmaking proposal is the interaction of the four dimensions presented, in the same space, time and place, and sharing a series of positive common principles and values for society.

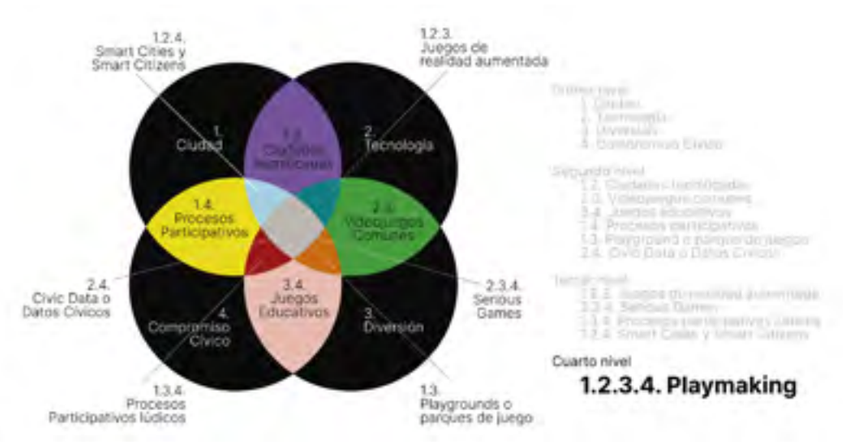

Figure 13. Intersections of playmaking dimensions.

8. SOME EXAMPLES OF PLAYMAKING

Currently there are already quite interesting examples of what Playmaking is, how it could be applied and what its potential is:

- The Fun Theory - Volkswagen (year 2009)

Advertising campaign where a series of experiments were carried out to try to demonstrate how fun can change our behavior for the better. They started by releasing 3 videos and then invited people through a contest to upload their ideas about how to use The Fun Theory to drive better behaviors and habits in people.

- Niantic social area

Niantic is the creator of games like Harry Potter, Ingress or Pokemon Go. They are games that have a large community of people who play daily and use public space thanks to the augmented reality technology that the game provides them through

mobile phones. What they have been doing for a long time is going one step further and starting to mobilize that community behind the game to carry out actions that contribute positively to society.

- Geocaching

Gymkhana-type game based on the activity of hiding and finding "treasures" anywhere with the help of the GPS that you carry in your mobile app. It is the community itself that makes the game, as long as a series of pre-established norms are respected. The treasures are called caches, and users are the ones who create and search for them. In addition, it is the community itself that validates the difficulty, status or fun of the cache.

These three examples have in common the search for empowerment of the communities that play them from which to work a greater social commitment without going against the game itself and without losing the fun.

With these examples we can see how the transformation power of Playmaking is immense and that the technology necessary for it already exists.

9. THE CITIZEN CARD

Within all the possibilities that are presented to us today, understanding the potential that Playmaking has, from the Office of Civic Innovation we are specifically investigating one: the implementation of a civic or citizen card as a platform or device from which to develop video games and improve city management.

In this sense, a citizen card could be the link between the mechanics of the game and the real rewards for having civic behaviors in the city, such as:

If you recycle you get points to be able to use public transport for free.
If you participate in community actions, you get rewards to access the theaters of the city
Etc.

It could host as many games as we want and the points or rewards would boost the motivation to build better cities.

10. CONCLUSIONS

We return here to the two questions that we asked ourselves in this research: one as a challenge and the other as a presumed opportunity.

Challenge: how can we minimize the inequalities that generate the bias with which we design?
Opportunity: how can we contribute to build with our designs a better society that takes care of people and life on the planet?

Regarding the challenge, a greater incidence in the training of future professionals and support in the understanding and visibility of these inequalities is necessary. Likewise, Playmaking should have a series of values and principles included in a code of ethics (as is already the case with other professions). Our designs directly affect people's lives and, if we ignore it, we could contribute to perpetuate or accentuate existing inequities in society, as well as other harmful aspects towards our environment.

Taking into account the opportunity that Playmaking presents us and recalling the two key data from research on the power of video games and the global growth of our cities, Playmaking can help us reduce the reproduction of inequalities, encourage people to have behaviors more civic and improve community cohesion or, in a simplified way, to enjoy public space by making responsible, positive and healthy use of it.

It will depend on us, the urban planners, the programmers or the gamers what we want to do with all this and where we want to lead creativity.

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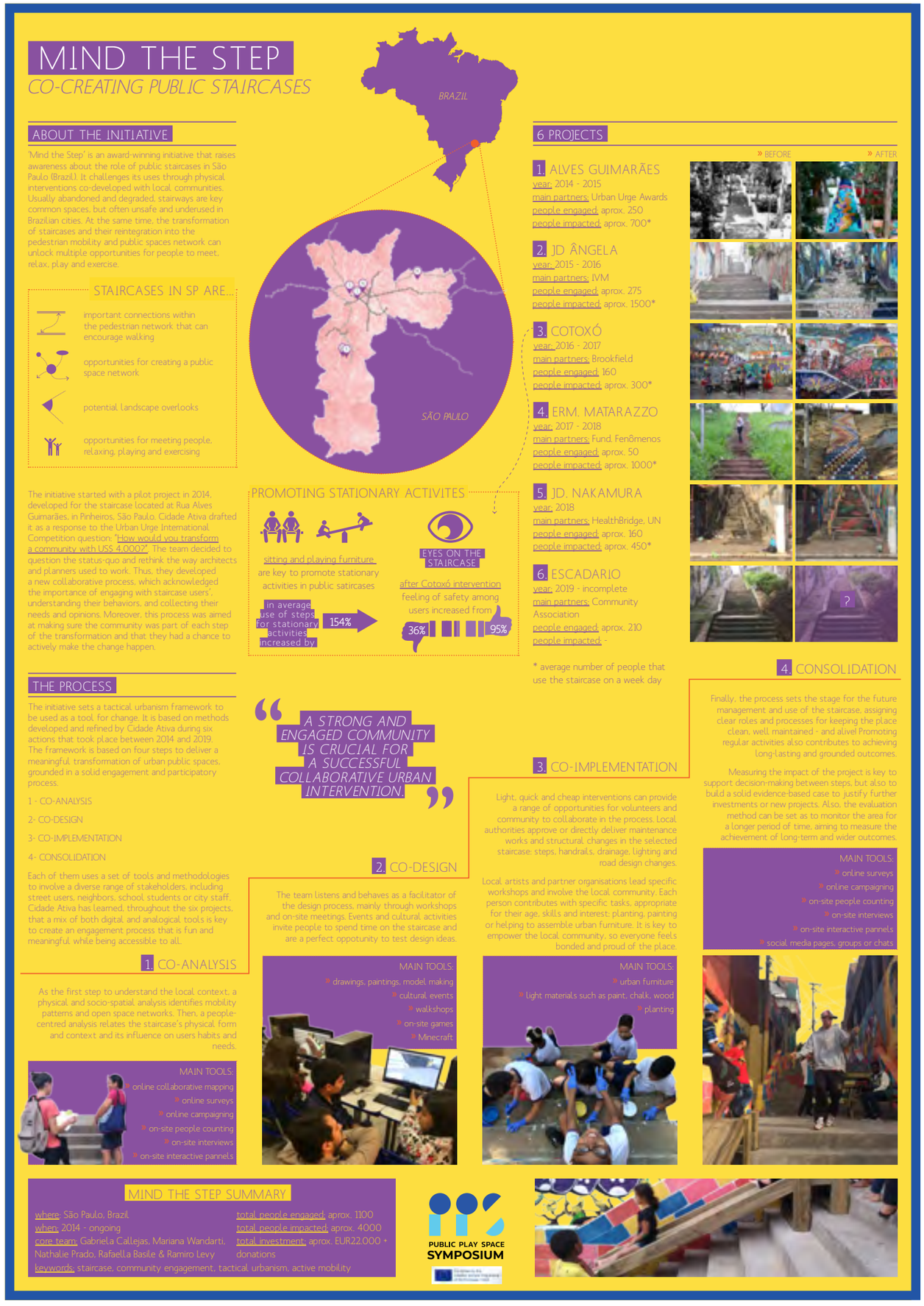
Mind The Step: Co-Creating Public Staircases

Brasil

Gabriela Callejas
Mariana Wandarti
Nathalie Prado
Rafaella Basile
Ramiro Levy
Cidade Ativa

ABSTRACT
"Mind the Step" is an award-winning initiative that raises awareness about the role of public staircases in São Paulo (Brazil). It challenges its uses through physical interventions co-developed with local communities. The initiative sets a tactical urbanism framework to be used as a tool for change. It is based on methods developed and refined by Cidade Ativa during six actions that took place between 2014 and 2019.

The process is based on four steps to deliver a meaningful transformation of urban public spaces, grounded in a solid engagement and participatory process: (i) co-analysis; (ii) co-design; (iii) co-implementation and; (iv) consolidation. Each of them uses a set of tools and methodologies to involve a diverse range of stakeholders, including street users, neighbors, school students or city staff. Cidade Ativa has learned, throughout the six projects, that a mix of both digital and analogical tools is key to create an engagement process that is fun and meaningful while being accessible to all.



Adaptive Furniture: Deep Learning In Human Activity Recognition (Har) To Promote Adaptability In Public Space Furniture

Hong Kong

Yu Hin Cheng
Tsz Fung Ngai

ABSTRACT

The research goal of this project is to merge digital technologies such as information technology and robotics to design transformative and interactive furniture. The objective is to let the installation adapt to the human movement without the necessity of letting humans control all the forms. Such that the system should be self-autonomous, human interference is kept at minimum.

Human activity recognition, or HAR, is a challenging time series classification task. It involves predicting the movement of a person based on sensor data and traditionally involves deep domain expertise and methods from signal processing to correctly engineer features from the raw data in order to fit a machine learning model. Two methods are used to capture the environment and people's movement. The Kinect is responsible for capturing the human's activities, and the lidar scanner is for the environment. This project aims to capture the human movement in social spaces, such as walkway, staircase, and park. Human activities such as resting, talking or eating are also captured. The Kinect scanner digitised human activities into Rhino and into skeletons.

Magic Garden: Children-Led Cocreation Of A Vertical Productive Garden

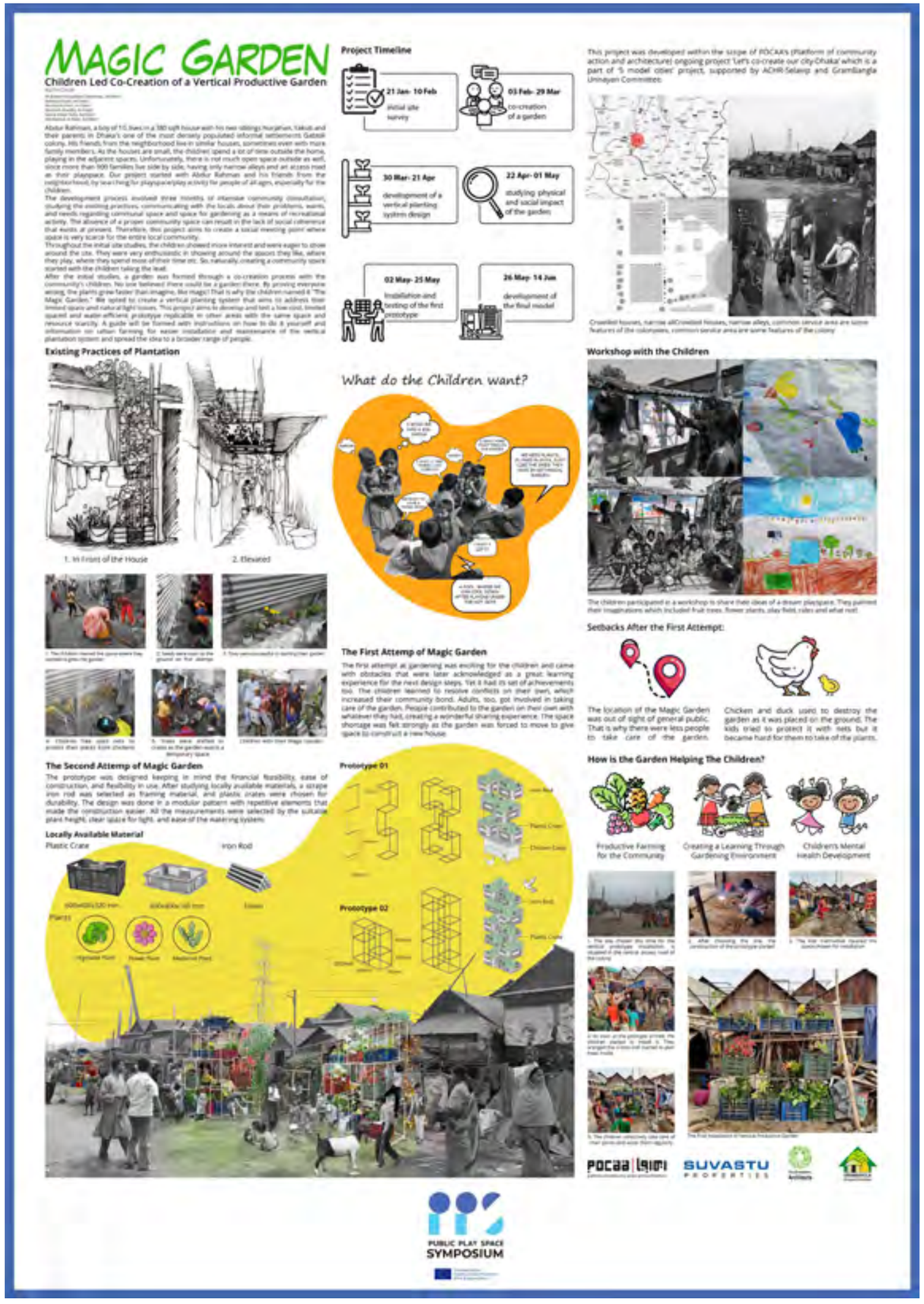
Bangladesh

Shahreen Mukashafat Semontee
Naheyan Islam
Mahmuda Alam
Nuuhash Akando
Samia Anwar Rafa
Md Mashuk Ul Alam
POCAA

ABSTRACT
Abdur Rahman, a boy of 10, lives in a 380 square feet house with his two siblings and parents in Dhaka's one of the most densely populated informal settlements, Gabtoli. His friends from the neighborhood live in similar houses, sometimes even with more people. As the houses are small, the children spend much time outside, playing in the adjacent spaces. Unfortunately, there is not much open space outside as well, since more than 900 families live side by side, having only narrow alleys and an access road as their playspace. Our project started with Abdur Rahman and his friends by searching for space to create a social meeting point for people of all ages, especially children.

The development process involved three months of community consultation, studying the existing practices, communicating about problems, aspirations, and needs regarding communal space. Throughout the initial site studies, the children were eager to show around the site. So, naturally, creating a community space started with the children taking the lead.

We opted to create a low-cost, limited spaced and water-efficient vertical planting system through a co-creation process that aims to address their limited space and natural light issues. A guide is being developed with instructions for easier installation and maintenance of the vertical plantation system on their own and spread the idea to a broader range of people.



Toolkit For Community Engagement With Delhi's Master Plan 2041

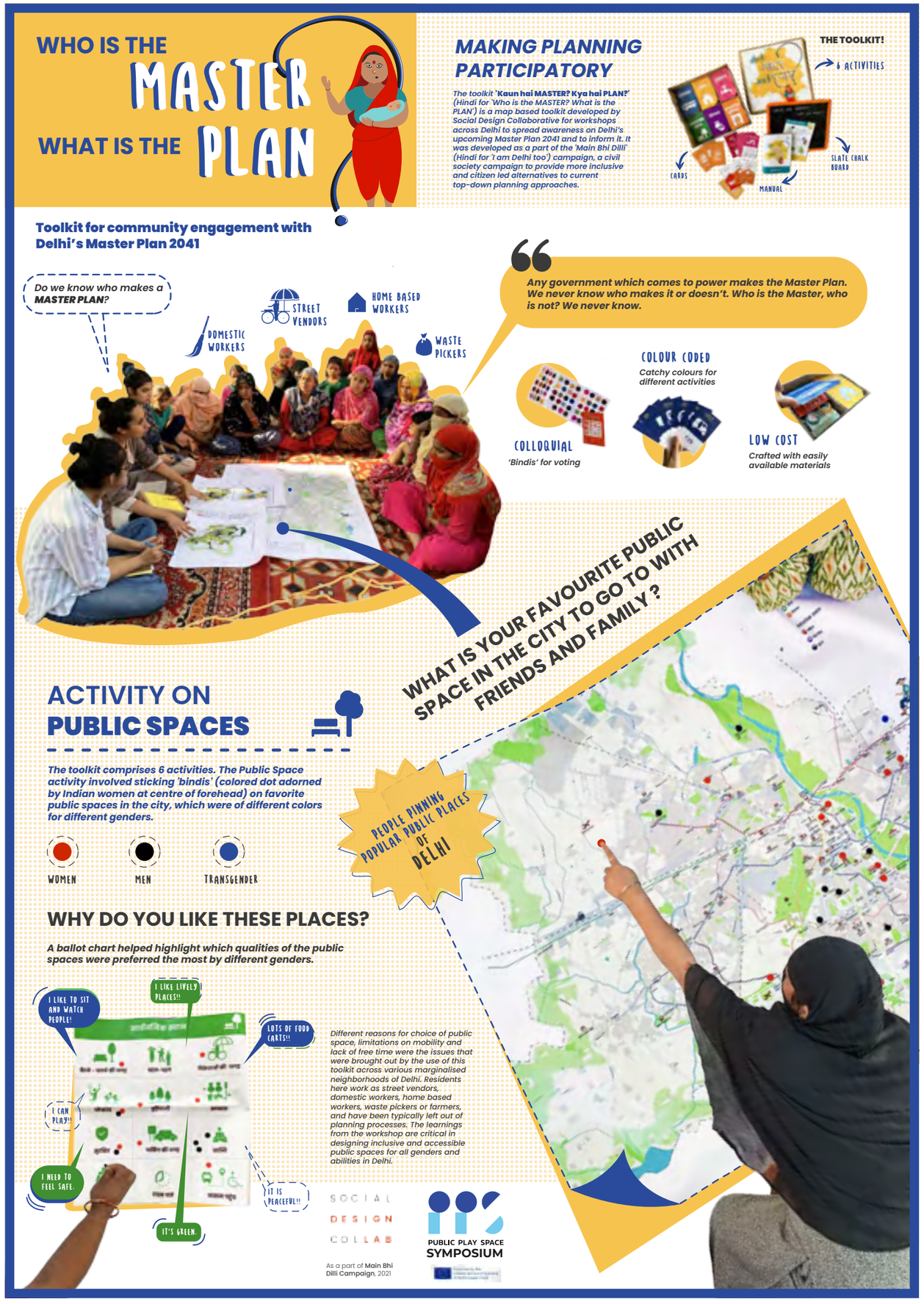
India

Swati Janu
Social Design Collaborative

ABSTRACT

'Kaun Hai Master? Kya Hain Plan' (Hindi for 'Who is the Master? What is the Plan?') is an interactive map based toolkit for community engagement. It was designed by Social Design Collaborative for workshops across Delhi to spread awareness on the city's latest Master Plan for 2041 and to help engage with it. Supported by SEWA Delhi, it was developed in early 2021 as a part of Main Bhi Dilli (Hindi for 'I am Delhi too') - a civic society campaign in Delhi to provide more inclusive and citizen-led alternatives to top-down planning processes.

It comprised 6 activities, of which the Public Space activity involved sticking 'bindis' (colored dots worn by many Indian women at centre of forehead) on favorite public spots on a map of the city, with different colors for different genders. Diverse perspectives and preferences, awareness on restrictions on mobility and lack of "free time" were some of the issues brought out through the workshops conducted in marginalised neighborhoods across Delhi. Residents here work as farmers, street vendors, waste pickers, domestic workers, home-based workers etc. The learnings have been critical for co-design of inclusive and accessible public spaces for all genders and abilities.



A New Theater Square For The Yak Community. Designing The Public Space Through Performative Activation In Varese

Italy

Anna Moro
Elena Acerbi
Matteo Pettinaroli
DAStU Politecnico di Milano

ABSTRACT

The regeneration of YAK square (De Salvo Square) is part of a two-years program which experiments an innovative way to merge a cultural program with public-space regeneration. Born at the intersection of the work of the cultural association Karakorum, based in north of Italy, and of some researchers from the Department of Architecture and Urban Studies - Politecnico di Milano, it aims to better connect Spazio Yak (a community driven theatre) with its neighbourhood, a fragile peripheral district in Varese where it was settled a few years ago.

The project develops an open and incremental methodology to achieve space improvement and community inclusion at the same time. It intends the transformation of urban space as a mean of integration between individual and collective well-being, gained through the use of existing resources and done in order to enhancing the appropriation of open space by engaged citizens. Graduality, test and redefinition and co-creation of shared tools define the methodology of the project. Organized in different phases (sensing, ignition, catalysis, consolidation, release), a rich program of artistic actions was promoted to re-imagine the public space around the theatre, the De Salvo Square in particular, now conceived as a “permeable” and recognizable place.

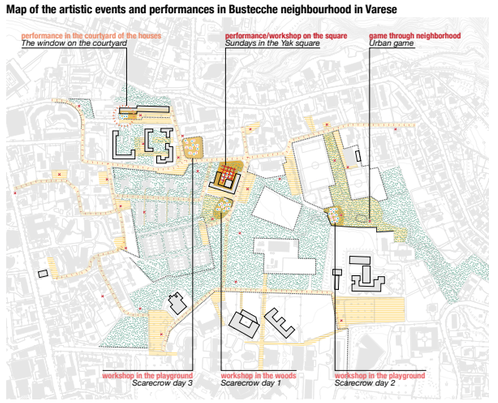
A new theater square for the Yak community. Designing the public space through performative activation in Varese

General project: **Yak Around. Theatre throug fragile spaces**
Location: Varese (Italy)
Year of realization: March 2020-ongoing
Author: **Anna Moro**, responsible, architect and urban planning researcher at DAStU Politecnico di Milano; **Elena Acerbi**, architect, expert in reaearch on public spaces and urban regeneration; **Matteo Pettinaroli**, architect specialized in co-design processes.
a project by: **Karakorum association**, in partnership with **Politecnico di Milano – DAStU (Department of Architecture and Urban Studies)**, **Municipality of Varese** and **B.Plano cooperative**.
Founded by: **Fondazione Cariplo**
website: https://www.karakorumteatro.it/yak-around/

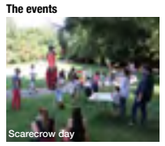
A Program about Action-Research within a fragile neighbourhood
The regeneration of YAK square (De Salvo Square) is part of a two years program which experiments an innovative way to merges a cultural program with urban public space regeneration. Born at the intersection of the work and reflection of the cultural association Karakorum, based in north of Italy (Varese), and some researchers from the Department of Architecture and Urban Studies of Politecnico di Milano, it aims to better connect Spazio Yak (a community driven theatre) with the Bustecche neighbourhood, a fragile peripheral district where it was settlend a few years ago.

Regeneration through culture and perfeormances
In the first period from its arrival in the site, the Karakorum company, despite its success upon a wider public and a broader context, was not able to tackle the involvement and interest of the settled community. The project answer to this problem through the application, declined as a cultural/artistic program, of an open and incremental methodology developed by the university researchers, to achieve space improvement and community inclusion at the same time.

Map of the artistic events and performances in Bustecche neighbourhood in Varese



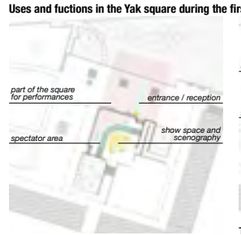
The events


Scarecrow day

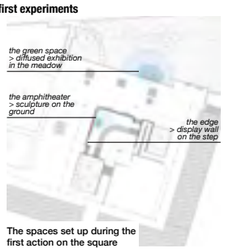

The window on the courtyard


Urban game

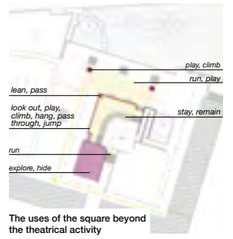
Uses and fuctions in the Yak square during the first experiments



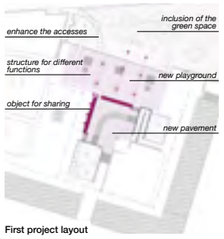
The uses of the square for the performances



The spaces set up during the first action on the square



The uses of the square beyond the theatrical activity



First project layout

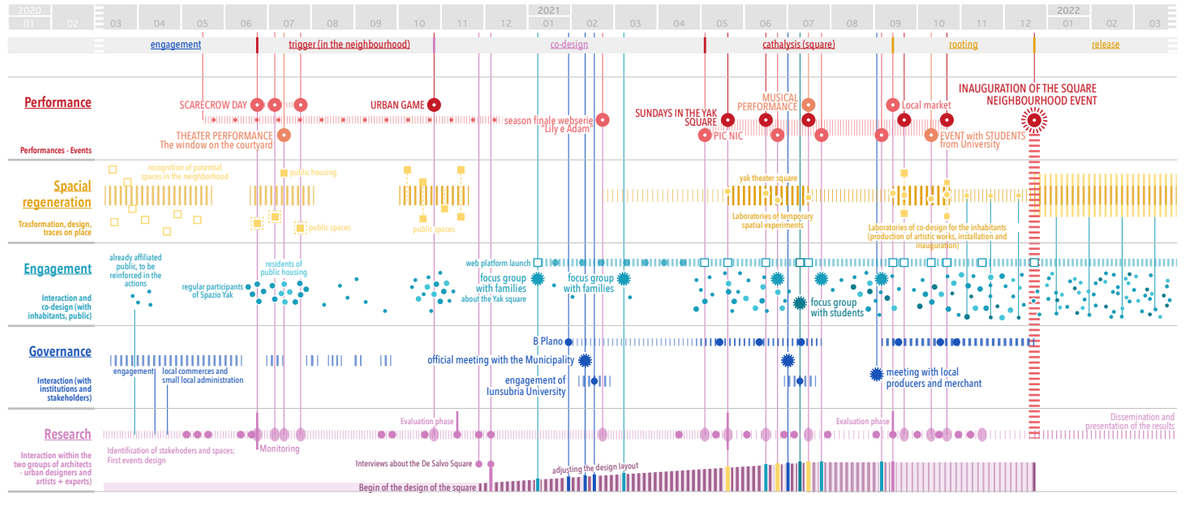

Sundays in the Yak square

The incremental design of the square

Application of an place-based incremental methodology
The program follows an overall methodology, the “Playtime concept”(1), for the transformation of urban space at the integration between individual and collective well-being, through the use of existing resources, enhancing the appropriation of open space by engaged communities, developed by a DAStU-PoliMi group of research. Graduality, test and redefinition, co-creation of shared tools are the main features of the project. Organized in different phases (sensing, ignition, catalysis, consolidation, release), a rich program of artistic actions was promoted to re-imagine the public space around the theatre, the De Salvo Square in particular, now conceived as a “permeable” place.

(1) Moro A. et al. 2020. *Playtime. An action framework for public space in fragile urban contexts:* https://www.architetti.com/wp-content/uploads/2019/07/Playtime-ENG.pdf

Process timeline



Outside / Inside the theater space
On the one hand, Spazio Yak went beyond the boundaries of its walls, in people’s daily lives, staging shows in the courtyards of public housing and under the balconies, transforming the neighbourhood into a tableau for urban games, or sharing music and lunches with the neighbours. On the other hand, it has allowed the public to have an active role rethinking the space of the theatre together.

An engaged community through artistic actions and co-design
Spazio Yak has managing to improve its role in the community by many point of views: through YAK AROUND project is today contaminating and regenerating public spaces and community life thanks to artistic performances. In addition to the material effects on space, Spazio Yak and the Yak square are also becoming a shared and participatory platform for its public, thanks to the development of innovative mixed, in presence/on-line, co-creation activities during the Pandemic.

Scenarios for interaction and design of the Yak square

PUBLIC PLAY SPACE SYMPOSIUM

En Mitjons A La Plaça: Collaborative Action For Urban Regeneration

Spain

Roger Paez
Manuela Valtchanova
Toni Montes
Rodrigo Aguirre
ELISAVA Barcelona School of Design and Engineering

ABSTRACT

En Mitjons a la Plaça (On the Square in Socks) is a collaborative action that is integrated within the framework of a research project commissioned by the Sant Boi City Council and “la Caixa” Foundation. The project consists in studying the potential of Plaça de la Generalitat square to become the engine for urban regeneration of the Marianao neighbourhood, and in understanding the reasons why this square does not work. The main design strategy aims to propose site-specific actions with potential to reverse the current dynamics, applying the logics of ephemeral architecture practices. One of the main conclusions of the study is that the neighbours have, in their greatest majority, a negative perception of this space, despite the good conditions of the square to become the central public space of the neighbourhood. On the Square in Socks is a collaborative action that aims to promote a collective, celebrative and cathartic experience which helps to build a new positive collective imagery of the place. An act of reappropriation of the public space by the neighbours themselves. The action comprises the Christmas decoration of the square through a network of light garlands made out of socks, each one of which personalized by a resident of the neighbourhood. Almost 1,000 children and adolescents and 24 entities among schools, associations and foundations of the neighbourhood were involved throughout the whole process of the development of the project.

EN MITJONS A LA PLAÇA*
collaborative action for urban regeneration

Co-created temporay intervention in Plaça de la Generalitat, Marianao, Sant Boi de Llobregat

part of the research project:
civic placemaking I: design, public space and social cohension.
Roger Paez, Manuela Valtchanova, Toni Montes, Rodrigo Aguirre | ELISAVA Research

ephemeral architecture and social purpose ELISAVA Barcelona School of Design and Engineering

On the Square in Socks

This is a collaborative action that is integrated within the framework of a research project commissioned by the local government of Sant Boi and “la Caixa” Banking Foundation. The project consists in studying the potential of Plaça de la Generalitat square to become the engine for urban regeneration of the Marianao neighbourhood, and in understanding the reasons why this square does not work. The main design strategy aims to propose site-specific actions with potential to reverse the current dynamics, applying the logics of ephemeral architecture practices.

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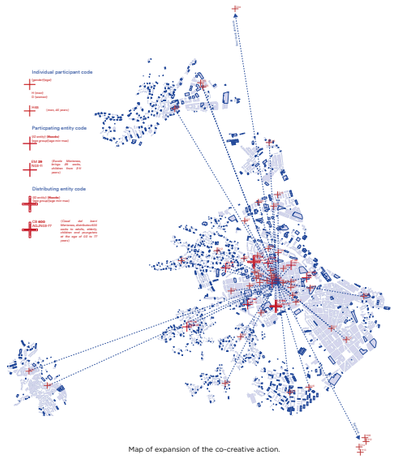


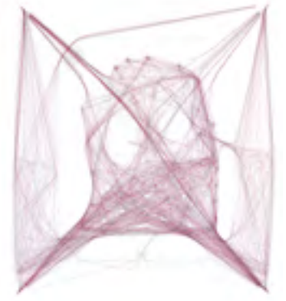
Map of expansion of the co-creative action.




Study of fluxes and clusuters of appropriation.


Proposal for a network of lights/socks.


Simulation study of illumination values.


Simulation of the expected fluxes.




PUBLIC PLAY SPACE SYMPOSIUM

Piecing Change In A Global Pandemic: A Participatory Geodesign Mapping Method For Urban Communities In Rio Piedras, Puerto Rico

Puerto Rico

Pamela Silva-Díaz
Mónica Ponce-Caballero
Julio C. Verdejo-Ortiz
PamLab Design and Engineering

ABSTRACT

The COVID-19 pandemic presented an array of challenges to community-based and participatory planning projects, as traditional methodologies tend to require gatherings and sharing of supplies. Additionally, experience shows that community members often face challenges with geo-spatial orientation when using two-dimensional maps in participatory mapping workshops. Understanding these challenges, the project team created an original methodology for a participatory geo-design project with low-income urban communities of Río Piedras, Puerto Rico. A socially distanced data collection process was strategically designed, and a "gamification" approach to community mapping was taken. A three-dimensional model, made of plastic building blocks ("Lego" toy bricks) was created to provide an intuitive representation of the participants' communities and to allow an interactive experience with modular and stackable pieces, while enabling ease of disinfection, disassembly and re-use.The researchers analyzed data from interactions with 165 participants, and found that the residents' most common concerns were associated with lack of cleanliness of public spaces, safety, and the impacts of abandoned houses and buildings. We believe the methodology is promising for future projects, as most participants expressed that they were able to adequately orient themselves geo-spatially and showed pride in seeing their community represented in a three dimensional model.

Piecing change in a global pandemic:
A participatory geodesign mapping method for urban communities in Río Piedras, Puerto Rico

Pamela Silva-Díaz[a], Mónica Ponce-Caballero[b], Julio C. Verdejo-Ortiz[c*]
[a] PamLab Design and Engineering, San Juan, PR; [b] University of Puerto Rico - Río Piedras, CAUCE Center, San Juan, PR;
[c] Coded S+P, San Juan, PR; *Corresponding author: jcverdejo@codedsandp.com

Key words: Community mapping, Participatory planning, Covid-19 innovation, Gamification, Geodesign
This project was developed during 2020 for the Río Piedras Community Board with grant funding from Hispanic Federation.

Achieving community engagement, mapping and innovation in a Covid-19 context

The COVID-19 pandemic presented various challenges to community-based and participatory planning projects. More conventional methodologies, such as mapping workshops, tend to require group gatherings, sharing materials and supplies, and virtual events are often not accessible to residents with low technological literacy or access. Additionally, the authors' experience with community mapping processes has shown that frequently, community members face challenges with geo-spatial orientation when using two-dimensional maps. Thus, the project team created an original methodology that addresses these challenges

for a participatory geodesign project with low-income urban communities of Río Piedras, Puerto Rico. This project, undertaken in neighborhoods experiencing urban and economic decline, aimed to engage community members inclusively and identify their community improvement and planning priorities.

Methodology: Data collection process and interactive three-dimensional map

In order to safely gather input from community members, a socially distanced data collection process was designed, upholding the necessary safety protocols. Participants were invited to an open-air area keeping close attention to avoid gatherings. Personal protective equipment and hand sanitation liquid was provided to all. In four data collection stations, facilitators gathered data from individual participants through cloud-based surveys on handheld mobile devices.

Design thinking as a problem-solving methodology was implemented to address these challenges, focusing on a "gamification" approach and a three-dimensional model to provide a more intuitive representation of the participants' neighborhoods. Built from plastic building blocks ("Lego" bricks), the model could be disassembled and reused for different community interactions. More importantly, these modular blocks were also selected due to their durability and impermeability, as they can be frequently and easily disinfected, especially between participant interactions, without damaging the pieces. The three-dimensional model included representations of community streets, buildings, public squares, green spaces, among other geographical elements. It also included 'flags' and photos identifying key sites and locations. Participants were asked to identify spaces within their community that required change and spaces that add value to the community and should be strengthened, supported, or not changed in future planning processes. The facilitator marked these locations with color-coded pieces that could be stacked on top of each other if repeated. The three-dimensional community map became a

representation of locations that required urgent attention (yellow and red pieces or "towers") and valuable community locations (green pieces or "towers"). Residents' detailed comments were captured and analyzed separately.

PUBLIC PLAY SPACE SYMPOSIUM

Results and Conclusions

A total of 165 participants from 5 different communities participated in the geodesign prioritization process from November to December 2020. Data revealed that the residents' most common challenges were waste disposal, illegal dumping activities, and the municipal government's lack of maintenance of public spaces. These were followed by perceptions of lack of safety due to reduced police patrolling and inadequate streetlight infrastructure. Participants mentioned another problem most commonly associated with urban decline, abandoned houses

and buildings. The collection of this data becomes a representation of areas of high concern where change is needed or points or high-value or appreciated areas where close attention is needed before proposals for change are presented. Each participant completed an evaluation survey after the interaction. Feedback from participants was used throughout different iterations to improve the interactive process and the three-dimensional mapping tool. Most participants expressed that they could adequately orient themselves using the three-dimensional tool and stated that reference photos and facilitator guidance highly contributed to their geospatial orientation. Furthermore, several participants expressed pride and enthusiasm for seeing their community represented in a detailed three-dimensional model.

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The recordings from the Symposium can be found online on the Public Play Space website:

https://www.publicplayspace.eu/symposium/

PUBLIC PLAY SPACE

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